Board Staff Interrogatory #89

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
Ref: Exh F2-2-1 page 1 and Table 1

The evidence states that, “Base OM&A provides the main source of funding for operating and maintaining the nuclear stations in support of: the ongoing production of electricity from the operating nuclear units; ensuring the safe operation of the plants; improving the reliability of the nuclear assets, and ensuring compliance with applicable legislation and nuclear regulatory requirements.”

Table 1 sets out base OM&A by stations and by support. The 2015 actual base OM&A for the Darlington station was $298.9M. The average base OM&A for Darlington for the 2017-2021 test period is $314.92M. Please explain why the base OM&A for Darlington in the test period, when there are three operational units (and only two in 2021), is higher than the 2015 actual base OM&A when there were four operational units.

Response

Darlington’s base OM&A in the test period is higher than 2015 actual, despite differences in the number of operational units, for two primary reasons.

First, the majority of base OM&A costs associated with operating a four unit station remains in place during refurbishment, as discussed at Ex. L-6.1-2 AMPCO-92.

Second, base OM&A increases over this period due to labour escalation reflecting collective agreement provisions.
Board Staff Interrogatory #90

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Reference:
Ref: Exh F2-1-1 Attachment 1 page 4 and Table 1
At page 4, it states that Decommissioning and Nuclear Waste Management is accountable for the safe and cost effective shutdown and safe storage of Pickering and the strategic aspect of Pickering end of commercial operations.

Is the Decommissioning & Nuclear Waste Management budget for the test period at line 12 of Table 1 reflective of Pickering 2020 shutdown or Pickering 2022/2024 shutdown?

Response
The correct reference is to Ex. F2-2-1, Attachment 1, p. 4 and Ex. F2-2-1 Table 1.

All base Operations, Maintenance and Administration Costs (OM&A) for the test period (Ex. F2-2-1 Table 1), including Decommissioning & Nuclear Waste Management at line 12, is reflective of a Pickering 2022/2024 shutdown.
Board Staff Interrogatory #91

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
Ref: Exh F2-2-1 page 2
Ref: Exh F2-1-1 page 21

a) Nuclear base OM&A includes an inventory obsolescence provision. Please provide the reasons for inventory obsolescence and the cost in each year of the historical and forecast period.

b) When was the inventory reduction initiative introduced?

c) OPG states that “An Inventory Management Organization will be established for each [nuclear] station.” Will that organization be staffed with existing staff? If not, how many new FTE are forecast and what is the forecast cost?

Response

a) Reasons for inventory obsolescence are:

i. to address inventory which has been de-valued due to shelf-life expiry and subsequent disposal, and inventory losses identified through the cycle count or physical verification process.

ii. to recognize the unique nature of the majority of nuclear materials, and their limited use outside of OPG, by allocating (depreciating) the expected residual inventory value at end of station life over the remaining station life. This provision also addresses the cost impact of technical obsolescence, due to design changes or other technical factors that would preclude inventory use within the stations.

The cost of the inventory obsolescence provision in each year of the historical and forecast period is shown in Chart 1 below.
b) The inventory reduction initiative was introduced in the 2016-2018 Business Plan (Ex. A2-2-1 Attachment 1).

c) Yes, the accountability for the Inventory Management Organization was accommodated within the existing resources from finance, supply chain, engineering, and each station.

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Board Staff Interrogatory #92

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
Ref: Exh F2-3-3 Attachment 1 Tab 2 Ref: EB-2010-0008 Exh L-6.3-Staff-52
This BCS relates to the Fuel Channel Life Management (FCLM) Project (OM&A - Project # 10-62444) and the Annulus Spacer Retrieval Tool (ASRT) Project (Capital - Project # 28-66567). The BCS identifies a close-out date of June 2015 for the FCLM project and December 2012 for the ASRT project. The total FCLM project cost in the first partial-release BCS dated 2009-08-10 was estimated to be $24.92M.

Appendix B (Comparison of Total Project Estimates) on page 19 of the BCS estimates the total FCLM project cost now at $54.05M. A Project Variance Analysis is provided on page 20 of the BCS. In its response to OEB Staff Interrogatory #052 submitted as part of EB-2010-0008, OPG explained the basis of the cost sharing ratio of 5.5:3.5 (OPG:Bruce Power) for the FCLM project.

a) Assuming close-out of the project by June 2015, what was the final total project cost?

b) What was OPG’s share of the total project cost and was it consistent with the cost sharing ratio of 5.5:3.5 between OPG and Bruce Power? If not, please explain why not.

Response

a) The full release of $54.0M for project #10-62444 Fuel Channel Life Management, reflects OPG’s portion of the total project. The project close out date was June 2016 and OPG’s portion of the total project cost was $49.5M.

b) The cost sharing arrangement was consistent with the cost sharing ratio previously reported in response to L-6.3-1 Staff-52 submitted as part of EB-2010-0008.
Board Staff Interrogatory #93

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
Ref: Exh F2-3-3 Attachment 1 Tab 4
This BCS relates to the Fuel Channel Life Extension (FCLE) Project (Project # 10- 80014). The BCS is identical to the BCS previously filed under EB-2013-0321 (Exh F2- 3-3, Attachment 1, Tab 11). The BCS is a partial-release BCS, approved on 2013-11-11, to fund Phase 1 of the FCLE project during 2014 and 2015. The BCS states that another CANDU operator will co-fund the R&D effort at 50% (page 3).

a) Please provide an update on the project schedule and cost including whether Phase 1 was completed and whether the estimated total project cost, including the non-OPG CANDU operator’s share, is still $105.8M including contingency.

b) It is noted that OPG received Canadian Nuclear Safety Commission (CNSC) approval in November 2015 to operate the Darlington units up to the proposed refurbishment outages, to a maximum of 235,000 EFPH (Equivalent Full Power Hours). Please confirm that the idle time (estimated at 57 months) on the last 3 Darlington units to be refurbished (refer to Figure 1 of BCS, page 2) has been eliminated.

c) What is the status of the project’s objective and/or confidence level to achieve fuel channel fitness-for-service of at least 261,000 EFPH for Pickering?

Response

a) In the partial release approved on November 11, 2013, OPG estimated the total project cost inclusive of industry shared work to be $105.8M with OPG’s costs estimated at $67.4M. OPG’s cost of $67.4M can be divided into two distinct scopes of work: OPG-specific work and industry-shared R&D work. The $67.4M estimate was based on best available information and prior to partnership arrangements being finalized for the shared scope of work.

OPG’s current best estimate of the total project cost (inclusive of industry shared work) is $97M (including contingency), with OPG’s share being $69.3M (see L-6.1-1 Staff-93 Attachment 1 which includes confidential content as marked). This revised total project cost does not include industry partner internal costs, which are not available to OPG.

Witness Panel: Nuclear Operations and Projects
As noted, a component of OPG’s share of $69.3M includes industry shared R&D work. Partnership agreements are now in place for the industry-shared scope of R&D work and OPG’s share for this portion of work is 47.5%.

Significant testing has been completed with respect to Burst Tests, pressure tube fracture toughness testing, material property testing of pressure tubes, fatigue crack initiation testing, crush and fatigue testing of Darlington spacers etc. Phase I work is scheduled to be completed in 2017 with project completion expected in 2020.

b) Confirmed. The idle time that was estimated on the last three Darlington units to be refurbished (see L-6.1-1 Staff-93 Attachment 1, p. 2, Figure 1) has been eliminated.

c) OPG is highly confident of continued safe operation of Pickering fuel channels for operation to the target service life of December 2020 based on its ongoing assessment of fuel channel fitness for service and interactions with CNSC staff.
To be used for investments/projects meeting Type 3 criteria in OPG-STD-0076.

Executive Summary and Recommendations

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Project Overview

DECISION REQUIRED

The purpose of this submission is to request Board of Directors approval of the full execution release (Gate 3) of the Fuel Channel Life Extension Project in the amount of $28.1 million, for a total release of $69.3 million (including ___________ contingency).

ISSUE

The project was first approved in 2013 for $105.8 million based on a Class 4 estimate (+50%, -15%). The project is now estimated at $69.3 million (including ___________ ) based on a Class 3 estimate (+20%, -15%). Board of Directors approval is required for projects exceeding $40 million.

ANALYSIS

OPG needs to continually update its assessments of degradation mechanisms on fuel channel components. These degradation mechanisms impact OPG's ability to demonstrate fitness-for-service of the units and continue to operate these units to planned end of life.

Understanding of fuel channel component degradation mechanisms has been improved by the research and development work and technical assessments co-ordinated under the completed Fuel Channel Life Management Project. Plans, tools, and methodologies were developed for assessing technical confidence in the fitness-for-service of Darlington pressure tubes to 210,000 effective full power hours and Pickering to 247,000 effective full power hours.

There is economic value in increasing the effective full power hour limits for both Darlington and Pickering. Darlington refurbishment requires that the three units with overlapping outages operate up to approximately 235,000 effective full power hours. Extended operation of all Pickering units to year end 2020 would require operation life of 261,000 effective full power hours. A separate project – Pickering Fuel Channel Life Assurance – is in progress to extend the life of the Pickering fuel channels to 2024.

The project objective is to issue Technical Confidence Statements on fuel channel fitness-for-service to 235,000 and 261,000 effective full power hours for Darlington and Pickering units respectively. The Confidence Statements will be based on the results on a number of research and development topics that have direct impacts on constituent parts of fitness-for-service statements.

The $36.5 million reduction in the cost of the project is driven primarily by Bruce Power co-funding of the project and reduced contingency ___________ offset by increases due to scope changes ($0.8 million) and vendor cost increases ($7.8 million). While the contingency is reduced due to the retirement of two risks, the remaining contingency is comparatively high for a Class 3 estimate due to a newly identified risk.

The original estimate of $105.8 million (including ___________ ) was based upon OPG funding the full extent of the research and development project managed by the CANDU Owners Group. Following the approval in 2013, Bruce Power agreed to co-fund of the programme, thereby reducing OPG’s investment.

*Associated with OPG-STD-0076, Developing and Documenting Business Cases*
Project Overview

Specific contingency for acquisition of non-OPG ex-service pressure tubes and cost escalation at Canadian Nuclear Laboratories have been eliminated with the retirement of those risks. These reductions are offset by a small increase in general contingency and a new specific contingency for co-funding risk.

Bruce Power reviews the value and continued funding of CANDU Owners Group projects annually. Since there is no guarantee that the later years of the project will be funded, specific contingency, requiring Chief Nuclear Officer approval for use, has been set aside to ensure the project is completed.

The cost increase in scope is due to work on crack initiation recommended by an expert panel ($4.2 million) offset by a reduction in the number of pressure tube burst tests ($3.4 million).

Vendor cost increases are driven by research & development technical issues ($2.3 million) and under-estimation of costs ($5.5 million).

The end of the project is extended by 2.5 years in order to complete work that was deferred by the CANDU Owners Group and to allow more time for project close-out activities after the completion of research and development activities.

RECOMMENDATION / RESOLUTION

That the Board of Directors approve the release of an additional $28.1 million for a full execution release of $69.3 million (including contingency) for the Fuel Channel Life Extension Project.

Figure 1 shows the additional life which would be enabled by extending high confidence in the Darlington fuel channels fitness-for-service from 210k EFPH to 235k EFPH. The idle time avoided on the last 2 Darlington units to be refurbished is estimated at 50 months.

Figure 1: Impact of Fuel Channel Life Extension on Operating Times for Darlington

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Life to 210k EFPH
Idle Time eliminated at 235k EFPH

The value to the electricity system if the FCLE Project is pursued and successfully achieves high confidence in fitness-for-service of the fuel channels to 261k EFPH at Pickering and to 235k EFPH at Darlington is estimated at $0.7B (PV 2016$). The value arises from enabling the elimination of approximately 50 months of idle time on the Darlington units, which would occur if the planned refurbishment schedules is implemented, but fitness-for-service of the fuel channels beyond 210k EFPH were not achieved.
Project Cash Flows, NPV, and OAR Approval Amount

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**Estimate Class:** Class 3  
**Estimate at Completion:**  
**NPV:** $700M  
**OAR Approval Amount:** $189.6M

Additional Information on Project Cash Flows (optional):
Project Cash Flows, Estimate at Completion, and OAR approval amount show in the table above assures co-funding by any other party. The Estimate at Completion does not include contingency of [redacted].

Ongoing Costs are composed of Consequential costs and contingency Single Fuel Channel Replacements (SFCR):

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<th>To Enable 225k EFPH for Darlington</th>
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*Consequential costs are composed of: material surveillance of pressure tubes and spacers beyond P1671 SFCR, Incremental station OM&A for fuel channel inspection and maintenance, incremental major components (Steam Generators) life cycle management costs, spacer material and ex-service spacer irradiation in High Flux Isotope Reactor, and potential additional burst tests to improve fracture toughness models at Heq<120PPM.

Note: This BCS assumes that OPG's partners in JP #4491 continue to co-fund the R&D effort at their current contribution levels. This assumption is based on COG JP #4491 partner approvals.

**Approvals**

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<th>Comments</th>
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| [Signature] | The recommended alternative, including the identified ongoing costs, if any, represents the best option to meet the validated business need.  
**Recommended by (Project Sponsor):**  
Glenn Jager,  
President, OPG Nuclear and CNO  
27 July 2016 |
| [Signature] | I concur with the business decision as documented in this BCS.  
**Finance Approval:**  
Ken Hartwick,  
SVP & Chief Financial Officer per OPG-STD-0076  
[Signature] | 29 Feb 2016 |
| [Signature] | I confirm that this project, including the identified ongoing costs, if any, will address the business need, is of sufficient priority to proceed, and provides value for money.  
**Approved by:**  
Jeffrey Lyash,  
President & Chief Executive Officer per OAR 1.11.11.1  
Business Case Summary

Part A: Business Need

As Darlington and Pickering reactors age, OPG needs to continually update its assessments of degradation mechanisms on fuel channel components. These degradation mechanisms may impact OPG's ability to demonstrate fitness-for-service of the units and, consequently, the success of continuing to operate these units to planned end of life (EOL).

Major degradation mechanisms can be categorized as follows:

1. Effect of Hydrogen/Deuterium ingress on pressure tube fracture toughness and impact on various fuel channel fitness for service assessments.
2. Pressure tube crack initiation by delayed hydride cracking (DHC), fatigue, or hydride region overload.
3. Mobility and integrity of annulus spacers, which carry pressure tube loads and prevent pressure tube/calandria tube contact.

Significant research and development (R&D) as well as improved assessment methodologies (e.g., Probabilistic Core Assessment (PCA), Probabilistic Leak Before Break (PLBB) assessment, and Probabilistic Fracture Protection assessment) are required, to provide OPG with assurance that fuel channels will remain fit-for-service to the end of unit targeted service lives.

R&D work and technical assessments co-ordinated under the Fuel Channel Life Management Project (FCLM 10-62444), have improved the understanding of degradation mechanisms behind the aging of fuel channel components. Under this project, high confidence has been established in the fitness-for-service of Pickering fuel channels to operate to 247k EFPH. Together with the required R&D, inspection and maintenance activities, this enables continued operation of Pickering Units (EOL 2018-2020).

The FCLM project is now complete. The project results have established plans, tools, and methodologies to analyze inspection and surveillance data for assessing technical confidence in the fitness-for-service of Darlington pressure tubes to 210k EFPH and Pickering to 247k EFPH. A Long Term Darlington Life Management Plan for Inconel X-750 Annulus Spacers [1] was also prepared under the FCLM. This plan describes the fuel channel inspection and spacer R&D and material surveillance activities required to assess fitness-for-service of Darlington spacers and ensure that they remain fit-for-service to EFPH end of life target. This plan has been submitted to and accepted by the CNSC and is now included in the Darlington License Condition Handbook.

Economic value exists in OPG's ability to increase operational flexibility with respect to the sequencing and timing for the refurbishment of Darlington units. For example, unit refurbishment with no overlap between the first (D2) and second (D3) unit refurbishment outage requires the remaining three units (with overlaps of their refurbishment outages) to operate up to and beyond 210k EFPH. This would require demonstrating the capability of the last unit scheduled for refurbishment to be able to operate safely to approximately 235k EFPH. There is also economic value in the extended operation of Pickering units to beyond 247k EFPH. For example, extended operation of all Pickering units to year end 2020 would require operation life of 261k EFPH. This increased operational flexibility or opportunity for additional economic value is offset to some extent by the cost risk of R&D activities.

Technical confidence in fuel channel fitness-for-service for Pickering and Darlington units to their end of life EFPH targets is required to mitigate business planning and regulatory risk. Technical confidence statements need to be based on the R&D results on a number of research topics that have direct impacts on the constituent elements of fitness-for-service statements.

BUSINESS COMMITMENTS NOT INCLUDED IN THE PROJECT:

OPG has the following commitments related to fuel channel component life cycle management beyond the FCLE project scope. These costs have been included in the economic assessment of this business case.

1. PT and Spacer Material Surveillance:
   2 SFCRs are planned (P1951 and D1711 outages). The pressure tubes will be subjected to the material surveillance testing required by CSA N285.4. The conceptual cost for these activities is $12 M.

2. Incremental Station OM&A Costs for Fuel Channel Inspection and Maintenance
   Includes 1 SFCR (P1951), 2 SLAR campaigns (P1751 and P1761), 1 PT-CT Gap inspection (P1961), Scrapping sampling (P1961), for total estimated cost of $19 M.

*Associated with OPG-STD-0076, Developing and Documenting Business Cases
### Part A: Business Need

3. Contingency SFCRs  
The long-term spacer life management plan includes two contingent SFCRs at Darlington in 2018 (D1831 outage) and 2019 (D1941 outage). These SFCRs may be required to retrieve additional spacers for testing and examination if the results of earlier spacer testing and the subsequent spacer integrity assessments are unfavourable (i.e. long-term spacer fitness-for-service cannot be assured). Spacer material surveillance testing is estimated at $2M per set of 4 spacers retrieved in a given outage, with a station cost of $10M/SFCR, for a total estimated cost of $24M.

4. Burst Test post-2017 for Fracture Toughness Model validation below 120 ppm [Heq]  
There is a risk that additional Burst Tests from 2018-2020 may be required to validate the fracture toughness models for equivalent hydrogen concentrations [Heq] below 120 ppm. Assuming that 9 additional BTs are required, cost is estimated to be $15 M.

5. Additional Life Cycle Management Cost of Other Major Components due to extended operations  
Cost of P1951 Steam Generator water lanceing is estimated at $4.2M.

6. Spacer Material Surveillance  
P1711 Spacers and the 24 spacers retrieved from Darlington Unit 2 during Refurbishment unit will be sent for testing and examination. Cost estimate is $15M.

7. HFIR Irradiation post-2017  
The HFIR irradiation program is planned through 2021 but only funded through 2017 (up to the dose that is equivalent to 225 kEFPH in a Darlington reactor). Based on the HFIR irradiation strategy in the current long-term spacer life management plan, the estimated funding requirement beyond 2017 is $13 M.

The total cost estimate for spacer material surveillance and testing listed (Items 6 and 7) is $28M.
Part B: Preferred Alternative: Execution of Fuel Channel Life Extension Project

Description of Preferred Alternative

Upon completion of the project, OPG will have the plans, tools, and methodologies to acquire and analyze inspection and surveillance data to assess fitness for service of fuel channels to the targeted lives of 261k EFPH plus margin at Pickering and 235k EFPH plus margin at Darlington. This would enable OPG to achieve its business objectives for Pickering Continued Operations and the Darlington operating units during their pre-Refurbishment lives.

PROJECT SCOPE AND RELEASE STRATEGY

The FCLE project is being released and executed in two phases:
- Phase 1 partial release (2014-2017) was for the execution of R&D scope, Burst Tests, surveillance testing of the PTs from D1321 and B8J18 SFCRs, and Phase II of HFIR Irradiation work. Part of Phase I was deferred into 2016/2017.
- Phase 2 full release (2016-2020) will include the remaining BTs from the matrix logic, surveillance testing of the PT and spacers from P1671 (deferred from P1561) SFCR and continuation of HFIR program. The final results will be used to refine models and methodologies. The R&D work is planned for the full year of 2019 and hence, funds ($600K) are required for the project management and close-out activities in 2020.

Progress to Date:

Major Deliverables Completed:

Fracture Toughness
- Completed fracture toughness tests on small specimens ex-service material.
- Completed two burst tests (BTs) on a hydrided pressure tube section.
- High pressure hydriding (HPH) of small and full scale specimens. A significant amount of discovery HPH work was performed to address technical issues with the hydriding process.
- Phase I Alternative Hydriding (Low Pressure Gaseous Hydriding or LPGH) process development complete.
- Completed surveillance testing of the PT from D1321 SFCR.
- Validated interim fracture toughness model and obtained CNSC acceptance to use the model to satisfy License requirements for fuel channel fitness for service.

Crack Initiation
- Completed fatigue crack initiation tests on unirradiated and irradiated PT material.
- Completed DHC initiation tests in unirradiated and irradiated PT material.
- Completed load reduction tests on hydride region overload crack initiation in unirradiated and irradiated material.

Spacers
- Darlington Unit 2 spacers were transported to ORNL, encapsulated, and inserted into the HFIR under the HFIR Phase III Irradiation Program. This was a first-of-a-kind activity at ORNL.
- Irradiation of ex-service spacers is ongoing in the HFIR.
- Ongoing development of spacer models
- Crush and fatigue tested Darlington and Bruce Power ex-service spacers for demonstration of fitness-for-service

Probabilistic Core Assessments /LBB/Fracture Protection
- Issued the technical basis on revised acceptance criteria for the maximum allowable frequency of pressure tube rupture, which will be implemented into Table C.1 of the CSA Standard N285.8 as part of the 2017 revision.
- Developing computer code on probabilistic evaluation of fracture protection and leak before break (LBB).

Regulatory
- Industry workshops with CNSC to provide R&D results and resolve regulatory concerns with new methodologies and models (eg. probabilistic leak-before-break and fracture protection)
- Regulatory submissions including those specified in the Darlington Long Term Spacer management plan.
- Disposition CNSC comments, concerns and recommendations.

Major Phase I work in progress:
- The work on developing an alternating hydriding technique needs to be continued to mitigate the risk of the HPH process failing to achieve the 150 ppm target. Phase II of this work package includes testing on unirradiated samples having full size pressure tube circumference and wall thickness. This work is currently funded solely by OPG. If this program proceeds to Phase III, it is expected that the other major partner in JP #4491 will fund the remaining work. Criteria for abandoning the HPH or alternate hydriding technique have been established. OPG does not plan to support both programs to completion.
Part B: Preferred Alternative: Execution of Fuel Channel Life Extension Project

Description of Preferred Alternative

- Complete two more Burst Tests by the end of 2016.

Project Scope under Phase 2 release:

1) Complete 6 Burst Tests (BTs):
   More BTs are required to generate data on fracture toughness model at [Heq] concentrations greater than 120 ppm. The test specimens are hydrided irradiated pressure tube material sections. These tests are required to demonstrate fitness-for-service of pressure tubes material late in their operating life.

2) High Pressure Hydriding (HPH):
   A procedure for hydriding pressure tube material to 150 ppm [Heq] is required to support burst tests that will provide further insight into pressure tube behaviour beyond current projected end of life projections (looking beyond our headlights).

3) Spacer Models:
   Preliminary (Version 0) spacer models were established under the partial release. Further development/refinement of the empirical and structural models is required for Darlington tight fitting spacers. The final objective is achieving a reliable formal spacer model that can be used to assess fitness for service throughout the extended life of Darlington units.

4) High Flux Isotope Reactor (HFIR) Irradiation Program:
   This release funds Phase I and II HFIR program activities to the end of 2017. Phase I (unirradiated optimized) and II (unirradiated non-optimized) spacers/spacer materials will be irradiated to the equivalent dose of roughly 100 and 82 kEFPH, respectively. Specimens will be removed from the HFIR for testing and examination as per the Long Term Spacer Plan. Phase III ex-service spacer specimens will be irradiated to the equivalent dose of 245,000 EFPH in a Darlington reactor. Phase III of the HFIR program is required to provide a look-ahead into spacer fitness for service late in Darlington life, supporting OPG business planning decisions that may be required during the execution of the Refurbishment project.

5) Complete remaining work:
   Under this release, the remaining assessments required to demonstrate fitness-for-service during extended life operation will be completed. The bulk of assessments focus on PCA, LBB and fracture protection using new fracture toughness and crack initiation models.

Other Project Tasks:

6) Other R&D activities such as deuterium ingress experiments, assessment of tight fitting spacer movement, continuation of hydride reorientation stress, probabilistic core assessments etc.

7) Key submissions and ongoing dialogue with CNSC on fracture toughness, and spacer fitness for service, and new probabilistic assessment methodologies.

8) Project management activities including project close-out.

9) Allowance for discovery work, which may be determined by expert panel discussions or CNSC requirements.
### Table 1 - Breakdown of the project work scope and estimates

<table>
<thead>
<tr>
<th>Item</th>
<th>Phase I</th>
<th>Est. Cost*</th>
<th>This Release</th>
<th>Est. Cost*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspection &amp; Maintenance Scoping (Tech Service Contracts)</td>
<td>Complete majority of R&amp;D, inspection and maintenance scoping including assessment of target end of life hoop stress, PT/CT contact. Pilot assessment of LBB and FP using new FT models.</td>
<td>$1.5M Complete</td>
<td>Complete remaining assessment work for the extended operations, including PCA, LBB and FP assessment using new FT models</td>
<td>$1.8M</td>
</tr>
<tr>
<td>COG Material Surveillance Testing</td>
<td>Complete surveillance testing of PTs from D1321 and B8J18 SCFRs (through COG JPs) and issue test reports.</td>
<td>$5.3M D1321 Complete B8J18 l/p</td>
<td>Complete shipping and surveillance testing of PT from P1671 SCFR (through COG JP) and issue test reports.</td>
<td>$2.5M</td>
</tr>
<tr>
<td>Core R&amp;D</td>
<td>Complete 4 Burst Tests (BTs) for Fracture Toughness (FT) model validation for the extended end of life conditions (higher [Hqe] and higher hoop stress)</td>
<td>$3.2M 2 BTs competed 2 more in 2016</td>
<td>Complete 6 (originally 10) BTs for FT model expansion to extended life conditions</td>
<td>$5.4 M</td>
</tr>
<tr>
<td></td>
<td>Hydriding to achieve 130 ppm. High Pressure Hydriding (HPH), Electrolytic and/or low pressure gaseous hydridding (LPGH) techniques development</td>
<td>HPH: $1.0M LPGH: $3.8M In Progress</td>
<td>Hydriding to achieve 150 ppm (HPH) to simulate higher [Hqe] in later life reactor conditions</td>
<td>$3.0M</td>
</tr>
<tr>
<td>High Flux Isotope Reactor (HFIR) Irradiation and Spacer Testing</td>
<td></td>
<td>$0.9M In Progress</td>
<td>HFIR Irradiation of spacer material and testing of ex-service spacers (to end of 2017 only)</td>
<td>$6.9M</td>
</tr>
<tr>
<td>Interim Spacer models and Spacer Fitness-for-Service (FFS).</td>
<td></td>
<td>$0.6M Complete</td>
<td>Development/refinement of the Empirical and structural models for the Darlington Spacer and FFS for extended life</td>
<td>$1.2M</td>
</tr>
<tr>
<td>Other related R&amp;D activities (Hydride Reorientation, Chlorine Content etc.) including fracture toughness work and core assessments.</td>
<td></td>
<td>$1.2M Complete</td>
<td>Other related R&amp;D activities (Deuterium Ingress, Tight Fitting Spacer Movement etc.)</td>
<td>$3.4M</td>
</tr>
<tr>
<td>Third Party Reviews</td>
<td>Key submission to the CNSC on FT and Spacer models</td>
<td>Not required</td>
<td>Key submission to the CNSC on Probabilistic Fracture Protection</td>
<td>$0.1M</td>
</tr>
<tr>
<td>Other Work</td>
<td>COG Project management activities</td>
<td>$0.7M</td>
<td>COG Project management activities, project close-out etc.</td>
<td>$1.0M</td>
</tr>
<tr>
<td>Crack Initiation R&amp;D</td>
<td>Discovery work determined by expert panel and CNSC discussion</td>
<td>$1.6M In progress</td>
<td>Discovery work determined by expert panel and CNSC discussion</td>
<td>$2.6M</td>
</tr>
<tr>
<td>OPG Internals</td>
<td>OPG Project/Technical Oversight</td>
<td>$3.6M</td>
<td>OPG Project/Technical Oversight</td>
<td>$4.8M</td>
</tr>
<tr>
<td>Total</td>
<td>Phase I</td>
<td>$23.3M</td>
<td>Phase II</td>
<td>$30.4M</td>
</tr>
</tbody>
</table>

*The majority of R&D work is executed through COG Joint Projects, for which OPG’s portion of the costs is shown.
Part B: Preferred Alternative: Execution of Fuel Channel Life Extension Project

Description of Preferred Alternative

Table 2 below explains the differences between FCLM (#62444) and this project (#80014) on the Core R&D scope items:

<table>
<thead>
<tr>
<th>Item</th>
<th>FCLM Scope (Proj. #62444)</th>
<th>FCLE Scope (Proj. #80014)</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fracture Toughness - Burst Tests</td>
<td>14 BTs has been completed with which Rev. I of the New Fracture Toughness (FT) models have been established.</td>
<td>The original test matrix recommended 17 to 50 BTs (including 6 from FCLM that will be credited towards the matrix). This BCS assumes funding for 10 additional BTs.</td>
<td>Additional BTs are required to test PT and spacer material with high [Heq], broader range of Chlorine concentrations and higher hoop stress conditions which would exist during the extended life. CNSC is closely scrutinizing the BT test matrix for granting acceptance of the new fracture toughness model.</td>
</tr>
<tr>
<td>2. Hydriding Techniques Development</td>
<td>High Pressure Hydriding target of 120 ppm [Heq]</td>
<td>Alternate Hydriding method has been included in parallel to HPH method for achieving 150 ppm [Heq].</td>
<td>HPH repeatability has been poor and may not achieve the target [Heq]. Alternative processes are required to support DNFS refurbishment planning. The very recent results from alternate hydriding at small scale have shown success.</td>
</tr>
<tr>
<td>3. Spacer HFIR Irradiation</td>
<td>HFIR piloting i.e. reactor set up, material procurement, shipping and testing of the samples removed from the first interval.</td>
<td>Irradiation (Neutron) cost of subsequent samples and ex-service spacers retrieved during SFCRs.</td>
<td>Oak Ridge National Laboratories (ORNL) did not charge for neutrons during FCLM scope which was considered R&amp;D work. Significant neutron charges will now be levied for future OPG commercial orders.</td>
</tr>
<tr>
<td>4. Spacer Empirical &amp; Structural Modelling</td>
<td>Initial development of the models</td>
<td>Refinement of the models and acceptance by CNSC</td>
<td>These models are required to predict the life of the DNFS tight fitting spacers.</td>
</tr>
</tbody>
</table>

PROJECT COMPLETION
Project is targeted for completion and close-out by December 2020. A PIR will be completed by December 2021.

Deliverables under this release (2016-2020):

<table>
<thead>
<tr>
<th>Deliverables</th>
<th>Associated Milestones (if any)</th>
<th>Target Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirmatory technical confidence statement for PNGS 261k EFPH</td>
<td></td>
<td>30/06/2017</td>
</tr>
<tr>
<td>Updated Spacer Engineering Structural Model</td>
<td></td>
<td>30/11/2017</td>
</tr>
<tr>
<td>Develop Hydriding Techniques to Achieve High [Heq] (up to 150 ppm)</td>
<td></td>
<td>29/12/2017</td>
</tr>
<tr>
<td>Technical Confidence Statement (235k EFPH for DNFS) if needed</td>
<td></td>
<td>30/06/2018</td>
</tr>
<tr>
<td>Confirmatory technical confidence statement for DNFS 235k EFPH</td>
<td></td>
<td>30/06/2020</td>
</tr>
<tr>
<td>Project Close-out</td>
<td></td>
<td>15/12/2020</td>
</tr>
</tbody>
</table>
Part C: Other Alternatives
In this alternative, OPG would not fund the next phase of the FCLE Project and would complete only the scope of work included in the FCLM, which concludes in Q2 2016, and some of the R&D activities in Phase I of the FCLE project.

Discussion with CNSC on Fracture Toughness Models have indicated that significant additional testing and analysis maybe required, beyond what was performed under the FCLM Project, to validate the primary fracture toughness model used for fitness for service assessment for the later life conditions at Pickering (beyond 247k EFPH) and Darlington (beyond 210k EFPH).

This alternative would impair OPG’s ability to make strategic decisions with high confidence that fuel channel components will remain fit for service to target service lives, and may incur idle times on operating units where fitness for service cannot be demonstrated due to overly conservative or invalid models and methodologies.

Alternative 2: Base Case – Achieve 210k EFPH for Darlington with Life Management of Darlington Units

NOT RECOMMENDED:
This alternative was considered but rejected. Given the current refurbishment schedule for the Darlington units, this alternative would imply either idle time of 22 months on Darlington Unit 1, and 29 months on Darlington 4 prior to refurbishment, or life management of these units during 2016 to 2021/2023 to mitigate this significant idle time threat immediately prior to refurbishment, or other mitigating activities such as SFCRs, or non-standard operating configurations in the most-at-risk fuel channels.

While the costs of the FCLE project would be saved as well as a portion of consequential costs, significant system economic value would be forsaken. This alternative would foreclose the option of operating the Darlington units for a longer period prior to refurbishment, if it were economical to do so.

Alternative 3: Delay Work – NOT RECOMMENDED - Do only R&D work to Achieve 225k EFPH for Darlington with Possible Life Management of Darlington Units

This alternative was considered but rejected. Given the currently contemplated Refurbishment Schedule for the Darlington units, this alternative would imply idle time of 7 months on Darlington Unit 3 and 18 months on Darlington Unit 4 prior to refurbishment, or life management of these units in the period 2014 to 2021/2022 to mitigate this significant idle time threat immediately prior to refurbishment or other mitigating activities, such as SFCRs or non-standard operating configurations in the most-at-risk fuel channels.

Alternative 4: NOT RECOMMENDED - Do Not Extend Pickering Fuel Channel Life Past 247 k EFPH, but Extend Darlington to 235k EFPH

The initial confidence statement for operating all Pickering units to the end of 2020 (247k EFPH) has already been issued. A confirmatory statement is expected in 2017. This alternative is not recommended as there is no additional cost except that identified as consequential cost. All R&D work is bounded by Darlington.

Part D: Project Cash Flows, NPV, and OAR Approval Amount

<table>
<thead>
<tr>
<th>k$</th>
<th>LTD</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>Future</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Currently Released</td>
<td>14.9</td>
<td>15.4</td>
<td>10.9</td>
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<td></td>
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<td></td>
<td></td>
<td>41.2</td>
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<td>Requested Now</td>
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<td>2.7</td>
<td>14.4</td>
<td>9.3</td>
<td>1.7</td>
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<td></td>
<td></td>
<td>28.1</td>
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<tr>
<td>Future Required</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Project Cost</td>
<td>14.9</td>
<td>15.4</td>
<td>13.6</td>
<td>14.4</td>
<td>9.3</td>
<td>1.7</td>
<td></td>
<td></td>
<td>69.3</td>
</tr>
<tr>
<td>Ongoing Costs</td>
<td>1.0</td>
<td>0.3</td>
<td>8</td>
<td>31.6</td>
<td>57.6</td>
<td>14.4</td>
<td>7.5</td>
<td></td>
<td>120.3</td>
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<tr>
<td>Grand Total</td>
<td>14.9</td>
<td>15.4</td>
<td>22.7</td>
<td>56.4</td>
<td>76.3</td>
<td>12.7</td>
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<td></td>
<td>189.6</td>
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<tr>
<td>Estimate Class:</td>
<td>Class 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimate at Completion:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>NPV:</td>
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<td></td>
<td></td>
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<tr>
<td>OAR Approval Amount:</td>
<td>$189.6M</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additional Information on Project Cash Flows (optional):
Project Cash Flows, Estimate at Completion, and OAR approval amount show in the table above assumes no co-funding by any other party. The Estimate at Completion does not include contingency of...
Ongoing Costs are composed of Consequential costs and contingency Single Fuel Channel Replacements (SFCR):

<table>
<thead>
<tr>
<th>$M</th>
<th>To Enable 261k EFPH for Pickering</th>
<th>To Enable 235k EFPH for Darlington</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consequential Costs*</td>
<td>39.9</td>
<td>56.4</td>
<td>96.3</td>
</tr>
<tr>
<td>Contingency SFCR (including material surveillance)</td>
<td>24</td>
<td>24</td>
<td>48</td>
</tr>
<tr>
<td>Total</td>
<td>39.9</td>
<td>120.3</td>
<td>120.3</td>
</tr>
</tbody>
</table>

*Consequential costs are composed of: material surveillance of pressure tubes and spacers beyond P1671 SFCR, Incremental station OM&A for fuel channel inspection and maintenance, incremental major components (Steam Generators) life cycle management costs, spacer material and ex-service spacer irradiation in High Flux Isotope Reactor, and potential additional burst tests to improve fracture toughness models at Heq<120PPM.

Note: This BCS assumes another CANDU operator will continue to co-fund the JP #4491 R&D effort at 50% contribution based on approved COG JP #4491 confirmation.

Part E: Financial Evaluation

<table>
<thead>
<tr>
<th>M$</th>
<th>Preferred Alternative</th>
<th>Base Case</th>
<th>Delay Work</th>
<th>Alternative 4</th>
<th>Alternative 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Cost</td>
<td>69.3</td>
<td>0</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>NPV</td>
<td>700</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Other (e.g., IRR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summary of Financial Model Key Assumptions or Key Findings:
The value to the electricity system if the Fuel Channel Life Extension (FCLE) Project is pursued and successfully achieves high confidence in fitness-for-service of the fuel channels to 261k EFPH at Pickering and to 235k EFPH at Darlington is estimated at $0.7B (PV 2016$). This value is based on the assumption that the Darlington units are indeed operated to 235k EFPH or to their planned refurbishment dates (whichever is earlier) and that the Pickering units are operated to the end of 2020 (261k EFPH allows all units to operate at least the end of 2020). The estimated value is net of the estimated $36 M (PV 2016$) cost of implementing the FCLE project, as well as net of the estimated $22 M (PV 2016$) of consequential costs associated with longer operation and increased life cycle management work on both Darlington and Pickering.

Table 3: Summary of Value Enabled by Recommended Alternative Versus Do Nothing (No project)

<table>
<thead>
<tr>
<th>No FCLE Project</th>
<th>Implement FCLE project</th>
<th>Impact</th>
<th>Value $B (PV 2016$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pickering</td>
<td>High Confidence in 247k EFPH achieved. Units Assumed Operated to 247k EFPH with Life Mgmt Outages on Unit 7</td>
<td>Tools and methodologies established to determine technical confidence in 261k EFPH achieved. Units Assumed Operated to 261k EFPH or end 2020, whichever is sooner.</td>
<td>Would allow all Pickering units to operate until end 2020, and would eliminate life mgmt outages on Pickering Unit 7.</td>
</tr>
<tr>
<td>Darlington</td>
<td>High Confidence in 210k EFPH achieved* and Units operated to 210k EFPH or start of refurbishment outages, whichever is sooner</td>
<td>Tools and methodologies established to determine technical confidence and Units operated to 235k EFPH or start of refurbishment outages, whichever is sooner</td>
<td>Would allow elimination of all idle time prior to start of refurbishment on all units, given current planning schedule. Also allows flexibility to start refurbishment of the first unit later if readiness issues arise. 0.7</td>
</tr>
</tbody>
</table>

Total Median Estimated Value 0.7

*Some additional funding above base programs and beyond the Fuel Channel Life Management Project would be required to achieve high confidence in 210k EFPH at Darlington.

Results of the economic assessment were tested for sensitivity to key inputs such as the assumed electricity value, the degree of success in achieving high confidence in additional fuel channel life, and therefore the amount of additional station operating life achieved, the cost of the FCLE project and the level of consequential costs.
Summary of Financial Model Key Assumptions or Key Findings:

In summary, the results indicate that, provided some additional life on Darlington is achieved, even if only to 225k EFPH, there would be a positive value to the electricity system, given the current planned refurbishment schedule (i.e. no overlap of the first two units to be refurbished), because of the reduction in idle time which is achieved.

The following tornado diagram shows the key sensitivity results.

Figure 1: Sensitivity of Value to Key Uncertainties

The following provides additional details on the sensitivity analysis:

i. Assumed Electricity Value: The estimated value of FCLE is extremely sensitive to the assumed electricity value. In a high value regime the estimated value of eliminating potential idle time on Darlington and operating all of Pickering to end 2020 could be as high as approximately $1.1 B (PV 2016$). In a low value regime the value could be approximately $0.3 B (PV 2016$). A low priced regime could result from low or declining electricity demand growth (which could result, for example, from a prolonged economic slowdown) and low or declining gas prices, and /or high conservation which could result in a prolonged period of significant surplus base load generation.

ii. Length of Operating Life Achieved: The value is sensitive to the additional fuel channel life which can be achieved with high confidence:
- If the FCLE project were to enable the Pickering units to operate until end 2020, but only allowed Darlington to operate to 225k EFPH the value would be reduced by approximately $700 M (PV 2016$) to approximately $0.0 B (PV 2013$), as approximately only 6 months of idle time would result for the last unit refurbished, and this is off set by project costs and consequential costs..

iii. Project Costs: The value is insensitive to FCLE Project Costs. An approximate doubling of these costs reduces the value by $72 M (PV 2016$) to approximately $0.7 B (PV 2016$). A halving of these costs increases the value by $36 M (PV 2013$). Given the magnitude of the consequential cost the value would also be insensitive to consequential costs.
**Part F: Qualitative Factors**

The completion of the scope in the preferred alternative of this project is critical to the Continued and Extended Operations of Pickering, Refurbishment of Darlington. Since OPG operates the first CANDU units to be impacted by the fuel channel degradation mechanisms being investigated, our R&D findings may present financial opportunities when other CANDU units in the world are approaching their end-of-life.

**Part G: Risk Assessment**

<table>
<thead>
<tr>
<th>Risk Class</th>
<th>Description of Risk</th>
<th>Risk Management Strategy</th>
<th>Post-Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>There is a risk that the CNSC may require additional BTs (beyond the 10 included in the scope) to validate the cohesive zone fracture toughness model</td>
<td>Mitigate – Contingency has been included for moderate scope addition</td>
<td>Medium Medium</td>
</tr>
<tr>
<td>Scope</td>
<td>There is a risk that additional BT request by CNSC increase the project scope.</td>
<td>Mitigate – OPG, Bruce Power and vendors setup workshop with CNSC to demonstrate adequacy, reliability and repeatability of data obtained from the existing scope.</td>
<td>Medium Medium</td>
</tr>
<tr>
<td>Resources</td>
<td>A delay in project schedule may occur due to unavailability of specialized resources that cannot easily be replaced. Reasons for unavailability could be due to emergent, spin-off work and conflicting priorities threatening the project schedule and cost.</td>
<td>Mitigate – Obtain resource commitment from vendors. Prioritize project work; communication and negotiation within business units regarding FCLCP commitments and support.</td>
<td>Low Medium</td>
</tr>
<tr>
<td>Technical</td>
<td>There is a risk that results of R&amp;D or field inspection may not support operations to the targeted fuel channel live (235k EFP for Darlington and 261k EFP for Pickering)</td>
<td>Mitigate – Phased release strategy and continuous assessments of the R&amp;D and inspection results to minimize the cost of the project should this risk materialize</td>
<td>Medium Medium</td>
</tr>
<tr>
<td>Schedule</td>
<td>There is a risk that technical complexity challenges the project team leading to delays in deliverables.</td>
<td>Mitigate – Identify challenges early through frequent Steering Committee meetings.</td>
<td>High Medium</td>
</tr>
<tr>
<td>Schedule</td>
<td>There is a risk that lab equipment breakdown jeopardize the timeliness of the tests or produce poor results.</td>
<td>Mitigate – Oversight on testing procedure and effective commissioning program. Vendor’s inventory includes critical spare parts.</td>
<td>Low Medium</td>
</tr>
<tr>
<td>Schedule</td>
<td>There is a risk that lengthy internal reviews affecting OPG milestones and CNSC submissions</td>
<td>Mitigate – Spread reviews across qualified OPG staff, monitor vendor’s report status</td>
<td>High High</td>
</tr>
<tr>
<td>Scope</td>
<td>There is a risk that discovery work, indeterminate results or unexpected results impact on the project scope.</td>
<td>Mitigate - Provide oversight on COG R&amp;D work and prioritize according to CNSC commitments. Use allocated funds if required.</td>
<td>Medium Medium</td>
</tr>
<tr>
<td>Scope</td>
<td>There is a risk that unexpected scope cuts from the outage causing insufficient data to perform FC fitness-for-service assessments.</td>
<td>Mitigate – provide input to MCED on scope change recommendations</td>
<td>Medium Medium</td>
</tr>
<tr>
<td>Cost</td>
<td>There is a risk that one of the funding partners drops out of JP or decrease their contribution.</td>
<td>Mitigate – Early alignment with funding partners</td>
<td>Low High</td>
</tr>
<tr>
<td>Technical</td>
<td>There is a risk that ON is underpredicted due to higher D-ingeness when fuel channels exceed the limit for</td>
<td>Mitigate – Conduct scrape samples and update</td>
<td>Medium High</td>
</tr>
</tbody>
</table>
Part G: Risk Assessment

<table>
<thead>
<tr>
<th>Risk Class</th>
<th>Description of Risk</th>
<th>Risk Management Strategy</th>
<th>Post-Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical</td>
<td>There is a risk that discrepancies between scrape and punch samples lead to higher than expected Heq at the outlet RJs.</td>
<td>Mitigate - Perform deeper scrapes and establish sample reliability model.</td>
<td>Medium</td>
</tr>
<tr>
<td>Quality</td>
<td>There is a risk that insufficient pressure tube test material will be available. This may impair our ability to perform tests required to develop and validate fracture toughness models.</td>
<td>Negotiate an arrangement that gives CANDU operators more control over ex-service materials</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Additional Risk Analysis:

Long term business risk to demonstrate fuel channel fitness-for-service (post project):

Management of fuel channel fitness-for-service must continue even after the completion of this project. As units age, CNSC is expecting that there would be sufficient inspection and surveillance data to support the projections that the units are safe to operate to their targeted service lives. An expansion of fuel channel inspection scope has been proposed to the outage organization with the potential for outage extension. A Darlington "Long Term Spacer Plan" has also been submitted to CNSC, stating OPG's plan to retrieve and test intact spacers from Single Fuel Channel Replacement campaigns in outages, as well as during Darlington's 1st Unit Refurbishment.

Part H: Post Implementation Review (PIR) Plan

<table>
<thead>
<tr>
<th>Measurable Parameter</th>
<th>Current Baseline</th>
<th>Target Result</th>
<th>How will it be measured?</th>
<th>Who will measure it? (person/group)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expanded fracture toughness curves covering the hydrogen concentrations at extended life (above 120 ppm)</td>
<td>Fracture toughness models are valid to 120 ppm [Heq]</td>
<td>Expanded fracture toughness curves reflecting effects of hydrogen concentration, covering lower-shelf and transition temperature region</td>
<td>CNSC acceptance of the validity of cohesive zone and statistical fracture toughness models beyond 120 ppm</td>
<td>MCED</td>
</tr>
<tr>
<td>Engineering model to project Darlington Spacer life to 235,000 EPFH</td>
<td>Preliminary model available. Model projects FFS to approx. 200 kEPFH.</td>
<td>Model provides a high confidence prediction of spacer FFS to 235 kEPFH.</td>
<td>Completion of CNE Review G4 in NK38-PLAN-31163-10000</td>
<td>MCED</td>
</tr>
<tr>
<td>Confidence in fitness-for-service of the Pickering fuel channels to 261k EPFH is established</td>
<td>Preliminary confidence statement issued</td>
<td>Confirmatory statement of technical confidence in fuel channel FFS issued</td>
<td>Document containing confirmatory statement issued in Asset Suite 7</td>
<td>MCED</td>
</tr>
<tr>
<td>Confidence in fitness-for-service of the Darlington fuel channels to 235k EPFH</td>
<td>High confidence statement in FFS to 210,000 EPFH issued</td>
<td>Level of confidence established and statement available</td>
<td>Statement of technical confidence in fuel channel FFS to 235,000 EPFH issued in Asset Suite 7</td>
<td>MCED</td>
</tr>
</tbody>
</table>
Project #: Project # 10-80014
Project Title: Fuel Channel Life Extension Project, Full Release

**Part I: Definitions and Acronyms**

- ASRT - Advanced Spacer Retrieval Tool
- BT - Burst Test
- CT - Calandria Tube
- EFPH - Equivalent Full Power Hours
- FCLE(P) - Fuel Channel Life Extension (Project)
- FCLM(P) - Fuel Channel Life Management (Project)
- FT- Fracture Toughness
- HFIR - High Flux Irradiation Reactor
- HPH- High Pressure Hydriding
- PM - Project Management
- SFCR - Single Fuel Channel Replacement
- SLAR - Spacer Location and Repositioning
This page is intentionally left blank
For Internal Project Cost Control
### Appendix A: Summary of Estimate

<table>
<thead>
<tr>
<th>Project Number:</th>
<th>Project # 10-80014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Title:</td>
<td>Fuel Channel Life Extension Project</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>LTD</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>20...</th>
<th>Future</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPG Project Management</td>
<td>1.4</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>4.9</td>
<td>9.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPG Engineering (including Design)</td>
<td>0.9</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>3.4</td>
<td>6.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPG Procured Materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total** | 14.9 | 15.4 | 13.6 | 14.4 | 9.3  | 1.7  | 69.3  | 100    |       |        |

### Notes

- **Project Start Date**: 2014-01-02
- **Total Definition cost**: (excludes unspent contingency for Nuclear) N/A
- **Target In-Service (or AFS) Date**: N/A
- **Contingency included in this BCS**: (Nuclear only)
- **Target Completion Date**: 2020-12-15 (FCLP Completion)
- **Total contingency released plus contingency in this BCS**: (Nuclear only)
- **Escalation Rate**: 2.0%
- **Total released plus this BCS without contingency**: (Nuclear only)
- **Interest Rate**: 5%
- **Total released plus this BCS with contingency**: (Nuclear only) $69.3M
- **Removal Costs**: N/A
- **Estimate at Completion**: (includes only spent contingency for Nuclear)

### Prepared by:
- **Name**: John Xiao
- **Date**: July 21, 2016
- **Position**: Section Manager, FCLP
- **Project Manager**

### Approved by:
- **Name**: Kathy Charette
- **Date**: July 21, 2016
- **Position**: Senior Manager, FCLP
- **Project Sponsor**
## Appendix B: Comparison of Total Project Estimates and Project Variance Analysis

### Comparison of Total Project Estimates

<table>
<thead>
<tr>
<th>Phase</th>
<th>Release</th>
<th>Approval Date</th>
<th>Total Project Estimate in M$ (by year including contingency)</th>
<th>Future</th>
<th>Total Project Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>LTD 2016 2017 2018 2019 2020</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Definition and Execution</td>
<td>Partial</td>
<td>2013-11-11</td>
<td>41.2 37.6 26.5 0.6</td>
<td></td>
<td>105.8</td>
</tr>
<tr>
<td>Execution</td>
<td>Full</td>
<td>2016 Q3</td>
<td>14.9 15.4 13.6 14.4 9.3 1.7</td>
<td></td>
<td>69.3</td>
</tr>
</tbody>
</table>

### Project Variance Analysis

<table>
<thead>
<tr>
<th>M$</th>
<th>LTD</th>
<th>Total Project</th>
<th>Variance</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Last BCS</td>
<td>This BCS</td>
<td></td>
</tr>
<tr>
<td>OM&amp;A: OPG Project Management</td>
<td>1.4</td>
<td>3.3</td>
<td>5</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Extension of project timeline due to COG financial constraint and discovery work.</td>
</tr>
<tr>
<td>OM&amp;A: OPG Engineering</td>
<td>0.9</td>
<td>2.1</td>
<td>3.3</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Extension of project timeline due to COG financial constraint and discovery work.</td>
</tr>
<tr>
<td>OM&amp;A: Permanent Materials</td>
<td>0</td>
<td>3.2</td>
<td>0</td>
<td>-3.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No materials/too's are required.</td>
</tr>
<tr>
<td>OM&amp;A: Design and Construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OM&amp;A: Technical Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OM&amp;A: Other Contracts/Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td>105.8</td>
<td></td>
<td>69.3</td>
<td>-36.5</td>
</tr>
</tbody>
</table>

Contingency is reduced together with reduction in total cost due to co-funding by another Candu Operator and lower percentage of contingency (from [general contingency] specific contingency if the other Candu operator does not fund the later years of COG JP (2018 and 2019).
Appendix C: Financial Evaluation Assumptions

Key assumptions used in the financial model of the Project are (complete relevant assumptions only):

Project Cost:
1. Incremental Project Costs are [REDACTED] for the Preferred Alternative.
2.
3.

Financial:
1. Discount rate is 5% for regulated assets.
2.
3.

Project Life:
1.
2.
3.

Energy Production:
1.
2.
3.

Operating Cost:
1.
2.
3.

Other:
1.
2.
3.

Appendix D: References

**Board Staff Interrogatory #94**

Issue Number: 6.1

**Issue:** Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

**Interrogatory**

**Reference:**
Ref: Exh F2-2-3 Attachment 2

This document contains a Technical and Economic Assessment of Pickering Extended Operations beyond 2020 and includes a partial release of $52M to cover incremental work program costs in 2016 and 2017. This includes the costs for the Fuel Channel Life Assurance Project, estimated to cost a total of $9M (refer to Table A1 on page 18 of Attachment 2).

Please advise if the Fuel Channel Life Assurance Project is subject to some sort of cost sharing agreement with another CANDU operator as was the case on both the Fuel Channel Life Management Project (Project # 10-62444) and the Fuel Channel Life Extension Project (Project # 10-80014).

This document contains a Technical and Economic Assessment of Pickering Extended Operations beyond 2020 and includes a partial release of $52M to cover incremental work program costs in 2016 and 2017. This includes the costs for the Fuel Channel Life Assurance Project, estimated to cost a total of $9M (refer to Table A1 on page 18 of Attachment 2).

Please advise if the Fuel Channel Life Assurance Project is subject to some sort of cost sharing agreement with another CANDU operator as was the case on both the Fuel Channel Life Management Project (Project # 10-62444) and the Fuel Channel Life Extension Project (Project # 10-80014).

**Response**

No, there is no cost sharing agreement with any other CANDU operators. The issues being managed under the Fuel Channel Life Assurance Project are unique to Pickering units and are primarily associated with the management of elongation of fuel channels.
Board Staff Interrogatory #95

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
Ref: Exh H1-1-1 page 24

The Nuclear Development Variance Account records variances between actual non-capital costs for planning and preparation for the development of proposed new nuclear generation facilities and the forecast costs in revenue requirement. In the previous proceeding, EB-2013-0321, OPG proposed that 2014-2015 OM&A expenditures for new nuclear development be entered in the variance account, i.e. the 2014-2015 forecast was $0.

What is OPG’s proposal in the current proceeding? What is the forecast amount for each year of the test period?

Response

Exhibit F2-1-1 Table 1 provides an annual forecast of new nuclear at Darlington expenditures included in the test period revenue requirement, as summarized in Chart 1 below. OPG proposes that the Nuclear Development Variance Account, as described at Ex. H1-1-1, pp. 23-24, continue to record variances related to those expenditures.

Chart 1

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>Exhibit Reference</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darlington New Nuclear OM&amp;A</td>
<td>F2-1-1 Table 1 Line 6</td>
<td>1.2</td>
<td>1.2</td>
<td>1.2</td>
<td>1.3</td>
<td>1.3</td>
</tr>
<tr>
<td>Allocation of Corporate Costs</td>
<td>F2-1-1 Table 1 Footnote</td>
<td>1.1</td>
<td>0.2</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>2.3</td>
<td>1.4</td>
<td>1.7</td>
<td>1.8</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Witness Panel: Nuclear Operations and Projects
Board Staff Interrogatory #096

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
Ref: Exh F2-4-1 page 1

Outage OM&A cost for Darlington in the test period include, “outage costs for units laid up during refurbishment (e.g., Unit 2 during 2016-2020), which will be subject to inspection and maintenance activities over the period 2017-2019 associated with a planned outage in accordance with OPG’s aging and life cycle management programs, in addition to and separate from the refurbishment of the units.”

a) Why are these inspection and maintenance activities separate from refurbishment?

b) What is the purpose of the aging and life cycle management programs for units undergoing refurbishment? Are the programs required by the CNSC? Please provide examples of aging and life cycle management programs.

Response

(a) These inspection and maintenance activities are separate from refurbishment because they are required as part of the ongoing maintenance and operation of the plant and are required to be performed even while the unit is being refurbished.

Examples of these inspection and maintenance activities, which are typical of regular planned outages at Darlington or Pickering, are set out in OPG’s response to part (b) below.

In contrast, Darlington Refurbishment Program (“DRP”) scope is defined as the replacement of station life limiting components, regulatory and safety improvements and other work best performed during an extended refurbishment outage as well as incremental facilities and infrastructure required for DRP to complete the above scope.

(b) As identified above, the DRP has a defined scope of work limited to specific systems and components. The remaining systems and components not included as part of DRP scope require ongoing inspection, maintenance, repair and replacement as defined by station aging and life cycle management programs for those systems and components.

The purpose of these programs is to ensure equipment is meeting safety and reliability standards and requirements. Some programs are required by the CNSC, which typically

Witness Panel: Nuclear Operations and Projects
include periodic inspections and preventative maintenance programs on safety related
equipment. Some investments are required to ensure the plant runs optimally and meets
performance expectations. Examples of maintenance activities as per the stations aging
and life cycle management programs are as follows:

- Replacement of system components at end of component life before failure
- Replacement of obsolete parts; e.g., plant computer equipment
- Overhauls of pumps and valves
- Preventative maintenance on motors
- Inspections of heat exchanger tube bundle wall thickness
- Inspection and testing of electrical circuit breakers
- Calibration of instrumentation.
**Board Staff Interrogatory #97**

**Issue Number: 6.1**

**Issue:** Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

**Interrogatory**

**Reference:**
- Ref: Exh F2-4-1 page 1
- Ref: Exh E2-1-1 page 3

The evidence at Exh F2-4-1 states that, “Darlington Unit 2 is scheduled to return to service in February 2020 following refurbishment. OPG has scheduled two post refurbishment mini planned outages to address any issues expected to arise after the major refurbishment is complete and the unit has resumed operations.”

The evidence at Exh E2-1-1 states that, “The need for these post-refurbishment outages is based on operating experience at other nuclear facilities that underwent major refurbishment.”

What is the cost of each of the mini planned Darlington Unit 2 outages?

**Response**

The estimated cost of the first mini post-refurbishment planned outage is $12.8M and the second $8.2M. The second mini-outage is estimated to cost less due to the shorter duration and expected smaller scope.
Board Staff Interrogatory #98

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
Ref: Exh F2-4-1 page 7

The evidence states, “For Pickering, a station-wide VBO is required every 11 years, with the most recent occurring in 2010 and the next scheduled for 2021. Pickering’s outage OM&A expenditures in 2020 include costs for preparatory work for the 2021 VBO and the outage OM&A forecast in 2021 includes expenditures associated with a six unit VBO.”

a) Please confirm that the outage OM&A expense for 2020 related to VBO would not be included in the forecast without the Pickering extended operations proposal.

b) If Pickering extended operations does not proceed, please confirm that the 2021 VBO would not be undertaken. Please confirm that the revenue requirement impact of any VBO costs underpinning payment amounts would then be credited to the capacity refurbishment variance account.

c) Please provide a table summarizing all the 2020 and 2021 VBO costs, including details for Pickering station and nuclear support division costs.

d) Are any of the costs set out in (b) also included in Exh F2-4-1 Chart 2, Pickering Extended Operations Outage OM&A?

e) Please provide the same table as set out in (b) for the Q2 2010 Pickering VBO. Please explain any differences in costs.

Response

a) Confirmed. For planning purposes, OPG assumed that the Vacuum Building outage as dictated by Canadian Safety Standards would not be required if operations were to cease in 2020.

b) As noted in part (a), if Pickering ends commercial operations in 2020, then OPG would seek approvals to not execute the VBO currently planned in 2021. As explained in Ex. L-05.1-1 Staff 87(c), the VBO is dictated by Canadian Safety Standards (CSA) N287.7 and undertaken pursuant to CNSC licence conditions. It is part of the normal periodic station inspection and testing activity.
OPG does not confirm that the revenue requirement impact of any VBO costs underpinning payment amounts would be credited to the Capacity Refurbishment Variance Account. As discussed in Ex. L-6.9-1 Staff 178(c), only expenditures to increase the output of, refurbish or add operating capacity to a prescribed generation facility fall within the definition of the CRVA pursuant to O. Reg. 53/05. Since the VBO does none of these things, any changes in VBO costs would not be captured within the CRVA.

c) The incremental budget for the VBO is $46M. The total amount has been budgeted in 2021 under the Pickering total found in Ex. F2-4-1 Table 1, Line 2. There currently are no VBO preparation costs included in the 2020 forecast. The final scope has not been defined and accordingly preparatory expenditures could not be distributed. When the final scope is defined, costs will be distributed between the station and support departments and an appropriate share allocated for preparations in the years preceding execution.

d) Refer to part (c). There are no VBO costs included in 2020 in Ex. F2-4-1, p. 2, Chart 2.

e) Chart 1 below provides a summary of incremental costs associated with the 2010 VBO compared to the 2021 budget as described in part (c). Total incremental costs are on par with the 2010 VBO assuming a 2% escalation factor. As stated in part (c) above, the 2021 VBO scope has not been finalized. Therefore, an explanation of differences in costs cannot be provided.

<table>
<thead>
<tr>
<th>Organization</th>
<th>2010 VBO Actual Costs</th>
<th>2021 VBO Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pickering Nuclear</td>
<td>29.7</td>
<td>46.2</td>
</tr>
<tr>
<td>Support Organizations</td>
<td>5.9</td>
<td>Not available</td>
</tr>
<tr>
<td><strong>Total ($M)</strong></td>
<td><strong>35.7</strong></td>
<td><strong>46.2</strong></td>
</tr>
</tbody>
</table>
Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
Ref: D2-2-8 Attachment 4 Page 27

a) Please quantify the % of costs associated with the full time operation of Darlington that remains during the test period by year and show the calculation.

Response

Chart 1 compares the Darlington operating costs in the test period to 2015 actual operating costs. Darlington operating costs reflect amounts shown in L-6.2-15 SEC-63 part (b), Chart 1 for Stations and Nuclear Support for 2017-2021.

Chart 1

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(a)</td>
<td>(b)</td>
<td>(c)</td>
<td>(d)</td>
<td>(e)</td>
<td>(f)</td>
</tr>
<tr>
<td>1</td>
<td>Total Darlington Operating Costs</td>
<td>694.6</td>
<td>723.4</td>
<td>686.0</td>
<td>681.4</td>
<td>725.4</td>
<td>588.5</td>
</tr>
<tr>
<td>2</td>
<td>Forecast Darlington Operating Costs as a % of 2015</td>
<td>104.1%</td>
<td>98.8%</td>
<td>98.1%</td>
<td>104.4%</td>
<td>84.7%</td>
<td></td>
</tr>
</tbody>
</table>

The majority of costs associated with the full-time operation of Darlington remain fixed as many of the functions that support the operation of all four units continue to be required during refurbishment to support the operation of a multi unit station even while units are on refurbishment outages. Examples of operating costs that remain even if one unit is in refurbishment include:

• Operating and maintaining safety systems and other common systems (i.e., Unit 0).

• Tritium removal facility that supports the remaining operating units, Pickering and other nuclear plants as well as other common facilities (e.g., water treatment plant).

• Fuel handling maintenance and operations to support fueling of the remaining operating units as well as fueling of the units undergoing refurbishment. Costs of defueling of the refurbishment units are included in DRP.
• Support, planning and contract oversight for work being performed within the station, except on the refurbishment units (the DRP will perform the oversight for the refurbishment unit).

• Operator training to ensure long term operability of the four units.

• Equipment inspections that are required on a periodic basis.

• Measurement, monitoring and reporting of environmental emissions.

• Security, nuclear programs, nuclear oversight, engineering and other nuclear support costs. Incremental security costs for the Refurbishment security entrance are funded by the DRP.

In addition, OPG has a comprehensive plan to perform non-refurbishment maintenance work on the unit that is offline. OPG cannot meaningfully allocate costs between the costs of such work and the other costs required to support the operation of the four-unit station. This work includes preventative and corrective maintenance work that would normally be done during scheduled outages but will be spread over the refurbishment period while a unit is on a refurbishment outage.

Note that total Darlington costs fluctuate year over year for a variety of reasons and in some years (e.g., 2017 and 2020), are higher than 2015 due to the outage program, additional inspection programs such as single fuel channel inspections, and specific life cycle management work. A description of year over year changes for base OM&A, project OM&A and outage OM&A costs can be found in Ex. F2-2-2, Ex. F2-3-2, and Ex. F2-4-2.
**AMPCO Interrogatory #109**

**Issue Number: 6.1**

**Issue:** Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

**Interrogatory**

**Reference:**
Ref: F2-2-1 Table 1 Nuclear Base OM&A

a) Please provide the number of FTEs allocated to each of the Stations and Support functions shown on the basis of regular and non-regular staff for the years 2013 to 2021.

b) Please provide the labour and overtime separately for each of the Stations and Support functions on the basis of regular and non-regular staff for the years 2013 to 2021.

**Response**

a) See Chart 1 – Base Labour FTEs
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<td>(a)</td>
<td>(b)</td>
<td>(c)</td>
<td>(d)</td>
<td>(e)</td>
<td>(f)</td>
<td>(g)</td>
<td>(h)</td>
<td>(i)</td>
</tr>
<tr>
<td><strong>Stations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Darlington NGS</td>
<td>1,256.5</td>
<td>1,203.2</td>
<td>1,163.9</td>
<td>1,157.5</td>
<td>1,068.0</td>
<td>1,039.0</td>
<td>1,054.7</td>
<td>1,067.2</td>
<td>1,022.6</td>
</tr>
<tr>
<td>2</td>
<td>Pickering NGS</td>
<td>1,847.9</td>
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**Total Base OM&A Labour (F2-2-1 Table 2)**

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### Chart 3

**Base OM&A Overtime - Nuclear ($M)**

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AMPCO Interrogatory #110

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
Ref: F2-2-2 Page 7

a) Under Projects and Modifications, please explain why internal staff supported the outage work rather than using previously planned external contractors.

b) Please explain how contractor costs compare to internal costs for the same scope of work.

Response

a) Internal regular staff supported the outage work rather than the budgeted external contractors due to regular staff availability. Regular staff costs are budgeted and charged to base OM&A, whereas external contractors are budgeted and charged to outage OM&A. The substitution of regular staff in the place of external contractors created a 2014 actual to budgeted positive variance of $1.4M in base OM&A (out of the total variance shown of $1.6M).

b) Estimated contractor costs for the same scope of work is $1.6M versus $1.4M for internal labour resulting in an estimated savings of approximately $0.2M.
**AMPCO Interrogatory #111**

**Issue Number: 6.1**

**Issue:** Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

**Interrogatory**

**Reference:**
Ref: F2-3-1 Table 1 Nuclear Project OM&A

**Response**

a) Please provide the number of FTEs allocated to each of the project categories shown for regular and non-regular staff for the years 2013 to 2021.

b) Please provide the labour and overtime costs separately for regular and non-regular staff for the years 2013 to 2021.

a) See Chart 1 below.
## Chart 1

### Project OM&A FTEs - Nuclear

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**FTEs not planned at detailed level**

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Witness Panel: Nuclear Operations and Projects
b) See Chart 2 and Chart 3 below.

### Chart 2

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Labour not planned at detailed level

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Labour not planned at detailed level

Witness Panel: Nuclear Operations and Projects
### Chart 3

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**Overtime not planned at detailed level**

Total Project OM&A Overtime | 2.0 | 1.3 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
**AMPCO Interrogatory #112**

**Issue Number: 6.1**

**Issue:** Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

**Interrogatory**

**Reference:**
Ref: F2-4-1 Table 1 Nuclear Outage OM&A

a) Please provide the number of FTEs allocated to each of the Nuclear Stations and the Nuclear Support Division categories for regular and non-regular staff for the years 2013 to 2021.

b) Please provide the labour and overtime costs separately allocated to each of the Stations and Support functions shown for regular and non-regular staff for the years 2013 to 2021.

**Response**

a) Please see the tables below.
### Outage OM&A FTEs - Nuclear

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| Total Outage OM&A Labour | 45.6 | 45.5 | 50.6 | 66.3 | 71.8 | 71.5 | 65.8 | 49.8 | 34.1 |
### Outage OM&A Overtime - Nuclear ($M)

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**Total Outage OM&A Overtime (F2-4-1 Table 2 & 3)**

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AMPCO Interrogatory #113

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
Ref: F2-4-1 Table 2 Nuclear Outage OM&A

a) Please recast the Table to provide the labour and overtime costs separately for regular and non-regular staff for the years 2013 to 2021.

Response
1 a) Please see recast table below.

### Outage OM&A by Labour and Overtime - Nuclear ($M)

<table>
<thead>
<tr>
<th>Line No.</th>
<th>Division</th>
<th>Regular Labour</th>
<th>Non-Regular Labour</th>
<th>Regular Overtime</th>
<th>Non-Regular Overtime</th>
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<tbody>
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<td>(a)</td>
<td>(b)</td>
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<td>(b)</td>
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<td>0.0</td>
</tr>
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<td></td>
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### Actual - Year Ending December 31, 2013

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### OEB Approved - Year Ending December 31, 2014

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### Outage OM&A by Labour and Overtime - Nuclear ($M)

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### Plan - Year Ending December 31, 2018

**Nuclear Stations:**

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<th>Non-Regular Labour</th>
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<th>Non-Regular Overtime</th>
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<th>Non-Regular Labour</th>
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<th>Non-Regular Labour</th>
<th>Regular Overtime</th>
<th>Non-Regular Overtime</th>
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<th>Non-Regular Labour</th>
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AMPCO Interrogatory #114

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
Ref: F2-6-1

a) Please provide the forecast and actual purchases by vendor for the years 2013 to 2015.

b) Please provide the OM&A Purchased Services Nuclear Operations forecast for 2016 to 2021.

Response

a) OPG did not forecast purchases of OM&A services for nuclear operations by vendor for the period 2013-2015. Four vendors were identified in Chart 1 in Ex. F2-6-1, pp. 2-3 as having provided services in excess of a $17M threshold over the period 2013-2015. These vendors are AMEC-NSS, Black & McDonald Ltd., ES Fox Ltd. and Candu Owners Group. Aggregated amounts were provided in Ex. F2-6-1. Chart 1 below sets out the actual purchases over the period 2013-2015 by vendor. For confidentiality reasons, the vendors have been identified as A, B, C and D. Please note that the correct 2014 total amount is $129.4M as shown in Chart 1 below; the total amount for 2014 shown in Ex. F2-6-1, page 1, line 24 is incorrect.

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<td>C</td>
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<td>136.2</td>
<td>129.4</td>
<td>166.7</td>
</tr>
</tbody>
</table>

b) Chart 2 below shows the Nuclear Operations OM&A Purchased Services forecast for each year from 2016-2021.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>(b)</td>
<td>(c)</td>
<td>(d)</td>
<td>(e)</td>
<td>(f)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Total OM&amp;A Purchased Service</td>
<td>365.3</td>
<td>446.8</td>
<td>466.0</td>
<td>486.8</td>
<td>515.6</td>
</tr>
</tbody>
</table>
**Issue Number: 6.1**

**Issue:** Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

---

**Interrogatory**

**Reference:**
Reference: Ex. F2/T2/S1/p. 1

The evidence states that OPG continues to implement various value for money, fleet wide and site initiatives to reduce costs as part of a focus on continuous improvement. Please specifically identify these initiatives and their impact in each of the test years (the cost reductions embedded in the forecasts).

---

**Response**

OPG initiatives currently being implemented as part of the 2016-2018 business plan are listed in Ex. F2-1-1, pp. 19-21.

The implementation of these initiatives will enable OPG to achieve and sustain the operational and value for money targets listed in Ex. F2-1-1 (see L-6.1-15 SEC-55).

Please also see L-6.2-20 VECC-25(b).
**CCC Interrogatory #26**

**Issue Number: 6.1**

**Issue:** Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

**Interrogatory**

**Reference:**
Reference: Ex. F2/T4/S1/p. 1

Please set out in detail how OPG developed its forecast outage OM&A expenses for the test period. When was this forecast produced?

**Response**

OPG develops its forecast of outage OM&A expenses as part of its business planning process. The process begins with a refresh and challenge of major scope required to be completed by each outage in the planning period. This typically defines the duration and flow of each outage. The outage plans are updated based on scope changes resultant from inspection programs, component aging management and system health analysis, and discovery work. The hours required to complete the scope as defined above is determined and a resource plan is developed to determine the required mix of regular, non-regular, augmented staff, other purchased services and overtime. Request for Interest quotations for contractor work are solicited from qualified vendor partners. Materials costs are estimated based on the amount of work in the outage overlaid with major materials purchases.

The forecast for this rate filing was developed in 2015 as part of the 2016-2018 Business Plan (Ex. A2-2-1 Attachment 1).
**ED Interrogatory #17**

**Issue Number: 6.1**

**Issue:** Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

**Interrogatory**

**Reference:**
Reference: Exhibit F2, Tab 1, Schedule 1, Table 1

(a) Table 1 includes $6.2 million from 2017 to 2021 for Darlington New Nuclear OM&A. Please provide a detailed breakdown of these costs;

(b) Please provide all directives and correspondence from the Ministry of Energy and/or the Independent Electricity System Operator in the past 5 years relating to the possibility of building new reactors at Darlington; and

(c) Please provide a detailed justification explaining why an expense of $6.3 million for the Darlington New Nuclear Project is prudent seeing as that project is not proceeding at the current time.

**Response**

(a) Exhibit F2-1-1 Table 1 Line 6 and corresponding Footnote 1 provide an annual forecast of new nuclear at Darlington expenditures included in the test period revenue requirement. Table 1 below provides a breakdown of those costs.

**Table 1**

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNSC Licence Fees</td>
<td>0.8</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
</tr>
<tr>
<td>Reg Affairs / Licence Support</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Project Management / Environment</td>
<td>1.4</td>
<td>0.4</td>
<td>0.7</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2.3</strong></td>
<td><strong>1.4</strong></td>
<td><strong>1.7</strong></td>
<td><strong>1.8</strong></td>
<td><strong>1.8</strong></td>
</tr>
</tbody>
</table>

Pursuant to the recommendations attached to the approval of the environmental assessment (“EA”) and site preparation licence for the Darlington New Nuclear Project, OPG has been working on the development of a methodology for location of the intake and diffuser structures and a bank swallow mitigation program. CNSC staff accepted these two programs as suitable activities to maintain the site preparation licence. These programs require sufficient lead time to collect the data and develop the results.
The non-license fee amounts reflect project management activities to support the EA and licence, licence support from Nuclear Regulatory Affairs, Environment staff technical support with responsibility for executing these programs, and environmental consulting services to perform analyses in support of the programs. There are also amounts allocated for management and governance to support the CNSC site preparation licence and legal support.

(b) The 2013 Long Term Energy Plan provides direction to OPG to maintain the necessary approvals should future construction of new reactors at Darlington be required, as follows: "Ontario continues to have the option to build new nuclear reactors in the future, should the supply and demand picture in the province change over time. The ministry will work with OPG to maintain the licence granted by the Canadian Nuclear Safety Commission, to keep open the option of considering new build in the future" (p. 29).

(c) Please refer to part (a) and (b).
GEC Interrogatory #23

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:

In 2014, Canada’s three reactor operators wrote to the Canadian Nuclear Safety Commission complaining that increased regulatory requirements have resulted in incremental one-time costs measured “in the hundreds of millions as well as ongoing year over year costs to maintain the capability measured in several tens of millions.” (See: A-2015-00037 Regulatory Framework Costs.pdf, attached).

Please provide a breakdown of these increased one-time and ongoing costs due to increased CNSC regulatory requirements.

Response

GEC has mischaracterized OPG’s letter to the CNSC as a complaint. See GEC’s Document, “A-2015-00037 Regulatory Framework Costs.pdf” at pages 8-10. As the letter’s opening paragraph clearly states:

The purpose of this letter is to provide comments and recommendations on the Canadian Nuclear Safety Commission (CNSC) process for development of new regulatory requirements, guidance and documents.

Contrary to the suggestion in GEC’s interrogatory, OPG’s letter does not say that it has incurred incremental costs “in the hundreds of millions as well as ongoing year over year costs to maintain the capability measured in several tens of millions.” Instead, OPG’s letter says:

OPG has always supported making investments that are reasonably expected to improve the safe, reliable operations of our nuclear facilities. The Canadian nuclear industry’s demonstrated excellent safety record is evidence of our support for the improvements to health and safety, security and the environment that is the intended purpose of regulatory document, but the efficiency and effectiveness of such controls is also important.

Much of the work that OPG does at its nuclear facilities is undertaken to enable it to operate pursuant to its CNSC licence. Regulatory costs are spread throughout the requested amounts for Base, Project and Outage OM&A, as well as in the requested capital

Witness Panel: Nuclear Operations and Projects
1. expenditures and are not separately identified. It would not be possible to provide the
2. requested breakdown within a reasonable period of time.
GEC Interrogatory #24

Issue Number: 6.1
Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
In 2014, OPG told the CNSC in regard to the 2013 licence for the Pickering Nuclear Generating that “….a total of eleven new or revised CSA Standards and CNSC Regulatory Documents were adopted in the licence, and currently approximately twenty new or revised CSA Standards and CNSC Regulator Documents (REGDOCs) are proposed for inclusion in the 2015 Darlington licence on its renewal. Each of these new regulatory documents have resulted in increased requirements and costs.” (See: A-2015-00037 Regulatory Framework Costs.pdf, attached)

Please provide a breakdown of the anticipated additional costs resulting from the additional regulatory requirements in the 2013 Pickering and 2015 Darlington operating licences. Where do these costs appear in the costs filed before the OEB in this proceeding?

Response

Please see OPG’s response to Ex. L-6.1-8 GEC-23.
**GEC Interrogatory #25**

**Issue Number: 6.1**

**Issue:** Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

**Interrogatory**

**Reference:**

FOI Pickering Action plan 2015 15-058.pdf (copy attached) lists safety related initiatives at Pickering and notes that ‘whole site based safety goals’ are in development with tentative completion dates of phases A, B and C in 2015, 2016 and 2017. (More specifically, “Phase A results/status will be provided to the CNSC in the February 2016 update”).

Please provide a copy of the 2016 update on the Pickering risk improvement plan as required under licence condition 5.1 of PROL 48.01/2018 and any available cost estimates for safety improvements that may flow from the study.

**Response**

As documented in the Pickering Risk Improvement Plan (P-CORR-00531-04672) provided to the CNSC in February 2016 (see Attachment 1), OPG took measures to improve cable tracing for selected systems and develop a methodology to enhance the Fire PSA at Pickering. The overall cost of these improvements is approximately $1.2M.
February 26, 2016

CD# P-CORR-00531-04672

MR. M. SANTINI
Director
Pickering Regulatory Program Division

Canadian Nuclear Safety Commission
280 Slater Street
Ottawa, Ontario
K1P 5S9

Dear Mr. Santini:

Pickering NGS: Risk Improvement Plan Update

Pursuant to Licence condition 5.1 of Pickering Power Reactor Operating Licence PROL 48.02/2018 and as described in the Licence Conditions Handbook LCH-PNGS-R004, the purpose of this letter is to submit the annual routine report on the status of implementation of the risk improvement plan provided in Commission Member Document CMD 14-M42.1 (Reference 1). This letter provides an update on the implementation status of Pickering NGS Risk Improvement plan that was provided to the CNSC in Reference 2.

The required update is in Attachment 1. This covers:

- Updates on improvements that have been implemented.
- Updates on work related to whole-site Probabilistic Safety Assessment (PSA)
- Conclusions and potential future improvements.

Enclosure 1 provides, on a compact disc, references 6, 7, 9 and 12 of Attachment 1 used in support of this update.

If you have any questions, please contact Carlos Lorencez, Director, Nuclear Safety Division at 905-839-6746 extension 5024.

Brian McGee
Senior Vice President
Pickering

cc: CNSC Site Office – Pickering
References:


Attachments:

1. 2016 Pickering Risk Improvement Plan Update

Enclosures:

1. Compact Disc containing:

   OPG Record, NA44-REP-03611-0581946, “Pickering A Internal Events PSA Model Update to Credit EME via EBWS Header”, February 9, 2016.


ATTACHMENT 1

2016 Pickering Risk Improvement Plan Update

This attachment updates the Pickering NGS Risk Improvement plan that was provided in Commission Member Document CMD 14-M42.1 in Reference 1. In addition, this attachment provides an update on the improvements provided to the CNSC in Reference 2. This covers:

- Updates on improvements that have been implemented.
- Updates on work related to whole-site Probabilistic Safety Assessment (PSA)
- Conclusions and potential future improvements.

Status on Improvements that have been implemented

Reference 2 had concluded that the immediate priorities are to reduce Pickering A Severe Core Damage Frequency (SCDF) and Large Release Frequency (LRF) for Internal Fires and reduce Pickering A LRF for Internal Events At-Power.

Table 1 shown below, provides an update on improvements discussed in Reference 2.

<table>
<thead>
<tr>
<th>Improvement</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase I EME modifications</td>
<td>Complete</td>
</tr>
<tr>
<td>Passive Autocatalytic Recombiners</td>
<td>Complete</td>
</tr>
<tr>
<td>Tie-down of EME equipment for high wind</td>
<td>Complete</td>
</tr>
<tr>
<td>Procedural changes for deployment of Phase I EME</td>
<td>Complete</td>
</tr>
<tr>
<td>Analysis of environmental impact of large feedwater line break in PNGS A powerhouse</td>
<td>Complete</td>
</tr>
<tr>
<td>Other analytical enhancements for FAP updated PSAs</td>
<td>Complete</td>
</tr>
<tr>
<td>Emergency makeup water to refill ECI storage tank</td>
<td>Complete</td>
</tr>
<tr>
<td>Flood barriers at PNGS buildings</td>
<td>Complete</td>
</tr>
<tr>
<td>Accounting for percentage of time in Guaranteed Shutdown State</td>
<td>Complete</td>
</tr>
<tr>
<td>EME modifications (Phase I enhancement e.g., quick connect, and Phase II)</td>
<td>Implementation per the plan and schedule provided for FAI 1.7.1 closure (References 3, 4 and Note #1 below)</td>
</tr>
<tr>
<td>Extension of Auxiliary Power Supply (APS) mission time to 72 hours</td>
<td>Complete (see Note #2 below)</td>
</tr>
<tr>
<td>Analysis to remove conservatism from level 2 outage assumptions</td>
<td>Complete (see Note #3 below)</td>
</tr>
<tr>
<td>Trace cables for select systems which are currently not credited in the Fire PSA</td>
<td>Complete (see updates on Note #4 below)</td>
</tr>
<tr>
<td>Crediting of some SAMG operator actions where possible, e.g., FADS activation</td>
<td>Complete (see updates on Note #5 below)</td>
</tr>
</tbody>
</table>
Facilitate EME hook-up south of H-line to improve EME benefit for accident scenarios that impose environmental restrictions on turbine building accessibility (e.g., large secondary side line breaks and large turbine hall fires).

Complete (see updates on Note #1 and Note #6 below)

Manual containment box-up after major turbine-generator fires

Complete (see updates on Note #7 below)

The notes below in italics show OPG progress from the previous action plan (Reference 2).

Notes:

1. Reference 2 included OPG plans to facilitate EME makeup to the Pickering A boilers by adding a new EME connection to the Emergency Boiler Water Supply (EBWS) at Unit 2. This connection is now in place and available for service.

   Physical changes have been implemented and procedures have been revised to support use of new EME connection points (Reference 5). Analysis has been performed to assess risk reduction in the Pickering A LRF for Internal Events by crediting this connection point (Reference 6). A sensitivity case was performed to credit all EBWS failures and results in Reference 6 conclude that providing an alternate EME connection point to supply the boilers provides a slight benefit for Level 2 At-Power Internal events LRF. The results show only a minor decrease in LRF due to the EME pump suction still being located in the turbine hall, which can be exposed to harsh environments during internal events.

2. Extended APS generator operation has been reviewed. On-site fuel capacity allows adequate time (~30 hours) for on-site fuel stocks to be replenished. In addition, it has been concluded that the generators can continue to operate during re-fuelling. Procedures have been revised to support extended operation of APS, including any necessary re-fuelling.

3. New analysis in Reference 8 concludes that the likelihood of Early Calandria Vessel Failure (ECVF) is negligible for accidents that initiate more than 10 days after the start of an outage. This will provide a small reduction in the predicted LRF for all Level 2 outage PSAs. Since outage risk is not an immediate priority, no further action is needed at this time. The new ECVF estimate will be factored into the next outage PSA update for Pickering A.

4. OPG has completed two important studies related to cables and the Pickering 014 Fire PSA. The S-294 Fire PSA credited only a very limited number of mitigating systems for which detailed cable information was available. OPG has completed a comprehensive Cable Tracing study which credits two additional mitigating functions: Calandria Spray cooling and maintaining Heat Transport System Liquid Relief Valves closed, along with their supporting systems. The Fire SCDF and LRF risk results were improved by identifying additional components to be credited and tracing cables in these mitigating functions, thereby allowing them to be credited in the Fire PSA.
Cable tracing has been completed and analysis has been performed (Reference 9) to assess risk reduction in the Pickering 014 SCDF/LRF for Internal Fire At-Power by crediting these additional mitigating functions. Results show a 20% reduction in the Fire SCDF and a 16% reduction in LRF.

Procedural Changes:

5. SAMG enabling instruction NK30-SAM-09013-10000-ENI32 has been issued to support powered operation of the Filtered Air Discharge System (FADS) under beyond design basis accident (BDBA) conditions. Similar procedures for un-powered FADS operation under BDBA conditions were prepared and have been issued. These new procedures will allow FADS operation to be credited for BDBA sequences (References 10 and 11). The resulting risk improvement will be reflected in the 2017/2018 updates for Pickering.

Potential for FADS un-powered operation to reduce LRF has been qualitatively investigated and the results are documented in Reference 12. The results show credit for un-powered FADS operation is expected to have a negligible impact on reducing the frequency of large releases. On the other hand, FADS venting (either powered or un-powered) has a potential to reduce LRF when coupled with other EME actions such as make-up to the calandria vessel that can ensure In-Vessel Retention (IVR) of debris.

6. This is an improvement in the plan that has arisen from work on an initiative previously identified as “being considered”. As discussed below, OPG considered analysis of turbine building response to catastrophic fires involving generator hydrogen and/or turbine oil. This led to the conclusion that risk could be reduced by EME deployment south of H-line. It was then further realized that this could also reduce risk for any accident that might threaten turbine building accessibility. Given the potential benefit, it was decided to include this as an “improvement to be implemented”. Changes to the physical plant have already been made as part of planned EME upgrades.

EME guidelines and supporting procedures have been revised to highlight and support available deployment options (See Note #1 above). Status (including estimated risk improvement) is provided in Reference 7 and the results show slight improvement to Internal Fire SCDF & LRF. Only a minor reduction in results is observed due to the EME pump suction still being located in the turbine hall, which can be exposed to a harsh environment during turbine building internal fire events.

7. This is a new committed improvement. Review of Reference 13 highlighted that a notable LRF contribution in the Fire PSA is inability to close the containment isolation dampers due to fire-induced “hot shorts”. The intent of this new action is to assess manual damper closure to avert this containment bypass and resulting large release.

Procedural changes have been initiated for operator to manually close containment isolation dampers (Pickering A TPAR-28812). An estimate of the resulting risk improvement has been performed for Level 2 Internal Events and Level 2 Internal Fires and is provided in Reference 6 and Reference 7. Improvements to the Level 2 Internal events results are negligible. Internal Fire results show a reduction of approximately 6% in LRF values.
Table 2 shows the risk improvement (as “point estimates”) to the Internal Fires SCDF/LRF from the physical, procedural and analytical improvements discussed above. The updated estimate is compared to the previous SCDF and LRF results submitted to the CNSC (Reference 14). The overall improvement is a 29% reduction in Fire SCDF and 27% improvement in Fire LRF results.

<table>
<thead>
<tr>
<th>Study</th>
<th>Fire SCDF (occ/r-yr)</th>
<th>Fire LRF (occ/r-yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARA-Fire FAP Enhancements</td>
<td>4.73E-05</td>
<td>8.42E-06</td>
</tr>
<tr>
<td>Cable Tracing Update</td>
<td>3.79E-05</td>
<td>7.08E-06</td>
</tr>
<tr>
<td><strong>Current assessment – Baseline Case:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• EME redeployment for obvious EBWS failures</td>
<td>3.70E-05</td>
<td>6.64E-06</td>
</tr>
<tr>
<td>• Recovery action for containment isolation dampers</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Current assessment – Sensitivity Case:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• EME redeployment for all EBWS failures</td>
<td>3.68E-05</td>
<td>6.62E-06</td>
</tr>
<tr>
<td>• Recovery action for containment isolation dampers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Whole-site Based Safety Goals and PSA Methodology

Although not strictly part of the Pickering risk improvement plan, whole-site PSA is a related issue for which OPG committed to provide an update.

COG Joint Project JP-4499 has been initiated to develop whole-site based safety goals and PSA methodologies (see References 15 and 16).

Per section 2.3 of Reference 1, the work is being done in 3 phases:

- Phase A - Safety goals framework (TCD – Q2- 2016)
- Phase B - Risk aggregation studies (TCD - 2016),
- Phase C - Pilot whole-site PSA for PNGS (TCD - 2017).

Work has progressed in collaboration with the industry, and the CNSC will be informed about results/status in the next annual update of this risk improvement action plan.

Conclusions and potential future improvements

OPG has invested significant time and effort and taken appropriate follow-up actions for all of the committed and potential risk improvements identified in Reference 2. The risk improvements can now be summarized as follows:

- Pickering A SCDF and LRF are below limits but exceed target for internal fire scenarios because of uncertainty about cable routing, the potential for isolation damper failure, and the possibility of a serious fire preventing EME deployment. Physical changes to the plant have now been implemented, which allows for an additional connection point
to inject EME. Specific and credible actions have been completed as procedural changes to provide manual closure of containment isolation dampers. Cable tracing analysis has also been completed to credit additional mitigating functions to improve fire risk results.

- Similarly, Pickering A LRF exceeds target for Internal Events At-Power (e.g., large secondary side pipe breaks) that produce harsh environments that can impede EME deployment. Again, alternate EME connection capability, as well as FADS unpowered venting procedures to support BDBA conditions, and actions to manually close containment dampers were committed improvements that have been implemented.

Some of the initiatives implemented resulted in a significant risk reduction to Internal Fires SCDF and LRF results. However, despite the significant effort, committed improvements in Table 1 were found to be insufficient in reducing the risk below the safety goal targets.

- For both fires and internal events at-power, plant environment conditions may prevent EME deployment. Adding the new EME connection point to supply boilers has partially addressed this concern, hence the limited reduction in SCDF and LRF.
- Cables traced for additional mitigating functions that were not credited in the fire PSA, have resulted in a 20% reduction in the Fire SCDF and 16% in LRF. In the interim, OPG does not intend to pursue any further cable tracing updates due to the diminishing returns based on the current methodology.
- Manual closure of Containment dampers has shown a relative improvement in the Fire LRF result (6%).
- FADS un-powered venting qualitative assessment concluded that the impact on reducing Internal Events At-power LRF is negligible. However FADs venting (either powered or un-powered) has a potential to reduce LRF when coupled with other EME actions such as make-up to the calandria vessel that can ensure IVR of debris.

Potential items to further reduce the Internal Events LRF and Fire SCDF/LRF will be considered in the 2018 PARA S-294 update:

- Phase 2 EME: When the Phase 2 EME modifications are complete, additional capability (building coolers and the powered FADS operation) will be available to increase the energy capacity of containment; which will reduce LRF.
- Updates to the Fire PSA methodology, based on international practice. Fire PSA methodology continues to evolve. Since the S-294 submission, best practices have been refined on a number of Fire PSA elements. These will be incorporated into the 2018 PARA update to the extent practicable. Some of these changes represent reductions in the previously conservative approaches as the result of improved industry research. Incorporation of such elements will have a beneficial impact on the fire risk result.
- Investigate potential reduction in LRF when crediting FADS venting along with EME actions that will likely prevent failure of calandria vessel, i.e., ensure successful IVR.
- Using ACUBE to refine fire results is expected to further reduce SCDF and LRF results.
- Investigate relocating EME pump suction out of turbine hall (See discussion in Note 1 and 6).
- Additional Analysis to remove conservatisms in PSA Assumptions.
In the next annual update the risk improvement plan will provide an update on the results/status of Whole Site Based Safety Goals and PSA Methodology; specifically, the Phase A Safety goals framework and Phase B Risk aggregation studies. Additional risk reduction measures (listed above) will be addressed earlier than the 2018 S-294 update, to the extent practicable.

References for Attachment 1:


GEC Interrogatory #29

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Reference:

Please confirm that the province has committed to hold public consultations on modernizing Ontario’s offsite nuclear plans post Fukushima and consider more severe accidents and confirm that the province has yet to consult the public or update offsite emergency measures post Fukushima.

Response

OPG declines to provide the requested information on the basis of relevance. This interrogatory seeks information on Provincial consultations that is not relevant to deciding any issue on the approved Issues List in this application.
GEC Interrogatory #30

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:

How much does OPG provide to municipalities and the province of Ontario to maintain offsite emergency measures around the Pickering and Darlington nuclear stations?

Response

OPG provides approximately $2.6M annually to the province and municipalities to maintain offsite emergency measures for its nuclear facilities.
GEC Interrogatory #31

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Reference:

Has OPG estimated what additional costs it may incur if the government of Ontario expands the current 10 kilometer evacuation zone (referred to as the Primary Zone) around Darlington and Pickering to 20 km or more? If so, please provide the cost estimates.

Response

No cost estimates have been prepared on the basis of expanding the 10 km evacuation zone around Darlington and Pickering to 20 km or more.
**GEC Interrogatory #32**

**Issue Number: 6.1**

**Issue:** Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

**Interrogatory**

**Reference:**

In 2014, the CNSC amended its emergency preparedness guidance to require potassium iodide (KI) pills be delivered to all residents within the 10 km primary zone and made available to anyone who wants them within the 50 km secondary zone by the end of 2015.

(a) How much has OPG spent to meet this regulatory requirement? Please break down costs between the pre-distribution in the 10 km primary zone and availability within the 50 km secondary zone.

(b) Is the cost of maintaining this programme included within the LUEC for the Darlington life-extension?

(c) Has OPG estimated how much it would cost if a decision is made to require KI pre-distribution in the event that the province decides to expand the primary zone beyond 10 km? If so, please provide these estimates.

(d) How often will OPG need to re-distribute these KI pills to meet regulatory requirements moving forward?

**Response**

a) OPG declines to provide the requested information on the basis of relevance. OPG is not seeking approval of 2014 or 2015 OM&A expenditures in this application.

b) Yes, these costs are included in the Support Costs component of the post-refurbishment costs set out in Ex. D2-2-8, Attachment 1, p. 17.

c) No cost estimates have been prepared on the basis of the province deciding to expand the primary zone beyond 10 km (see Ex. L-6.1-8 GEC-31).

d) KI pills are distributed each month upon request and three times per year to new residents and businesses.
GEC Interrogatory #57

Issue Number: 6.1
Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:

In 2015, the Nuclear Liability and Compensation Act received royal assent. The Act increases operator liability from $75 million to $1 billion.

a. Please provide estimated increases in accident insurance premiums between 2015 and 2021 to comply with the NLCA.

b. Please indicate if the increased premiums have been included in the evaluations of Pickering continued operations and in the DRP estimates filed.

Response

a) As reflected in Ex. F4-4-1 Table 1, line 3, the actual (2015) and planned (2016-2021) costs associated with the increased nuclear liability insurance limits prescribed by the Nuclear Liability and Compensation Act are provided in the table below. Please refer to L-6.8-20 VECC-35 for further details.

<table>
<thead>
<tr>
<th></th>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Premiums for Higher NLCA Nuclear Liability Limits*</td>
<td>0</td>
<td>11</td>
<td>13</td>
<td>15</td>
<td>17</td>
<td>17</td>
<td>17</td>
<td>78</td>
</tr>
</tbody>
</table>

*Numbers may not add due to rounding

b) OPG confirms that the increased premiums have been included in the costs used in the evaluations of Pickering Extended Operations (Ex. F2-2-3, Attachment 2) and in the Darlington Refurbishment Execution Phase Business Case Summary (Ex. D2-2-8, Attachment 1).
GEC Interrogatory #58

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:

The government’s 2013 Long Term Energy Plan directive instructed OPG to maintain the approvals to permit the potential future construction of new reactors at Darlington.

a. Please provide a breakdown of how much OPG has or will spend to maintain its approvals to build new reactors since 2011 through 2016.

b. What costs will OPG incur to maintain approvals during 2017 through 2021?

c. Where do these costs appear in the application (i.e. in what component, rider or deferral account)?

Response

a) New build costs incurred from 2011 through to 2016 are provided in Chart 1 below ($M):

<table>
<thead>
<tr>
<th></th>
<th>2011 (Actual)</th>
<th>2012 (Actual)</th>
<th>2013 (Actual)</th>
<th>2014 (Actual)</th>
<th>2015 (Actual)</th>
<th>2016 (Budget)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>15.7</td>
<td>24.7</td>
<td>25.6</td>
<td>1.5</td>
<td>1.3</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Expenditures incurred from 2011-2013 included regulatory hearings and licensing process requirements, environmental compliance and monitoring activities, site readiness activities and vendor Selection / project planning.

b) Refer to Ex. F2-1-1 Table 1 Line 6.

c) Refer to L-6.1-1 Staff-95.
SEC Interrogatory #53

Issue Number: 6.1
Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
[F2/1/1, p.14]

What is the makeup of the OPG Nuclear Executive Committee? How often do they meet?

Response

The OPG Nuclear Executive Committee is made up of the Chief Nuclear Officer and President, Nuclear, his direct reports, and other senior executives providing services to Nuclear. The makeup is as follows:

- Chief Nuclear Officer and President, Nuclear
- Deputy Chief Nuclear Officer
- Senior Vice President, Nuclear Engineering and Chief Nuclear Engineer
- Senior Vice President, Pickering Nuclear
- Senior Vice President, Darlington Nuclear
- Senior Vice President, Decommissioning and Nuclear Waste
- Senior Vice President, Nuclear Projects
- Vice President, Security and Emergency Services
- Vice President, Fleet Operations and Maintenance
- Vice President, Nuclear Finance
- Vice President, Nuclear Regulatory Affairs and Stakeholder Relations
- Vice President, HR Business Partners Nuclear
- Vice President, Inspection and Maintenance Services
- Vice President, Learning & Development
- Chief Supply Officer
- Director, Nuclear Oversight

The Nuclear Executive Committee meets bi-weekly (approximately 23-26 times per year).
SEC Interrogatory #54

Issue Number: 6.1
Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
[F2/1/1, p.15, Table 4]

Please provide the full operational and financial targets for each year between 2017 and 2021.

Response

OPG’s 2016-2018 Business Plan (Ex. A2-2-1 Attachment 1) includes financial information for the full five years of the IR term.

Full operational and financial targets were developed for 2016-2018 as part of 2016-2018 Business Plan and targets for key metrics were developed for the forecast years 2019-2021.

Chart 4 in Ex. F2-1-1, p.15 sets out detailed OPG nuclear operational and financial targets for the 20 benchmark performance indicators for the 2016-2018 period.

Targets for the three key metrics were necessary to develop the generation and financial plan for 2019-2021 are provided in Chart 5 in Ex. F2-1-1, p.17.
SEC Interrogatory #55

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
[F2/1/1, p.19]

For each of the listened initiatives, please provide the expected OM&A savings for each year between 2017 and 2021.

Response

While the business plan is based on the successful execution of the initiatives, OPG cannot quantify specific OM&A savings attributable to individual initiatives. The initiatives have varied and, in some cases, overlapping effects on OPG’s performance. Some are focused on operational matters to improve reliability to meet production targets (e.g., Forced Loss Rate and Unit Capability Factor), while others are aimed at offsetting cost pressures. Overall, the successful implementation of these initiatives is necessary to enable OPG to achieve and sustain the operational and value for money targets listed in Ex. F2-1-1.
SEC Interrogatory #56

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
[F2/1/1, p.19]

Please provide further details regarding the Human Performance Initiative. Please explain specifically how OPG is planning on improving “supervisory effectiveness and leadership oversight”.

Response

The Human Performance Initiative is focused on three key elements during the 2016-2018 business plan period: Leadership Accountability, Supervisor Effectiveness, and Procedure Use and Adherence. The specific activities related to each of these elements are summarized below.

Leadership Accountability:
1. Standardize the criteria for department level Human Performance Event resets in alignment with industry best practices.
2. Review all Human Performance Program documents to ensure alignment with industry best practices.
3. Conduct regular Management Review Boards to review crew and section performance and field observations.
4. Develop and implement leadership workshops to improve performance of Managers and Section Managers.
5. Benchmark industry best practices related to Human Performance Review Boards and implement recommendations for OPG.

Supervisor Effectiveness:
1. Using a cross-functional team, review the current process for field observation and coaching and implement improvements recommended by the team.
2. Develop and implement training to improve supervisory coaching skills.
3. Review industry best practices for supervisor rating/scorecarding and implement a standardized process across OPG.
Procedure Use and Adherence:

1. Deliver training to all levels of leadership to drive alignment for the expected behaviours related to Procedural Use and Adherence.

2. Implement a Rapid Revision Process for procedures to ensure updates are available for next required use.

3. Develop and execute a communications campaign to drive an improved understanding of procedure adherence and place keeping requirements.

4. Promote Peer-to-Peer coaching to encourage staff to give and accept coaching from peers in areas of safety and work practices.

5. Update the Nuclear General Employee Training to include key messages related to Human Performance Tools.

Improvements to 'supervisory effectiveness and leadership oversight' are related to the activities listed as part of the Leadership Accountability and the Supervisor Effectiveness elements of the Human Performance Initiative described above. In addition to these initiatives and the current supervisor training programs, a new 4-Step Leadership Training & Qualification Process has recently been designed and implemented for all Refurbishment Construction Supervisors. This two-day Nuclear Construction Supervisor Academy educates vendor supervisors on the basic nuclear fundamental elements, shows the relevance of these elements to their job role and how they can impact Nuclear Power Plant performance. In addition, a hands-on Dynamic Learning Activity, paired observations and an Oral Review Board are elements of ensuring qualified, competent supervisors are utilized to support Refurbishment construction and maintenance activities.
SEC Interrogatory #57

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
[F2/2/2, p.20]

What are the 19 deliverables of the Parts Improvement Initiative?

Response

See Ex. L-6.2-19 SEP-7 part (a).
SEC Interrogatory #58

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference: [F2/1/1/, p.21]

Please provide full details regarding the Workforce Planning and Resource Initiative. Please provide copy of any formal OPG document setting out the details of the initiative.

Response

See response to L-1.2-2 AMPCO-5.
**SEC Interrogatory #59**

**Issue Number: 6.1**

**Issue:** Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

**Interrogatory**

**Reference:**

[F2]

For each unit, please provide a table showing the Force Loss Rate, by year, and by contributing cause.

**Response**

The historical annual Forced Lost Rate (FLR) for the historical years 2013-2015 is as follows:

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pickering annual FLR (%)</td>
<td>9.73</td>
<td>10.72</td>
<td>2.89</td>
</tr>
<tr>
<td>Darlington annual FLR (%)</td>
<td>4.84</td>
<td>1.50</td>
<td>4.86</td>
</tr>
</tbody>
</table>

Contributing causes to the FLR by year by unit per station over 2013-2015 are presented below:
## Forced/Sudden Outages at Pickering in 2013

| Unit   | Start Date/Time | End Date/Time | Duration (Days) | Cause  | Gross Prod Loss (TWh) | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------|-----------------|---------------|-----------------|--------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
| Unit 7 | 25/Apr/13       | 15:10         | 28/Apr/13       | 09:59  | 2.8                   | HP 0.04 Forced Outage. Turbine tripped on loss of Condenser Vacuum. See SCR P-2013-05982.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Unit 4 | 24/May/13       | 03:48         | 26/May/13       | 15:50  | 2.5                   | ER 0.03 Forced Outage. Unit transient leading to Turbine trip due to Moderator Calandria Hot Valve failing closed. See SCR P-2013-07604.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Unit 4 | 05/Jun/13       | 22:14         | 16/Jun/13       | 23:07  | 13.0                  | HP 0.17 Forced Outage to inspect electrical connections to meet environmental regulations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Unit 7 | 06/Jul/13       | 09:10         | 15/Jul/13       | 02:47  | 38.7                  | HP 0.50 Forced Outage to inspect electrical connections to meet environmental regulations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Unit 2 | 22/Jul/13       | 09:16         | 02/Aug/13       | 08:49  | 14.0                  | ER 0.18 Forced Outage due to DCC failure. See SCR P-2013-10215.                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Unit 6 | 10/Aug/13       | 21:42         | 15/Aug/13       | 23:22  | 5.1                   | ER 0.07 Forced Outage due to Turbine trip during T-12 test. See SCR P-2013-10068.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Unit 6 | 23/Aug/13       | 22:19         | 06/Sept/13      | 09:56  | 13.5                  | ER 0.17 Forced Outage due to Fueling Machine stuck on channel with fuel in cross flow. See SCR P-2013-11320. Return to service time is actual.                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Unit 1 | 27/Sept/13      | 08:27         | 18/Oct/13       | 21:00  | 21.5                  | ER 0.28 ABNO / Forced Outage. Turbine trip due to 230 kV protection trip to MOT. Unit remained offline in October in a Forced Outage due to problems with the Heat Transport Pressurizing Pumps.                                                                                                                                                                                                                                                                                                                                                                                                 |
| Unit 1 | 01/Dec/13       | 22:00         | 13/Dec/13       | 05:11  | 11.3                  | ER 0.15 Unit 1 Forced Outage to plug leaking tubes on Feedheater 1-43120-V02A. The unit was returned to service on December 13th.                                                                                                                                                                                                                                                                                                                                                                                                                        |

### 2013 Total  
122.4

ER - Equipment Reliability, HP - Human Performance, DI - Design Issue

### Forced/Sudden Outages at Pickering in 2014

| Unit   | Start Date/Time | End Date/Time | Duration (Days) | Cause  | Gross Prod Loss (TWh) | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------|-----------------|---------------|-----------------|--------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
| Unit 1 | 09/Jan/14       | 04:20         | 21/Jan/14       | 14:07  | 12.4                  | ER 0.46 Forced Outage to repair fueling machine conveyor cable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Unit 7 | 30/Jan/14       | 18:31         | 03/Feb/14       | 04:50  | 3.4                   | ER 0.04 ABNO (Available but not Operating). Turbine trip due to loss of both CCW pumps during ice transient event.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Unit 1 | 03/Feb/14       | 23:24         | 17/Feb/14       | 21:27  | 14.9                  | ER 0.19 Forced Outage to repair leak on Heat Transport Main Pump 5 and also to repair electrical cable on Main Pump Motor 8.                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Unit 7 | 04/May/14       | 12:53         | 04/May/14       | 01:45  | 4.5                   | ER 0.06 Forced Outage due to loss of Moderator Bubbler flow.                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Unit 1 | 06/May/14       | 16:24         | 24/May/14       | 03:02  | 17.4                  | ER 0.23 Forced Outage due to Liquid Zone problems.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Unit 6 | 13/Jul/14       | 22:53         | 28/Aug/14       | 10:28  | 45.5                  | ER 0.59 Forced Outage for West Fueling Machine Bridge lift maintenance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Unit 4 | 28/Oct/14       | 14:39         | 02/Nov/14       | 12:31  | 4.9                   | ER 0.06 Forced Outage due to high temperature trip on Shutdown System A, Channel D.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Unit 5 | 27/Nov/14       | 11:52         | 30/Nov/14       | 02:12  | 2.6                   | ER 0.03 Sudden Outage. Reactor stepback on DCCX stall with DCCY out of service.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Unit 8 | 30/Nov/14       | 10:38         | 15/Dec/14       | 14:28  | 15.2                  | ER 0.20 Forced Outage to replace Shutdown Cooling Pump seals on Pumps 2, 3 and 4, and 33410-V70 and 35390-RV9 and replacement.                                                                                                                                                                                                                                                                                                                                                                                                                        |

### 2014 Total  
120.8

ER - Equipment Reliability, HP - Human Performance, DI - Design Issue

Witness Panel: Nuclear Operations and Projects
## Forced/Sudden Outages at Pickering in 2015

<table>
<thead>
<tr>
<th>Unit</th>
<th>Start Date/Time</th>
<th>End Date/Time</th>
<th>Duration (Days)</th>
<th>Cause</th>
<th>Gross Prod Loss (TWh)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 6 (P1562)</td>
<td>11/Jan/15 01:53</td>
<td>16/Jan/15 09:56</td>
<td>5.3</td>
<td>ER</td>
<td>0.07</td>
<td>Forced Outage due to faulty termination of wires on SDS2 HT high/low pressure loop resulting in unit trip. See SCR P-2015-00591.</td>
</tr>
<tr>
<td>Unit 7 (P1571)</td>
<td>25/Feb/15 12:25</td>
<td>06/Mar/15 14:50</td>
<td>9.1</td>
<td>ER</td>
<td>0.12</td>
<td>Forced Outage for Liquid Zone Control System maintenance. Investigation identified passing trap. See SCR P-2015-04586.</td>
</tr>
<tr>
<td>Unit 6 (P1563)</td>
<td>10/Mar/15 09:22</td>
<td>14/Mar/15 23:47</td>
<td>4.6</td>
<td>ER</td>
<td>0.06</td>
<td>Sudden Outage due to Turbine trip on FRF low pressure. See SCR P-2015-05913.</td>
</tr>
<tr>
<td>Unit 4 (P1541)</td>
<td>10/Mar/15 09:22</td>
<td>14/Mar/15 23:47</td>
<td>4.6</td>
<td>ER</td>
<td>0.06</td>
<td>Sudden Outage due to failure of the alarm unit for boiler very high level, which is part of the governor valve trip circuit and turbine runback function. See SCR P-2015-17557.</td>
</tr>
<tr>
<td>Unit 4 (P1542)</td>
<td>16/Sep/15 02:38</td>
<td>18/Sep/15 05:09</td>
<td>2.1</td>
<td>ER</td>
<td>0.03</td>
<td>Sudden Outage due to failure of the alarm unit for boiler very high level, which is part of the governor valve trip circuit and turbine runback function. See SCR P-2015-20458.</td>
</tr>
</tbody>
</table>

### 2015 Total

| | | | | | | 25.5 |

## Forced/Sudden Outages at Darlington in 2013

<table>
<thead>
<tr>
<th>Unit</th>
<th>Start Date/Time</th>
<th>End Date/Time</th>
<th>Duration (Days)</th>
<th>Cause</th>
<th>Gross Prod Loss (TWh)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 4 (D1322)</td>
<td>04/May/13 08:10</td>
<td>05/Sep/13 00:00</td>
<td>11.4</td>
<td>HP</td>
<td>0.26</td>
<td>Forced Outage D1342: Unit Transient: Red phase failure of main output transformer. SCR D-2013-04718.</td>
</tr>
<tr>
<td>Unit 4 (D1343)</td>
<td>27/Aug/13 08:10</td>
<td>04/Sep/13 17:19</td>
<td>8.4</td>
<td>ER</td>
<td>0.19</td>
<td>Forced Outage D1343: Repair PHT leak to containment and FRF filter change over valve 41720-V20/24. SCR D-2013-07919.</td>
</tr>
<tr>
<td>Unit 4 (D1344)</td>
<td>01/Oct/13 10:03</td>
<td>04/Oct/13 11:49</td>
<td>3.1</td>
<td>ER</td>
<td>0.07</td>
<td>Forced Outage D1344: Unit Transient: Class A protection trip from the red phase MOT gas relay circuit. SCR D-2013-196.</td>
</tr>
<tr>
<td>Unit 3 (D1331)</td>
<td>19/Dec/13 22:23</td>
<td>03/Jan/14 03:37</td>
<td>14.2</td>
<td>ER</td>
<td>0.32</td>
<td>Forced Outage D1331: Repair main feedwater line from DA to MBFPs. SCR D-2013-24206. (Carryover from 2013, began on Dec. 19 @22:23h)</td>
</tr>
</tbody>
</table>

### 2013 Total

| | | | | | | 49.0 |

## Forced/Sudden Outages at Darlington in 2014

<table>
<thead>
<tr>
<th>Unit</th>
<th>Start Date/Time</th>
<th>End Date/Time</th>
<th>Duration (Days)</th>
<th>Cause</th>
<th>Gross Prod Loss (TWh)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 3 (D1331)</td>
<td>01/Jan/14 00:00</td>
<td>03/Jan/14 03:37</td>
<td>2.2</td>
<td>ER</td>
<td>0.05</td>
<td>Forced Outage D1331: Repair main feedwater line from DA to MBFPs. SCR D-2013-24206. (Carryover from 2013, began on Dec. 19 @22:23h)</td>
</tr>
<tr>
<td>Unit 2 (D1422)</td>
<td>08/Feb/14 00:52</td>
<td>12/Feb/14 10:12</td>
<td>4.4</td>
<td>ER</td>
<td>0.10</td>
<td>Forced Outage D1422: To investigate and repair cause of high vault temperatures. SCR D-2014-02831.</td>
</tr>
<tr>
<td>Unit 1 (D1412)</td>
<td>26/Jan/14 11:43</td>
<td>28/Jan/14 11:43</td>
<td>2.4</td>
<td>ER</td>
<td>0.05</td>
<td>Forced Outage D1412: To investigate and repair erratic output governor (MW swings). SCR D-2014-19194.</td>
</tr>
<tr>
<td>Unit 2 (D1423)</td>
<td>09/Aug/14 19:48</td>
<td>05/Aug/15 19:48</td>
<td>2.8</td>
<td>ER</td>
<td>0.06</td>
<td>Forced Outage D1423: Unit Transient: main output transformer (MOT) gas trip. SCR D-2014-22658.</td>
</tr>
</tbody>
</table>

### 2014 Total

| | | | | | | 11.7 |

---

Witness Panel: Nuclear Operations and Projects
## Forced/Sudden Outages at Darlington in 2015

<table>
<thead>
<tr>
<th>Unit</th>
<th>Start Date/Time</th>
<th>End Date/Time</th>
<th>Duration (days)</th>
<th>Cause</th>
<th>Production Loss (TWh)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 2</td>
<td>23/Jan/15</td>
<td>26/Jan/15</td>
<td>2</td>
<td>ER</td>
<td>0.05</td>
<td>Forced Outage D1522: Turbine trip on FRF stand-by pump start test. SCR D-2015-01738.</td>
</tr>
<tr>
<td>Unit 4</td>
<td>29/Jan/15</td>
<td>02/Feb/15</td>
<td>4.1</td>
<td>ER</td>
<td>0.09</td>
<td>Forced Outage D1542: Unit shutdown due to Recirculating Cooling Water (RCW) leak.</td>
</tr>
<tr>
<td>Unit 2</td>
<td>14/Apr/15</td>
<td>17/Apr/15</td>
<td>2.6</td>
<td>ER</td>
<td>0.05</td>
<td>Forced Outage D1523: Unit shutdown due to HTS leak outside containment. SCR D-2015-08597.</td>
</tr>
<tr>
<td>Unit 2</td>
<td>17/Apr/15</td>
<td>17/Apr/15</td>
<td>0.5</td>
<td>ER</td>
<td>0.01</td>
<td>Forced Outage D1524: Due to turbine drain main steam balance header high level alarm. SCR D-2015-08866.</td>
</tr>
<tr>
<td>Unit 3</td>
<td>06/Jul/15</td>
<td>19/Jul/15</td>
<td>12.6</td>
<td>ER</td>
<td>0.27</td>
<td>Forced Outage D1532: Due to a generator hydrogen seal oil leak (42510-HX1). SCR D-2015-15522.</td>
</tr>
<tr>
<td>Unit 3</td>
<td>22/Dec/15</td>
<td>01/Jan/16</td>
<td>9.5</td>
<td>ER</td>
<td>0.20</td>
<td>Forced Outage D1533: Heat Transport/Pressurizer Heater (3-3330-HTRG) leak to collection during unit start-up. SCR D-2015-29007.</td>
</tr>
</tbody>
</table>

**2015 Total:** 54.1

*Note: This value reflects outage assumptions used in the October Month net output projection issued to site.*
SEC Interrogatory #60

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:

[F2/2/2]

For Nuclear Base OM&A, please provide a cost driver table showing the sources of the year-over-year increases from 2015 (Board Approved) through to 2021.

Response

Exhibit F2-2-2 Table 1 shows year-over-year variances in nuclear base OM&A from 2015 (Board Approved) through to 2021 by OPG functional group. A description of the year-over-year variances is provided in Ex. F2-2-2, pages 1-6.
SEC Interrogatory #61

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
[F2/3/1, p.3, 8-12]

Please explain how OPG plans to reduce and minimize project write-off costs during the test period.

Response

OPG is increasing the amount of Identification and Initiation Phase work for projects to better validate project need, define project requirements, and identify alternatives. Combined with the improvements in the project management processes being implemented as part of the Project Excellence initiative discussed in Ex. L-4.4-15 SEC-43 (a), management will have more information on the recommended alternative before proceeding to the Development Phase, thereby reducing the risk of future capital write-offs.

While the risk of project capital write-offs can be reduced, it cannot be eliminated. Management reassesses projects on a regular basis, and, if a project becomes uneconomic, business needs change, the project no longer addresses the business need, or a lower cost solution becomes available, a project write-off would be warranted. Additionally, certain project costs incurred during the execution of the project, such as environmental cleanup costs, are written off to current operations.
SEC Interrogatory #62

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
[F2/3/3, Table 1,2a, 2b]

With respect to Tier 1 and Tier 2 projects, please provide a revised table 2a and b that shows for each project listed (as applicable):

a. The actual start date and the actual/revised final completion date.

b. Total project cost.

c. Total costs to be recovered for each year between 2017 and 2021.

Response

See Attachment 1.
Numbers may not add due to rounding.
Privileged and confidential. Prepared in contemplation of litigation.

<table>
<thead>
<tr>
<th></th>
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<td>1</td>
<td>DN</td>
<td>DN OH180 Aging Management/Support Program</td>
<td>34011</td>
<td>Sustaining</td>
<td>Design and quality replacement circuit boards, power supplies and other components to replenish inventory and eventually replace obsolete components in the OH180 programmable logic controllers.</td>
<td>Dec-08</td>
<td>Dec-17</td>
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<td>2</td>
<td>DN</td>
<td>DN Capping of D2O Collection Lines</td>
<td>38419</td>
<td>Sustaining</td>
<td>Cap D2O leakage collection lines on all four units downstream of Pressure &amp; Inventory Control system valves to stop any significant leakage flow to the Primary Heat Transport D2O Collection tank.</td>
<td>Dec-11</td>
<td>Oct-19</td>
<td>8.4</td>
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<td>3</td>
<td>ENG</td>
<td>Power Operated Valve Program, N-PROC-MA-0092, Recovery</td>
<td>62447</td>
<td>Sustaining</td>
<td>Update power operated valve program to address deficiencies and complete outstanding work.</td>
<td>Jul-11</td>
<td>Apr-16</td>
<td>6.9</td>
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<td>4</td>
<td>ENG</td>
<td>Severe Accident Management Guidelines (SAMG) Implementation Improvements</td>
<td>62449</td>
<td>Regulatory</td>
<td>Improve the OPG Severe Accident Management program and ensure related CNSC Fukushima Action Items are completed.</td>
<td>Mar-12</td>
<td>Aug-16</td>
<td>19.5</td>
<td>7.1</td>
<td>2.9</td>
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<td>5</td>
<td>ENG</td>
<td>DCC Aging Management</td>
<td>62553</td>
<td>Sustaining</td>
<td>Participate in CANDU Owners’ Group joint project to manage the aging of digital control computers vital to the operation of the units.</td>
<td>Mar-04</td>
<td>Dec-17</td>
<td>14.5</td>
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<td>6</td>
<td>IMS</td>
<td>Inspection Qualification</td>
<td>66105</td>
<td>Regulatory</td>
<td>Demonstrate compliance with the Canadian Standards Association Standard N285.4 Periodic Inspection of CANDU Nuclear Power Plant Components by proving a systematic and well-documented approach to non-destructive examination qualification.</td>
<td>Nov-06</td>
<td>Jun-17</td>
<td>15.3</td>
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<td>1.0</td>
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<td>7</td>
<td>PN</td>
<td>PB DCC Obsolescence</td>
<td>40505</td>
<td>Sustaining</td>
<td>Upgrade display hardware, replace necessary components, and procure critical spares.</td>
<td>Aug-03</td>
<td>Dec-15</td>
<td>5.9</td>
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<td>8</td>
<td>PN</td>
<td>PB Boiler Blowdown Pipe Support Improvements</td>
<td>40683</td>
<td>Sustaining</td>
<td>Install new and/or modified piping supports at selected locations in the Reactor Auxiliary Bay and Screenhouse to make the Boiler Blowdown system more robust.</td>
<td>Oct-10</td>
<td>Jun-15</td>
<td>11.1</td>
<td>2.5</td>
<td>2.2</td>
<td>0.9</td>
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<td>9</td>
<td>PN</td>
<td>PA Fuel Handling SPV Equipment Reliability Improvement Project - OM&amp;A</td>
<td>46635</td>
<td>Sustaining</td>
<td>Refurbish fuel handling equipment that present single points of vulnerability for reliable operation.</td>
<td>Feb-11</td>
<td>Dec-13</td>
<td>7.0</td>
<td>0.4</td>
<td>0.2</td>
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<tr>
<td>11</td>
<td>DN</td>
<td>Boiler Water Lancing (Future campaigns)</td>
<td>38450</td>
<td>Sustaining</td>
<td>Remove deposits from secondary side the Steam Generators to prevent under-deposit corrosion.</td>
<td>Apr-07</td>
<td>Sep-12</td>
<td>9.4</td>
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<td>12</td>
<td>DN</td>
<td>DN Modified 37 Element Fuel Bundle</td>
<td>38936</td>
<td>Sustaining</td>
<td>Develop and qualify modified fuel bundle to address heat transport aging effects and prevent derating of Darlington.</td>
<td>Jan-09</td>
<td>Nov-14</td>
<td>6.0</td>
<td>0.1</td>
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<td>13</td>
<td>DN</td>
<td>DN SG Gas Generator and Power Turbine Overhaul</td>
<td>38324</td>
<td>Sustaining</td>
<td>Complete overhaul and refurbishment of the Sandby Generators.</td>
<td>Dec-06</td>
<td>Dec-11</td>
<td>7.1</td>
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<td>0.0</td>
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<td>14</td>
<td>ENG</td>
<td>Cyber Security</td>
<td>62442</td>
<td>Regulator</td>
<td>Security Protected</td>
<td>Apr-09</td>
<td>Nov-14</td>
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<td>15</td>
<td>PN</td>
<td>PB U8 Moderator Annubar Retrieval</td>
<td>40547</td>
<td>Sustaining</td>
<td>Locate and retrieve flow measurement primary element that broke off during commissioning that may cause failure of moderator piping.</td>
<td>Jan-10</td>
<td>Jul-15</td>
<td>5.3</td>
<td>2.9</td>
<td>2.1</td>
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*Table 2a: OM&A Project Listing - Nuclear Projects $5M - $20M Total Project Cost*
<table>
<thead>
<tr>
<th>PN</th>
<th>Project Description</th>
<th>Sustaining Code</th>
<th>Demolish buildings outside of the Protected Area that are past their expected life and are no longer in use (Fire Code requirement)</th>
<th>May-11</th>
<th>Deferred</th>
<th>Total Cost</th>
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<tr>
<td>16</td>
<td>Pickering B Life Expired Building Demolition</td>
<td>25010</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>8.8</td>
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</tr>
<tr>
<td>17</td>
<td>NPT Fire Safety Assessment Upgrades</td>
<td>26003</td>
<td>Update fire safety assessments to comply with Canadian Standards Association Standard N293-07 Fire Protection for CANDU Nuclear Power Plants</td>
<td>Aug-09</td>
<td>Feb-13</td>
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<td>18</td>
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</table>

Table continues on Ex. D2-3-3 Table 2b

Notes:
1. Projects with expenditures during Test Period AND Completed/Deferred Projects (from EB-2013-0321 or subsequent).
2. "Total Project Cost" reflects BCS amounts, with the exception of Completed/Deferred Projects (for which actual costs are shown).
<table>
<thead>
<tr>
<th>No.</th>
<th>Facility</th>
<th>Project Name</th>
<th>Project No.</th>
<th>Category</th>
<th>Description</th>
<th>Start Date</th>
<th>Completion Date</th>
<th>2013 Actual ($M)</th>
<th>2014 Actual ($M)</th>
<th>2015 Actual ($M)</th>
<th>2016 Budget ($M)</th>
<th>2017 Plan ($M)</th>
<th>2018 Plan ($M)</th>
<th>2019 Plan ($M)</th>
<th>2020 Plan ($M)</th>
<th>2021 Plan ($M)</th>
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<tr>
<td>19</td>
<td>DN</td>
<td>DN Boiler Blowdown Piping Refurbishment</td>
<td>31506</td>
<td>Sustaining</td>
<td>Redesign Boiler Blowdown System piping and supports based on dynamic load analysis to address significant vibration and pipe movement arising from steam/water hammer and thermal shock during intermittent blowdown operations.</td>
<td>Dec-12</td>
<td>Nov-19</td>
<td>17.8</td>
<td>1.1</td>
<td>1.4</td>
<td>1.1</td>
<td>3.0</td>
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<tr>
<td>20</td>
<td>DN</td>
<td>DN GFP Sample Delay and Alternative PHT Sampling Point</td>
<td>31514</td>
<td>Sustaining</td>
<td>Modify the sample lines of the Gaseous Fission Product (GFP) Monitoring system to ensure adequate Heat Transport System (HTS) sample delay in order to correct a legacy design deficiency discovered during commissioning of the new system and allow the GFP Monitoring system to function within its design requirements; and provide an alternate HTS sampling point.</td>
<td>Dec-12</td>
<td>May-16</td>
<td>8.5</td>
<td>0.1</td>
<td>0.1</td>
<td>2.3</td>
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<td>21</td>
<td>DN</td>
<td>DN EPG2 Gas Producer Engine Replacement</td>
<td>38323</td>
<td>Regulatory</td>
<td>Refurbish Emergency Power Generator 2, which condition assessments have shown to have a degraded gas generator and power turbine.</td>
<td>Oct-12</td>
<td>Dec-18</td>
<td>20.0</td>
<td>0.3</td>
<td>0.8</td>
<td>0.4</td>
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<td>0.3</td>
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<td>22</td>
<td>DN</td>
<td>DN Reduced HTS Pressure-Temperature Envelope Modifications</td>
<td>80016</td>
<td>Regulatory</td>
<td>Implement modifications necessary to meet the revised pressure-temperature envelope during cooldown arising from results of the Fuel Channel Life Management project.</td>
<td>Jan-14</td>
<td>Dec-26</td>
<td>11.7</td>
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<td>1.4</td>
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<td>23</td>
<td>DN</td>
<td>DN RD-310 Implementation - Safety Analysis Improvement</td>
<td>80028</td>
<td>Regulatory</td>
<td>Upgrade the Darlington Safety Report to meet the requirements of CNSC Regulatory Document REGDOC-2.4.1 Deterministic Safety Analysis (formerly RD-310 Safety Analysis for Nuclear Power Plants).</td>
<td>Jul-14</td>
<td>Dec-20</td>
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<td>DN</td>
<td>DN Phase 2 Station Battery Replacement (50310, 50390)</td>
<td>80062</td>
<td>Sustaining</td>
<td>Replace lead-calcium Class 1 and Emergency Power System battery banks that are approaching their end of service life.</td>
<td>Jan-15</td>
<td>Aug-16</td>
<td>0.1</td>
<td>0.0</td>
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<td>25</td>
<td>DN</td>
<td>DN New Heat Transport Pump Seals</td>
<td>80071</td>
<td>Sustaining</td>
<td>Install new design Heat Transport Pump seals that address the operating deficiencies and poor reliability of the existing seals.</td>
<td>Dec-14</td>
<td>Jul-19</td>
<td>16.8</td>
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<td>26</td>
<td>DN</td>
<td>DN Aging Management</td>
<td>80079</td>
<td>Sustaining</td>
<td>Fund a dedicated team initially for 2 years at station to strategize and manage the aging management scope in collaboration with Station and Refurbishment stakeholders and eventually manage these issues into Darlington station business plan.</td>
<td>Nov-14</td>
<td>Dec-16</td>
<td>8.2</td>
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<td>27</td>
<td>DN</td>
<td>DN Aging Management Scope Defining Inspections</td>
<td>80110</td>
<td>Sustaining</td>
<td>Support execution of inspection activities to better define the aging management scope is support of the updated Integrated Implementation Plan.</td>
<td>Feb-15</td>
<td>Dec-18</td>
<td>9.9</td>
<td>0.0</td>
<td>0.0</td>
<td>0.7</td>
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<td>28</td>
<td>DN</td>
<td>DN X-750 Spacer Retrieval</td>
<td>80112</td>
<td>Regulatory</td>
<td>Retrieve 24 spacers, intact, from all four axial locations of six selected channels, for material surveillance as mandated by OPG’s established plan for maintaining Inconel X-750 annulus spacer fitness-for-service and, thereby, allow the Darlington units to operate to their planned service lives in advance of their respective refurbishments.</td>
<td>Mar-15</td>
<td>Nov-18</td>
<td>10.4</td>
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<td>FY 14</td>
<td>FY 15</td>
<td>FY 16</td>
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<td>29</td>
<td>Fukushima Oversight Project</td>
<td>62448</td>
<td>Regulatory</td>
<td>Fund a dedicated project oversight team to interface with regulatory and nuclear industry agencies, manage regulatory actions, identify and initiate projects, and provide high level monitoring for successful completion of the Fukushima Response regulatory commitments and portfolio.</td>
<td>Dec-11</td>
<td>Aug-16</td>
<td></td>
<td>7.4</td>
<td>1.3</td>
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<td>Nuclear Fleet Safety Systems Functional Assessment</td>
<td>80072</td>
<td>Regulatory</td>
<td>Perform functional assessments of the Backup Safety Systems to assure they are capable of performing their functions required by design and licensing basis and that testing is adequate to demonstrate reliable safety functions.</td>
<td>Apr-14</td>
<td>Mar-18</td>
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<td>7.3</td>
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<td>31</td>
<td>PN Instrumentation &amp; Control Obsolescence</td>
<td>41024</td>
<td>Sustaining</td>
<td>Specify and qualify replacement instrumentation and control devices to replace obsolete components in a number of different systems.</td>
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<td>Dec-17</td>
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<td>9.3</td>
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<td>32</td>
<td>PA PHT D2O Storage Tank Pressure Control Improvement</td>
<td>49234</td>
<td>Sustaining</td>
<td>Improve control of the Pickering A Primary Heat Transport D2O Storage Tank cover gas pressure during reactor cooldown by increasing helium make-up rate.</td>
<td>Nov-11</td>
<td>Jul-16</td>
<td></td>
<td>2.4</td>
<td>0.7</td>
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<td>33</td>
<td>PN Equipment Reliability Initiatives</td>
<td>80060</td>
<td>Sustaining</td>
<td>Address selected equipment and/or system degradation to ensure improvement in forced loss rate.</td>
<td>Feb-14</td>
<td>Dec-18</td>
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<td>19.5</td>
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<td>PN Fuel Channel Life Assurance</td>
<td>80157</td>
<td>Value Enhancing</td>
<td>Preserve the option of operating Pickering beyond its present planned service life of December 2020 by funding a number of technical assessments and implementation of strategies to manage fuel channel fitness for service past December 2020.</td>
<td>Sep-15</td>
<td>Dec-17</td>
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<td>PA LP Feed Heater Tube Bundle Degradation</td>
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<td>Replace low-pressure feedwater heaters in Units 1 and 4 that are exhibited tube degradation due to chemical attack and are at or approaching the tube plugging limits.</td>
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<td>Dec-15</td>
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**Subtotal**: 167.2

**Total**: 309.9

**Notes:**
1. Projects with expenditures during Test Period AND Completed/Deferred Projects (from EB-2013-0321 or subsequent).
2. "Total Project Cost" reflects BCS amounts, with the exception of Completed/Deferred Projects (for which actual costs are shown).
**VECC Interrogatory #20**

**Issue Number: 6.1**

**Issue:** Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

**Interrogatory**

**Reference:**
Reference: F2/T4/S1/Table 1

a) Please amend Table 1 to show outage OM&A by unit.

**Response**

a) See Chart 1.

**Chart 1**

Outage OM&A - Nuclear ($M)

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**Note:**
1. Common outage costs include Vacuum Building Outages and repair of spare parts.
VECC Interrogatory #21

Issue Number: 6.1
Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
Reference: F2/T2/S2/pgs4-

a) Please explain what projects were completed at Pickering under the ambit of “primarily due to spending to improve plant operations in areas of reliability and human performance”.

b) Please explain what is meant by “There is an increase in the base OM&A associated with Inspection and Maintenance Services (+$13.2M or 38.8 per cent increase) primarily due to higher labour as a result of 2015 attrition and movement of resources in 2015 from base OM&A activities to support outage extensions.” Specifically is this indicating that costs were $13.2 million higher due to severance costs being allocated to this area?

c) Is the increase in security and emergency services of $12.1M simply a transfer of costs from other areas, or is there a net increase in OM&A of $12.1 million in these costs?

Response

a) The $11.3M variance with the Operations component of Pickering is mainly attributable to returning resources (staff) to planned levels for Operations including Nuclear Operators in Training. The Operations department and Operators make program improvements in the areas of reliability and human performance through:
   - Monitoring material condition of the plant and identify, advocate, and prioritize station reliability work.
   - Providing oversight for all reactivity management related to operations and work protection.
   - Increasing leadership accountability at the station by: setting the highest standards, adhering to expectations, practicing core values, and continuously seeking ways to perform activities more safely and efficiently.
   - Routinely review management standards, procedures and operations standards.

b) There are no severance costs in the 2016 Budget. Rather, Inspection and Maintenance Services 2016 Base OM&A Budget increased relative to 2015 actual costs because 2015 actual costs were under-spent. The 2016 Budget reflects the expected level of support required.
1. c) The increase in Security and Emergency Services, due to a transfer of costs, is $6.9M and the remaining variance is primarily due to higher purchased services as stated in Ex. F2-2-2.
VECC Interrogatory #22

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
Reference: F2/T2/S1/Table 1

a) Between 2013 and 2014 there as a doubling of the costs in Fleet Operations and Maintenance. Please explain why.

Response

As explained at Ex. F2-2-2, p. 8, lines 15 -21, Nuclear Services groups were restructured to other organizations to improve alignment with key business areas. As part of this restructuring, Radiation Safety, Fleet Improvement, and Generation Planning groups from Nuclear Services moved to Fleet Operations and Maintenance (+$31.2M variance or 102.1 per cent increase).
VECC Interrogatory #23

Issue Number: 6.1

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
Reference: F2/T2/S1/Table 1

a) Base OM&A spending with respect to Engineering shows a significant trend increase from 2014 ($147.6m) to 2021 ($191.8m). Please explain why.

b) Please explain what portion of this increase is due to increased labour costs and specifically what, if any increase in FTEs underlie the trend increase.

Response

a) The increase in of $44.2M in Engineering Base OM&A spending between 2014 and 2021 is primarily due to increases in Regular Labour costs of $27.4M and Purchased Services of $16.1M. Regular labour cost increases are primarily due to the filling of engineering staff vacancies and labour escalation reflecting collective agreement provisions. Purchased services increases are primarily due to costs added in 2015 to join cost sharing strategic research projects (e.g. research on fuel channel life) through the Candu Owners Group.

b) Approximately 34% of the Regular Labour costs increase is due to higher FTEs, primarily for filling engineering staff vacancies as noted in part (a) above.
VECC Interrogatory #24

Issue Number: 6.1
Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities (excluding that for the Darlington Refurbishment Program) appropriate?

Interrogatory

Reference:
Reference: F2/T3/S1/Table 1

a) Please provide the basis for the forecast of Portfolio Projects Unallocated for each year 2017-2018. Specifically, please explain how each year's forecast was derived.

Response

During business planning, the overall budget for the Project Portfolio (Capital and Project OM&A) is developed on a top-down basis for each year using a number of inputs, including benchmarking with peers, project backlogs, and an assessment of the ability of the project organizations to execute the volume of work planned. The Project Portfolio budget is composed of a Project Portfolio–Capital portion and a Project Portfolio- Project OM&A portion.

As stated at Ex. F2-3-1, p. 2, Project OM&A (Portfolio) includes: “Portfolio Projects (Unallocated)”, which is the remaining budget available to cover the cost of projects that are progressing through the review and approval process but do not have an Asset Investment Screening Committee (AISC) approved budget or an approved business case summary (BCS). A list of these projects is provided in Ex. F2-3-3 Table 4."
Board Staff Interrogatory #100

Issue Number: 6.2

Issue: Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

Interrogatory

Reference:
Ref: Exh A2-2-1 Attachment 1

At page 30 of the attachment, a summary of operational targets for the nuclear business is provided. Please explain the unusually high collective radiation exposure target for Darlington in 2017 and the increasing exposure trend for Pickering in the 2016-2018 business plan period.

Response

The higher collective radiation exposure (CRE) target for Darlington in 2017 is a result of following:
- The scope of the Darlington 2017 Unit 1 outage includes a Single Fuel Channel Replacement program (additional 25 REM), which is required by the CNSC every four years.
- The impact of averaging the dose of the D1711 outage over 3 units as opposed to 4 units in previous years, as the non-operating Refurbishment Unit 2 is excluded from the metric.

The trend in the targeted Pickering CRE in the 2016-2018 Business Plan is directly linked to an increase in major reactor component inspection programs including a Single Fuel Channel Replacement program performed to ensure fitness for service and continued safe operations, largely driven by Pickering Extended Operations. This has resulted in longer and more dose intensive outages from 2016 to 2018 and a targeted increase in CRE.
Board Staff Interrogatory #101

Issue Number: 6.2

Issue: Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

Interrogatory

Reference:
Ref: Exh F2-1-1 page 3 and 16

At page 16 of the reference, it states:

The TGC/MWh for Darlington has been calculated on a normalized and non-normalized basis for 2017 and 2018 to account for the impact of reduced unit output during Darlington Refurbishment. The denominator in TGC/MWh, i.e., MWh, declines because units are being refurbished but there is not a corresponding decline in the numerator, as corporate allocated costs and station costs are largely fixed. The net impact will be to temporarily skew these metrics higher than would otherwise be the case. Nuclear Operations has set internal performance targets for TGC/MWh on a non-normalized basis, but for benchmarking against industry peers, will continue to compare Darlington’s performance using a normalized TGC metric.

a) Please provide the Nuclear Operations internal performance targets for TGC/MWh, on a non-normalized basis or note whether the internal targets are provided in the nuclear business plan filed in response to a previous interrogatory.

b) Please provide the details of the normalized TGC calculation.

c) Is normalizing TGC standard practice for utilities during major nuclear refurbishments?

d) In 2015, ScottMadden validated the ongoing appropriateness of OPG’s application of the benchmarking methodology. Was ScottMadden consulted about normalizing TGC during the DRP, and if yes, what was their feedback?

Response

a) The non-normalized TGC/MWh is included in Ex. F2-1-1 Chart 4 (p. 15) and Chart 5 (p. 17).

b) The denominator in TGC/MWh declines as noted in the evidence reference as the planned Darlington units are being refurbished. TGC/MWh is normalized by adding back to the denominator the deemed generation had refurbishment not taken place:
1. Added back generation based on duration of refurbishment (e.g., 365 days X 878 MW X 24 hours).

2. Adjusted for regular scheduled outage (i.e., Unit 2 would have a regularly scheduled outage in 2019 if it were not being refurbished)

3. Adjusted for forced losses based on Darlington’s expected forced loss rate (FLR) of 1% instead of the post refurbishment targeted FLRs.

The numerator has been adjusted for higher fuel costs as a result of normalizing the generation. Fuel costs are adjusted based on Total Fuel Bundle Cost and Used Fuel Storage & Disposal costs per Ex. F2-5-1 Table 1.

c) & d) ScottMadden’s evaluation of OPG’s approach to normalizing TGC/MWh during DRP is attached as Attachment 1. ScottMadden found OPG’s normalization approach to be unique but logical, reasonable, and easy to understand.
ScottMadden Evaluation of OPG Proposed Approach to Normalize Cost Metrics During Darlington Refurbishment
Table of Contents

1. Background..........................................................................................................................2
2. Executive Summary...............................................................................................................2
3. Objectives, Scope and Approach ..........................................................................................3
4. Assumptions and Qualifications............................................................................................4
5. Evaluation and Summary........................................................................................................4

APPENDIX A: OPG PROPOSED NORMALIZATION METHODOLOGY FOR COST METRICS.................7
1. Background

Darlington Nuclear Generating Station (DNGS) is one of two nuclear stations operated by Ontario Power Generation (OPG). DNGS is a four-unit station with a net output of 3,512 megawatts (MW), and it has been producing almost 20 percent of Ontario’s electricity needs since the early 1990s. OPG is performing a major mid-life refurbishment of the four nuclear reactors at DNGS (Refurb), which involves the replacement of certain life-limiting components. The execution of the Refurb “mega-project” started in October 2016 with breaker-open on Unit 2. This evolution will take 40 months, and OPG will conduct a six-month “burn-in” period after breaker-close. Other units will follow Unit 2 with scheduled completion of Refurb in 2026.

OPG tracks and benchmarks the performance of DNGS against industry peers under its nuclear cornerstone of value for money using a suite of four cost metrics. OPG believes that two of these cost metrics, Total Generating Cost per MWh (TGC per MWh) and Non-Fuel Operating Cost per MWh (NFOC per MWh), will not be comparable to prior site performance or industry peers during Refurb as a result of significantly reduced MWhs of generation with no corresponding decline in costs, which are largely fixed. In order to ensure that DNGS performance can be tracked and benchmarked during Refurb, OPG intends to “normalize,” or adjust to facilitate comparison of these two cost metrics.

2. Executive Summary

OPG asked ScottMadden to provide a written evaluation of its proposed methodology for normalizing Total Generating Cost per MWh (TGC per MWh) and Non-Fuel Operating Cost per MWh (NFOC per MWh), both of which are used to track performance at DNGS. The goal of this normalization is to facilitate easier comparison to industry peers and pre-Refurb performance at DNGS. ScottMadden performed the evaluation according to the approach described in this document and subject to the listed assumptions and qualifications. One noteworthy qualification is that Refurb is a unique “mega-project,” and the experience and perspective of other industry professionals, while useful to consider, cannot provide established practice for normalizing cost metrics during this unique project.

ScottMadden concurs with OPG that Refurb will significantly impact station performance indicators for these two cost metrics and that normalization will be necessary to facilitate useful comparisons to past performance and industry peers. ScottMadden also supports OPG’s decision to continue to report an unadjusted (i.e., not normalized) version of these cost metrics in conjunction with any normalized version. Further, ScottMadden observed that OPG evaluated a robust list of the options available in selecting its normalization approach and assessed these options against an appropriate set of criteria for selecting a normalization approach that facilitates useful comparisons to past performance and industry peers.

ScottMadden views OPG’s current normalization approach for these metrics, as detailed in the Appendix, as unique but logical, reasonable, and easy to understand. These normalized measures can facilitate useful comparisons to past performance and industry peers. And, if the normalized measures are accepted by management and external stakeholders, they can be used to drive performance monitoring and improvement. ScottMadden’s evaluation found that, while Refurb is a unique mega-project, a more strongly supported and conventional approach to normalization of cost metrics under comparable scenarios was to adjust the distribution of actual costs to reflect performance of the operating units while using actual MWhs generated in the denominator.
3. Objectives, Scope and Approach

Objectives and Scope

OPG asked ScottMadden to provide a written evaluation of its proposed methodology for normalizing two cost metrics that are used to track performance at DNGS. The goal of this normalization is to facilitate easier comparison to industry peers and pre-Refurb performance at DNGS for:

1) Total Generating Cost per MWh (TGC per MWh)
   - Numerator is Non-Fuel Operating Cost + Fuel Cost + Capital Cost
   - Denominator is the electrical energy generated and delivered to the grid, metered at DNGS
   - Metric represents total costs incurred per unit of net electrical production in the same period

2) Non-Fuel Operating Cost per MWh (NFOC per MWh)
   - Numerator is Non-Fuel Operating Cost. Denominator is the electrical energy generated and delivered to the grid, metered at DNGS
   - Metric represents Non-Fuel Operating Cost incurred per unit of net electrical production in the same period

ScottMadden’s Approach

ScottMadden’s approach to completing this evaluation can be broken down into six steps:

1) Understand and document exactly how OPG proposes to normalize these two cost metrics
2) Conduct research on comparable utility capital projects and related utility finance approaches to measure cost performance
3) Compare research findings to OPG approach
4) Develop and document ScottMadden evaluation of OPG approach
5) Send draft of evaluation to OPG for review
6) Finalize report

ScottMadden did not participate in the development of the proposed methodology but, to ensure completion of Step 1, did speak with internal OPG personnel and reviewed various internal OPG documents.

To complete Step 2, ScottMadden spoke with its internal nuclear experts and conducted research to identify other nuclear operators who could provide valuable operational experience (OpEx) for this evaluation. ScottMadden then conducted phone interviews with the following companies:

- NB Power
- Bruce Power
- Duke Energy

ScottMadden and these companies agreed to acknowledge and keep confidential any specific company information provided by OPG. OPG agreed to make every commercially reasonable effort to protect the confidentiality of any specific company information provided in response to the interviews.
4. Assumptions and Qualifications

Assumptions

In preparing this evaluation, ScottMadden made the following assumptions:

- OPG will continue to report an unadjusted (i.e., not normalized) version of these cost metrics in conjunction with any normalized version.
- Documents OPG has shared with ScottMadden reflect current plans for normalization of the cost metrics to be evaluated (TGC/MWh and NFOC/MWh) as of the date of this report.
- Information provided by personnel from other companies accurately reflects what was (or would be) their approach to normalizing cost metrics in a comparable situation.

Qualifications

ScottMadden’s evaluation is subject to the following qualifications:

- Refurb is a unique “mega-project,” and the experience and perspective of other industry professionals, while useful to consider, cannot provide established practice for normalizing cost metrics during this unique project.
- This evaluation is based solely on the approach described in this document, and ScottMadden does not imply the performance of any additional, specific research.
- The ScottMadden evaluation of the OPG approach to normalizing these cost metrics was prepared for the benefit of OPG and is limited to the subject matter expressly stated in this document; no additional ScottMadden opinion is implied or may be inferred.
- ScottMadden does not express an opinion in this document on:
  - Effectiveness of cost management practices at OPG.
  - Appropriateness of any costs incurred by OPG.

5. Evaluation and Summary

Evaluation

ScottMadden concurs with OPG that Refurb will significantly impact station performance indicators for these two cost metrics and that normalization will be necessary to facilitate useful comparisons to past performance and industry peers.

ScottMadden supports OPG’s decision to continue to report an unadjusted (i.e., not normalized) version of these cost metrics in conjunction with any normalized version.

ScottMadden observed that OPG evaluated a robust list of the options available in selecting its normalization approach to these cost metrics, including:

- Adjust numerator (cost)
  - Adjust up – Increase fuel cost using historical cost data on the assumption that no units are offline during refurbishment.
  - Adjust down – Reduce fixed costs using allocation factors on the assumption that actual costs do not scale up or down with generation.
  - Do not adjust – Make no adjustment to cost.
• Adjust denominator (MWhs generated)
  o Adjust up – Increase MWhs using historical data and forced-loss rate (FLR) projections, on the assumption that no units are offline for Refurb
  o Adjust down – Not considered
  o Do not adjust – Make no adjustment to MWhs generated

OPG selected its preferred normalization approach by measuring each option against six criteria:

• Understandability – how easy is it to describe how the metric was normalized?
• Ease of calculation – how easy would it be to perform the normalization and calculate this metric as Refurb continues?
• Protection from understatement – is there sufficient protection from making performance look better than it is through changes to the numerator or denominator?
• Acceptance by station management – would station management believe the metric is reflective of true performance and use it to pursue improvement?
• Acceptance by executive oversight – would OPG management believe the metric is reflective of true performance and use it to pursue improvement?
• Acceptance by external stakeholders – would external stakeholders believe the metric is reflective of true performance and use it to pursue improvement?

ScottMadden believes this is an appropriate set of criteria for selecting a normalization approach that facilitates useful comparisons to past performance and industry peers. Ultimately, the normalized metrics must support effective ongoing performance monitoring and improvement, and, as such, ease of calculation is the least important criterion of the group.

ScottMadden views OPG’s current normalization approach for these metrics, as detailed in the Appendix, as unique but logical, reasonable, and easy to understand.

The ScottMadden observations that OPG should consider as supportive of its current normalization approach include:

• Significant historical data on fuel cost is available for use in “normalizing up” the numerator
• Significant historical data on MWhs of generation is available for use in “normalizing up” the denominator
• The current normalization approach is relatively easy to understand and calculate
• The top industry cost organization (the Electric Utility Cost Group or EUCG) allows nuclear operators who were available to generate MWhs but did not do so at the request of the market operator to submit those MWhs as if they generated the MWhs

The ScottMadden observations that OPG should consider as not supportive of its current normalization approach include:

• Allocation of corporate and nuclear support costs to DNGS still inflate the numerator
• OpEx from other companies did not support “normalizing up” costs in the numerator and was focused instead on adjusting the distribution of actual costs to reflect performance
• OpEx from other companies did not support “normalizing up” MWhs in the denominator
  o Other companies used actual MWhs generated (or available to generate) in every case
  o In the noted case where MWhs available to generate were included (see supportive observations above), the unit was operational and the period was hours or days rather than months or years, which is the case with Refurb
  o Other companies did not include potential MWhs in the calculation when a unit was offline due to a capital project

Summary

OPG asked ScottMadden to provide a written evaluation of its proposed methodology for normalizing Total Generating Cost per MWh (TGC per MWh) and Non-Fuel Operating Cost per MWh (NFOC per MWh), both of which are used to track performance at DNGS. The goal of this normalization is to facilitate easier comparison to industry peers and pre-Refurb performance at DNGS. ScottMadden performed the evaluation according to the approach described in this document and subject to the listed assumptions and qualifications. One noteworthy qualification is that Refurb is a unique “mega-project,” and the experience and perspective of other industry professionals, while useful to consider, cannot provide established practice for normalizing cost metrics during this unique project.

ScottMadden concurs with OPG that Refurb will significantly impact station performance indicators for these two cost metrics and that normalization will be necessary to facilitate useful comparisons to past performance and industry peers. ScottMadden also supports OPG’s decision to continue to report an unadjusted (i.e., not normalized) version of these cost metrics in conjunction with any normalized version. Further, ScottMadden observed that OPG evaluated a robust list of the options available in selecting its normalization approach and assessed these options against an appropriate set of criteria for selecting a normalization approach that facilitates useful comparisons to past performance and industry peers.

ScottMadden views OPG’s current normalization approach for these metrics, as detailed in the Appendix, as unique but logical, reasonable, and easy to understand. These normalized measures can facilitate useful comparisons to past performance and industry peers. And, if the normalized measures are accepted by management and external stakeholders, they can be used to drive performance monitoring and improvement. ScottMadden’s evaluation found that, while Refurb is a unique mega-project, a more strongly supported and conventional approach to normalization of cost metrics under comparable scenarios was to adjust the distribution of actual costs to reflect performance of the operating units while using actual MWhs generated in the denominator.
Four different Value for Money (VFM) Metrics, hereafter referred to as Cost Metrics, are used by OPG to measure its Nuclear Stations’ performance and to benchmark against industry standards. These metrics include, as outlined in the graphic below:

1. Total Generating Cost (TGC) per MWh
2. Non-Fuel Operating Cost (NFOC) per MWh
3. Fuel Cost per MWh
4. Capital Cost per MW Design Electrical Rating

For benchmarking purposes, Cost Metrics do not include:
- Darlington Refurbishment
- P2/P3 Safe Storage Project
- New Nuclear
- NWMO oversight costs

The following costs are fully allocated to operating stations:
- Corporate Operating, Maintenance and Administrative (OM&A)
- Nuclear support cost
- Nuclear capital projects (excluding refurbishment capital costs)
- Minor fixed assets

**Issue Summary:** For benchmarking purposes, the first two Cost Metrics, TGC per MWh and NFOC per MWh, will not be comparable to peers (or steady state operations) during the Darlington refurbishment for two key reasons:
1. Lower generation (MWhs in the denominator) while the Darlington units are offline and not generating electricity
2. Fixed costs which do not scale up or down proportionally with how much electricity the Darlington units generate

**Note:** Fuel Cost per MWh and Capital Cost will continue to be comparable because fuel cost varies proportionately with generation and Capital Cost per MW DER will not be impacted by lower generation during refurbishment.
Proposed Solution: In order to compensate for the lost MWhs of net electrical production during refurbishment while the Darlington units are off-line, OPG has proposed reporting Cost Metrics in two ways:

1. As historically reported, the two Cost Metrics highlighted on the previous slide (TGC and NFOC) would be comparatively higher than would otherwise be the case due to the reduction in generation while the Darlington units are off-line during refurbishment

2. “Normalized,” assuming that the Darlington units are generating at full capability during the refurbishment, to retain comparability of the two impacted KPIs with peers (and with steady state operations)

The proposed rationale of this approach is that it provides the OEB with a perspective on the degree and extent to which the two Cost Metrics are impacted by the outages – and how the two Cost Metrics would compare to peers, if not for the outages required to complete the capital projects associated with the refurbishment.
OPG Proposed Normalization Methodology for Cost Metrics

Current vs. Future State: Total Generating Cost per MWh

Total Generating Cost (TGC) per MWh – Current State (Before Normalization)

- Non-Fuel OM&A Cost\(^1\)
  - Including station cost and allocated nuclear support and corporate support which are fixed, but excluding Refurb costs

- Capital Cost\(^2\)
  - Only including capital cost associated with ongoing maintenance and investment in operating units (i.e., excluding Refurb capital cost)

- Fuel Cost
  - Declines proportionately with generation during refurbishment outages

\[ \text{TGC per MWh (Before Normalization)} \]

Total Generation Cost (TGC)

Total Generating Cost (TGC) per MWh – Proposed Future State (After Normalization)

- Non-Fuel OM&A Cost\(^1\)
  - Including station cost and allocated nuclear support and corporate support which are fixed, but excluding Refurb costs

- Capital Cost\(^2\)
  - Only including capital cost associated with ongoing maintenance and investment in operating units (i.e., excluding Refurb capital cost)

- Adjusted Fuel Cost
  - Does not decline proportionately with generation during refurbishment outages; assumes units remain online

\[ \text{TGC per MWh (After Normalization)} \]

Total Generation Cost (TGC)

Notes:
1. All OM&A costs associated with Refurb are being tracked separately and managed by separate Refurb organization
2. Capital costs associated with Refurb are excluded and tracked/managed separately in Refurb organization

---

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Non-Fuel Operating Cost (NFOC) per MWh – Current State (Before Normalization)

= Non-Fuel OM&A Cost\(^1\)
  Including station cost and allocated nuclear support and corporate support which are fixed, but excluding Refurb costs

\[ \frac{\text{Non-Fuel Operating Cost (NFOC)}}{\text{Generation (MWhs) from 3 of 4 Units On-Line During Refurbishment}} \]  

= NFOC per MWh (Before Normalization)

Non-Fuel Operating Cost (NFOC) per MWh – Proposed Future State (After Normalization)

= Non-Fuel OM&A Cost\(^1\)
  Including station cost and allocated nuclear support and corporate support which are fixed, but excluding Refurb costs

\[ \frac{\text{Non-Fuel Operating Cost (NFOC)}}{\text{Generation (MWhs) from 3 of 4 Units On-Line During Refurbishment}} + \text{Assumed Generation (MWhs) from 4\textsuperscript{th} Unit in Refurbishment} \]  

= NFOC per MWh (After Normalization)

Notes: \(^1\) All OM&A costs associated with Refurb are being tracked separately and managed by separate Refurb organization.
Board Staff Interrogatory #102

Issue Number: 6.2

Issue: Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

Interrogatory

Reference:
Ref: Exh F2-1-1 page 10

OPG benchmarks value for money performance on a $/generating unit basis, which OPG states eliminates generation impacts due to extensive outage programs, reactor design and unit size. Was ScottMadden consulted in 2015 about this value for money metric, and if yes, what was their feedback?

Response

No, ScottMadden was not consulted in 2015 about the value for money metric on a $/generating unit basis.

However, the impact of unit size on plant cost performance was identified by ScottMadden in its 2009 Benchmarking Report, which states “Specific drivers of performance vary from station to station and will be discussed in more detail later in the report, but overall the biggest drivers are; capability factor, station size, CANDU technology, corporate cost allocation and potential controllable costs.” (EB-2010-0008, Ex. F5-1-1, p. 123) The reference to station size was further defined as meaning “the combined effect of number of units and size of units [emphasis added]. The number of units and size of those units can have significant impacts on plant cost performance and review of the benchmarking data reveals a link between the two.” (EB-2010-0008, Ex. F5-1-1, p. 124)

See also Ex. L-11.4-1 Staff-256.
Board Staff Interrogatory #103

Issue Number: 6.2

Issue: Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

Interrogatory

Reference:
Ref: Exh A2-2-1 Attachment 1 page 30

The nuclear business operational performance and targets are summarized in a table at page 30 of the OPG 2016-2018 business plan.

a) Are the 2015 actual operational performance data annual results or rolling actual results? If the data are annual results, please provide the rolling results.

b) Note 1 to the table states that the Darlington targets reflect the impact of the Unit 2 refurbishment. Please identify the Darlington targets and explain how the Unit 2 refurbishment is reflected in these targets.

Response

(a) All eight of the 2015 actual operational performance data set out in Ex. A2-1-1, Attachment 1, p. 30, with the exception of WANO NPI (rolling average) and Human Performance Error Rate (18 months), are annual results. OPG calculates the following five metrics on a rolling average basis (two-year rolling for Pickering; three-year rolling for Darlington), as set out in Chart 1 below:

Chart 1: Operational Performance Data – 2015 Rolling Average

<table>
<thead>
<tr>
<th>Metric</th>
<th>Pickering</th>
<th>Darlington</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collective Radiation Exposure (person-rem/unit)</td>
<td>97.72</td>
<td>79.55</td>
</tr>
<tr>
<td>Unit Capability Factor (%)</td>
<td>77.3</td>
<td>84.0</td>
</tr>
<tr>
<td>Forced Loss Rate (%)</td>
<td>6.85</td>
<td>3.65</td>
</tr>
<tr>
<td>WANO NPI (Index)</td>
<td>68.5</td>
<td>83.7</td>
</tr>
<tr>
<td>Total Generating Cost per MWh</td>
<td>67.36</td>
<td>44.38</td>
</tr>
</tbody>
</table>
(b) The Darlington performance targets shown at Ex. A2-2-1, Attachment 1, p. 30 were established to apply to the three operating units (Units 1, 3, and 4) as well as any impact from operation of systems common to the operating units (Unit 0). The targets were derived to exclude any impact from the Darlington Unit 2 refurbishment. For example, the unit capability factor (%) reflects expected generation of the three operating units, and excludes the lost generation foregone during the Unit 2 refurbishment outage.

The exception is Total Generating Cost per MWh, which has both a normalized and non-normalized target. Nuclear Operations has set internal performance targets for TGC/MWh on a non-normalized basis (Ex. F2-1-1, p. 16), which excludes any impact from Darlington Unit 2 Refurbishment. By comparison, the normalized target has been adjusted to show normalized costs per MWh for Darlington as outlined in Ex. F2-1-1, p. 16 and described further at L-6.2-1 Staff-101.
Board Staff Interrogatory #104

Issue Number: 6.2
Issue: Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

Interrogatory

Reference:
Ref: Exh F2-1-1 page 15 Attachment 1 pages 89 and 95 Ref: Exh F2-1-1 Table 1

The operator level summary at page 89 presents EUCG indicator results including TGC/MWh. The value for money definitions, including operating costs are provided on page 95. The footnote to Chart 4 at page 15 states that TGC/MWh excludes the centrally held pension and OPEB costs and asset service fees to align with industry standard.

Are all the costs listed in Table 1, Operating Costs Summary – Nuclear, of Exh F2-1-1 included in the determination of TGC/MWh except centrally held pension and OPEB costs and asset service fees? If not, please identify which other costs are excluded and explain why they are excluded.

Response

No. The following costs in Ex. F2-1-1, Table 1 are excluded from TGC/MWh, in addition to centrally held pension and OPEB costs and asset service fees:
- Darlington Refurbishment OM&A and Darlington New Nuclear OM&A
- IESO Non-Energy Charges (Ex. F4-4-1 Table 3 line 6)
- Depreciation and Amortization
- Income Tax
- Property Tax

These costs have also been excluded to align with the industry standard for the purpose of comparability amongst peers.
Board Staff Interrogatory #105

Issue Number: 6.2

Issue: Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

Interrogatory

Reference:
Ref: Exh F2-1-1 Attachment 3 page 13 Ref: EB-2010-0008 Exh F5-1-2

As part of its 2015 review, ScottMadden reviewed the use of benchmarks in the business planning process and target setting. Was there any review of OPG performance against the 2014 targets that ScottMadden proposed in 2009 and what were the results of that review? If not, why not?

Response

No. The purpose of the ScottMadden Evaluation of OPG Nuclear Benchmarking Report in 2015 was to conduct an independent review of OPG Nuclear’s 2014 benchmarking report and process to ensure continued accuracy of reporting and consistency with industry best practices.
Board Staff Interrogatory #106

Issue Number: 6.2

Issue: Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

Interrogatory

Reference:
Ref: Exh F2-1-1 Attachment 3 page 12

ScottMadden states that, “The work management metrics (Scope Stability and Schedule Adherence) are relatively new for the industry. OPG benchmarks their performance against these metrics at a lower level in the organization…”

Please provide the scope stability and schedule adherence benchmarked data for 2014 and any prior years for which the data are available.

Response

The following charts summarize OPG’s performance for scope stability and schedule adherence from 2012-2014.

Chart 1: Scope stability

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
</tr>
<tr>
<td>DN</td>
<td>83%</td>
<td>84%</td>
<td>80%</td>
</tr>
<tr>
<td>PN</td>
<td>62%</td>
<td>55%</td>
<td>60%</td>
</tr>
</tbody>
</table>

Top quartile for scope stability is benchmarked at 92%.

Chart 2: Schedule Adherence

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
</tr>
<tr>
<td>DN</td>
<td>89%</td>
<td>90%</td>
<td>88%</td>
</tr>
<tr>
<td>PN</td>
<td>89%</td>
<td>88%</td>
<td>87%</td>
</tr>
</tbody>
</table>

For Schedule Adherence, OPG uses Schedule Completion to benchmark. Top quartile is benchmarked at 95%.

Witness Panel: Nuclear Operations and Projects
Board Staff Interrogatory #107

Issue Number: 6.2

Issue: Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

Interrogatory

Reference:
Ref: Exh F2-1-1 page 8, Attachment 1 page 57 Ref: EB-2013-0321 Exh F2-1-1 page 5
One of the reliability metrics is the “1 Year On-line Corrective Maintenance Backlog”. The 2014 actual result for Pickering was 160 work orders per unit, while the 2014 benchmark median was 20. The 2011 actual result for Pickering as noted in the EB- 2013-0321 application was also 160 work order per unit, while the 2011 benchmark median was 52.

At page 57 of Attachment 1, it states that Pickering has teams focused on reducing corrective and deficient work backlogs. Please explain why Pickering’s performance on 1 Year On-line Corrective Maintenance Backlog did not improve in the 3 year period 2011 to 2014.

Response

The Pickering team executes a number of initiatives to improve equipment reliability. A particular initiative during 2011 to 2014 was the “3K3” Plan, which involved execution of 3,000 key work orders in three years to improve system health. Execution of the 3K3 Plan is now complete. While the 3K3 Plan did not focus on reducing corrective and deficient work backlogs, it has contributed to significant improvement in reliability demonstrated by achieving the best Forced Loss Rate performance in site history (2.89%) in 2015. Following completion of the 3K3 Plan, increased focus and resources are being directed back to deficient and corrective maintenance backlog reductions. In that regard, the corrective maintenance backlogs reduced by over 20% from 2014 (160 work orders/unit) to 2015 (125 work orders/unit).
Board Staff Interrogatory #108

Issue Number: 6.2

Issue: Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

Interrogatory

Reference:

Ref: Exh F2-1-1 Attachment 2 page 3
Attachment 2 is the “2014 Nuclear Staffing Benchmarking Analysis” prepared by Goodnight Consulting. The report is dated December 22, 2014. At page 3 of the report, there is reference to data as at March 2014.

a) Are the data and the analysis in this report reflective of benchmarking at March 2014?

b) Is this report reflective of data provided by OPG as undertaking J6.1 in the previous cost of service proceeding EB-2013-0321?

Response

(a) Yes. Data for the basis of the “2014 Nuclear Staffing Benchmarking Analysis” was as of March 2014.

(b) Yes.
**Board Staff Interrogatory #109**

**Issue Number:** 6.2

**Issue:** Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

**Interrogatory**

**Reference:**

Ref: Exh F2-1-1 Attachment 2 page 3 and 11 Ref: Exh F4-3-1 Attachment 1

At page 3, it states, “We benchmarked 5,421 OPG Nuclear staff and long-term contractors; 2,036 OPG Nuclear personnel could not be benchmarked.”

- a) Confirm that these data units are FTE, as used in the balance of the Goodnight report.
- b) What is the definition of long-term contractor? What is the equivalent term used by OPG?
- c) The total nuclear staff referred to by Goodnight is 7,457 FTE, presumably at March 2014. Attachment 1 to Exh F4-3-1 is a table summarizing FTE for the period 2013 to 2021. The total actual nuclear FTE for 2014 are 8,431.8.
  - i. At page 11, Goodnight states that an FTE is 1,890 hours/year (or 36-1/3 hours per week). What factor did OPG use to determine FTE in Attachment 1 to Exh F4-3-1?
  - ii. While the FTE data were collected at different times in 2014, please explain the approximately 1,000 FTE difference between the 7,457 FTE referred to in the Goodnight study and the 8,431,8 FTE summarized in Attachment 1 to Exh F4-3-1.
  - iii. Using the same categories as lines 3 to 22 Attachment 1 to Exh F4-3-1, please set out the distribution of the 5,421 FTE that were benchmarked by Goodnight.

**Response**

- a) Goodnight data is a combination of regular staff headcount translated into FTEs and long-term contractor FTEs at March 2014.
- b) Goodnight Consulting defines a long-term contractor as non-regular staff or purchased services contractors of 6 months or longer duration (Goodnight report at EB-2013-0321 Ex. F5-1-1 Part a, p. 39). OPG does not distinguish between short term and long term.
contractors in its contractor support services (see definition of non regular labour, augmented staff and other purchase services in Ex. F2-4-1, p. 4).

c) Goodnight refers to 7,457 FTEs, which represent 6,926 regular staff, 195.3 non-regular staff contractor FTEs and 335.7 purchased services contractor FTEs.

i. More specifically, Goodnight is referring to an annual factor of 1,890 hours per year to calculate FTEs for purchased services contractors.

The FTEs in Attachment 1 to Ex. F4-3-1 were determined based on the weekly base hours associated with each position over the course of the year. Different factors were used depending on the base hours of work associated with each regular staff position as follows:

• For an employee whose base hours of work are 35 hours per week, an annual factor of 1,820 hours per year was used

• For an employee whose base hours of work are 37.5 hours per week, an annual factor of 1,950 hours per year was used

• For an employee whose base hours of work are 40 hours per week, an annual factor of 2,040 hours per year was used

ii. The difference of 974.8 FTEs from the 7,457.0 Nuclear FTEs in the Goodnight study to the 8,431.8 actual FTEs for 2014 in Ex. F4-3-1 Attachment 1 is shown in Chart 1 below:

<table>
<thead>
<tr>
<th>Goodnight March 2014 Reported Total</th>
<th>Total FTEs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less: Augmented Staff + Other Purchased Services</td>
<td>(335.7)</td>
</tr>
<tr>
<td>Plus: Non-Regular Staff Not Benchmarked + Security Protected Staff Excluded + Other (timing differences, etc)¹</td>
<td>765.0</td>
</tr>
<tr>
<td>Indirect Corporate Staff</td>
<td>545.4</td>
</tr>
<tr>
<td>Ex. F4-3-1 Attachment 1 2014 Actual</td>
<td>8,431.8</td>
</tr>
</tbody>
</table>

The Goodnight study identified 7,457.0 Nuclear FTEs, consisting of 6,926.0 Regular Staff and 531.0 Contractors. Of the 7,457.0 Nuclear FTEs, Goodnight was able to benchmark 4,890.0 Regular Staff FTEs and the 531.0 Contractor FTEs engaged in baseline steady state operations, for a total of 5,421.0 FTEs. The 531.0 Contractor FTEs in the Goodnight study represent Non–Regular Staff, Augmented Staff and Other Purchase Services. Goodnight was

¹ Provided on an aggregated basis, as OPG is unable to disclose information separately for Security Protected Staff.
unable to benchmark the remaining 2,036.0 Regular Staff FTEs as described at Ex. F2-1-1 Attachment 2, p. 14.

The 8,431.8 FTEs identified in Ex. F4-3-1 Attachment 1 also includes Non-Regular Staff FTEs but excludes 335.7 Augmented Staff and Other Purchase Services FTEs, which have been subtracted in the reconciliation in Chart 1.

The other reconciliation items in Chart 1 include adjustments for:

- 765.0 FTEs for Non-Regular Staff Not Benchmarked, Security Protected Staff Excluded, and Other:
  - Non-regular staff engaged in non-benchmarked activities, primarily outage execution (Ex. F2-2-1 Attachment 2, p. 10). These non-baseline, non-regular staff FTEs were excluded from the 7,457.0 FTEs analysed by Goodnight but have been included in the 8,431.8 FTEs.
  - Security Protected Staff. The number of security personnel working at OPG is confidential and therefore OPG did not provide information on Security Protected Staff FTEs to Goodnight. Security Protected Staff are excluded from the 7,457.0 FTEs but have been included in the 8,431.8 FTEs.
  - Other (e.g. timing differences). Goodnight derived FTEs based on March 2014 headcount whereas the 8,431.8 FTEs reflect actual 2014 FTEs.

- 545.4 FTEs for Direct versus Indirect Corporate Staff:
  - Goodnight benchmarked those Corporate Staff directly supporting Nuclear (e.g., Nuclear Finance). Corporate Staff that indirectly support Nuclear (e.g., Treasury) were excluded from Goodnight but have been included within the 8,431.8 FTEs.

iii. Of the 5,421 FTEs benchmarked by Goodnight, these include 335.7 purchased services contractor FTEs, which are not represented in Ex. F4-3-1 Attachment 1. Therefore, 5,085.3 regular and non-regular benchmarked FTEs can be distributed according to the format of Ex. F4-3-1 Attachment 1 lines 3 to 22:
<table>
<thead>
<tr>
<th>Line No.</th>
<th>NUCLEAR FACILITIES</th>
<th>Goodnight 2014 StudyBenchmarked FTEs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Staff</strong> (Regular and Non-Regular)</td>
<td>FTEs</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td><strong>Nuclear - Direct</strong></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Management</td>
<td>271.2</td>
</tr>
<tr>
<td>5</td>
<td>Society</td>
<td>1,281.3</td>
</tr>
<tr>
<td>6</td>
<td>PWU</td>
<td>2,335.7</td>
</tr>
<tr>
<td>7</td>
<td>EPSCA</td>
<td>42.5</td>
</tr>
<tr>
<td>8</td>
<td>Subtotal</td>
<td>3,930.7</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td><strong>Nuclear - Allocated</strong></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Management</td>
<td>148.0</td>
</tr>
<tr>
<td>12</td>
<td>Society</td>
<td>335.7</td>
</tr>
<tr>
<td>13</td>
<td>PWU</td>
<td>671.0</td>
</tr>
<tr>
<td>14</td>
<td>EPSCA</td>
<td>0.0</td>
</tr>
<tr>
<td>15</td>
<td>Subtotal</td>
<td>1,154.6</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td><strong>NUCLEAR FACILITIES</strong></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Management</td>
<td>419.2</td>
</tr>
<tr>
<td>19</td>
<td>Society</td>
<td>1,617.0</td>
</tr>
<tr>
<td>20</td>
<td>PWU</td>
<td>3,006.6</td>
</tr>
<tr>
<td>21</td>
<td>EPSCA</td>
<td>42.5</td>
</tr>
<tr>
<td>22</td>
<td>Total</td>
<td>5,085.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Contractor FTEs Purchased Services</th>
<th>335.7</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>5,421.0</td>
</tr>
</tbody>
</table>
Board Staff Interrogatory #110

Issue Number: 6.2

Issue: Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

Interrogatory

Reference:
Ref: Exh F2-1-1 Attachment 2 page 13 and 28
Ref: EB-2010-0008 Undertaking J5.3
Ref: Exh F2-1-1 Attachment 4 page 12

Goodnight contacted CANDU operators globally and received no data to contribute to the study and was therefore unable to benchmark data for CANDU-specific activities. Through “technical adjustments” of PWR operator data, Goodnight determined that the appropriate CANDU benchmark was 5,208 FTE.

In response to undertaking J5.3 in the 2011-2012 payment amounts proceeding, OPG provided minimum complement data as set out in operating licences. Based on 5 shifts, the minimum complement for Darlington was 475 people and for Pickering was 630 people.

a) Are the minimum complement data based on headcount or FTE?

b) Have the minimum complement data changed since undertaking J5.3 was filed? If yes, what are they currently for Pickering and Darlington?

c) At Exh F2-1-1 Attachment 4 page 12, it states that the Days Based Maintenance initiative required CNSC approval as the minimum complement staffing number changed. What was the change in staffing number related to this initiative?

d) What are the CNSC minimum complement data for:
   i. An operational 4 unit Pickering facility
   ii. A non-operational Pickering facility
   iii. A Darlington facility with one unit under refurbishment
   iv. A Darlington facility with two units under refurbishment

Witness Panel: Nuclear Operations and Projects
Response

a) The minimum complement is based on headcount.

b) Yes, the minimum complement data has changed since undertaking J5.3 was filed in EB-2010-0008.

The Pickering minimum complement is currently 67 (previously 84) per shift with additional staff required during fuelling activities on a unit or if the heavy water upgrader is required to be operating.

The Darlington Minimum complement is currently 54 (previously 57) per shift when no fuel handling trolleys are being operated and 58 (previously 61) per shift when all three fuel handling trolleys are being operated.

c) The Days Based Maintenance initiative resulted in a net reduction of four minimum complement positions per shift at Darlington and 15 minimum complement positions per shift at Pickering. In addition, four of the minimum complement roles at each station were changed to only be required on 12 hour days (i.e., position is not required to be filled on night shift).

d) The CNSC does not prescribe minimum complement numbers. Rather, they are derived by the licensee based on the most resource-intensive conditions under all operating states, design basis accidents, and emergencies. The CNSC must accept any changes to minimum complement proposed by the licensee prior to implementation of those changes.

Related to the future reduction of operational units at Pickering, OPG expects to propose changes to the minimum shift complement as justified by changes to credible accidents, emergency situations, and operating states; however, the number of staff and related station conditions have not been determined at this time.

For Darlington, OPG has not proposed a reduction in minimum complement staff number for units under refurbishment as these staff are still required for monitoring and control of the units, although there has been a request accepted by the CNSC to reduce qualification requirements for operations staff monitoring the defueled unit in the control room.
**CCC Interrogatory #27**

**Issue Number: 6.2**

**Issue:** Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

**Interrogatory**

**Reference:**
Reference: Ex. F2/T1/S1/p. 14

The evidence states that the Chief Nuclear Office (CNO) in consultation with OPG’s Nuclear Executive Committee (NEC) provided direction on top-down performance targets for each nuclear station for the business planning period. Please provide all of the documents related to this direction.

**Response**

The 2016-2018 Business Planning Instructions Memo (see Ex. A2-2-1 Attachment 2) provided direction for the business planning period. Corresponding top-down performance targets are provided for the 2016-2018 period, as per Attachment 1.
### Preliminary Benchmarking Results and Business Plan Targets

#### Notes

- **1.00 1.03 1.29 6.48 10.08 2.85 5.50 1.00 5.00 1.00 5.00 1.00 5.00 1.00 2018 targets based on Long-Term Outlook production submission.**
- **0.0250 0.0001 0.0024 0.0115 0.0000 0.0000 0.0250 0.0250 0.0250 0.0250 0.0250 0.0250 0.0250 0.0250 Maintain a target of 0.0250 in line with Max NPI points.**
- **0.000500 0.000001 0.000001 0.000158 0.001580 0.000158 0.000500 0.000500 0.000500 0.000500 0.000500 0.000500 0.000500 0.000500 Maintain a target of 0.000500 in line with Max NPI points.**
- **0.50 0.00 0.05 0.33 0.36 0.00 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50 Maintain a target of 0.50 in line with Max NPI points.**
- **0.15 0.10 0.20 0.00 0.02 0.06 0.03 0.06 0.15 0.15 0.15 0.15 0.15 0.15 0.15 Accidents (#/200k hours worked) reflect refurbishment.**
- **80.00 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 Radiation Exposure (Person-rem per unit) reflects emissions for 3 operating units (including TRF and U0) and excludes U2 from Oct 2016 onwards. Report card target split for DN and NR are draft and will be finalized during 2016 BP. Increases in 2016 and 2017 reflect impact of moderator drains (D1641), D2 defueling as well as D2O treatment and storage during refurbishment. Higher emissions per unit reflect U2 emission exclusions and higher station targets from TRF outage.**
- **0.50 0.00 0.00 0.00 0.00 0.00 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.50 Human Performance (Index) 2-Year Reactor Trip Rate (# per 7,000 hours) 2-Year Auxiliary Feedwater System Unavailability (%): 80.00 42.25 78.94 82.24 79.08 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year Auxiliary Feedwater System Unavailability (%): 82.24 78.94 79.08 103.27 77.60 101.67 71.50 # 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc.
- **2-Year Reactor Trip Rate (# per 7,000 hours): 80.00 42.25 78.94 82.24 79.08 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc.
- **2-Year Reactor Trip Rate (# per 7,000 hours): 80.00 42.25 78.94 82.24 79.08 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc.
- **2-Year Reaction Trip Rate (# per 7,000 hours): 80.00 42.25 78.94 82.24 79.08 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc. 103.27 77.60 101.67 71.50 3-Year High Pressure Safety Injection Unavailability, etc.
**PWU Interrogatory #10**

**Issue Number: 6.2**

**Issue:** Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

**Interrogatory**

**Reference:**
Ref (a): Exhibit F2-1-1, Page 8 of 22, Chart 1: Comparison of OPG Nuclear Performance to Industry Benchmarks:
Ref (b): Exhibit F2-1-1, Page 15 of 22, Chart 4: Operational and Financial Targets

a) Please provide updated actual figures for the Rolling Average Collective Radiation Exposure (Person-rem per unit) and the Fuel Reliability Index (microcuries per gram) for 2015 and 2016, if available.

b) What steps have been taken to improve these two metrics since 2014?

c) In Chart 4, targets for Collective Radiation Exposure show the expectation of below-median performance. The targeted trends show further metric deterioration moving forward, particularly for Pickering. What initiatives, if any, are planned to improve this safety metric going forward?

d) In Chart 1, all safety metrics, aside from Collective Radiation Exposure and Fuel Reliability at Pickering, are shown to be better than the median. In Chart 4, the targets for 7 of the 9 safety metrics are set at the median or worse than the median. Why are the majority of safety metrics benchmarked to deteriorate from 2014 actuals to 2016 targets?

**Response**

a) 2015 actual results are presented in Chart 1 below. 2016 annual results are not available.

<table>
<thead>
<tr>
<th>Metric</th>
<th>2015</th>
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</thead>
<tbody>
<tr>
<td>Rolling Average Collective Radiation Exposure (person-rem/unit)</td>
<td>97.72 79.55</td>
</tr>
<tr>
<td>Fuel Reliability Index (microcuries per gram)</td>
<td>0.000421 0.000122</td>
</tr>
</tbody>
</table>

**Chart 1**

Witness Panel: Nuclear Operations and Projects
b) **Collective Radiation Exposure (CRE)**

Pickering

Since 2014, Pickering has executed a number of initiatives to improve CRE performance including:

- Procurement of reactor face shielding
- Enhanced shielding canopy for reactor face work
- Improved heat transport filtration (through reduction in bleed filter pore size)

Darlington

Some of the key steps taken at Darlington to improve CRE performance since 2014 have been:

- Implemented use of reactor face shielding blocks
- Reduce scaffold dose – remote periodic inspection program/flow accelerated corrosion inspections and access crew
- Improve utilization of teledosimetry
- Feeder ice jacket improvements

Longer term objectives are also being pursued, along with recommended changes to corporate governance for establishing dose impacts when major or minor projects are progressing through the approvals phase. There is a CANDU Plant Managers Guide to Source Term Reduction being developed via a Candu Owners Group project, similar to the INPO/EPRI Guides for Pressurized Water Reactors and Boiling Water Reactors. Radiation Protection excellence plan specific initiatives are provided in response c) below.

**Fuel Reliability Index (FRI)**

Pickering

Station procedures are in effect to locate and discharge defective fuel by monitoring Iodine I-131 levels and spikes. Currently, the absence of these spikes indicates that there have been no fuel defects in all Pickering Units since January 2016. The implemented procedures increase the level of surveillance on suspect and neighboring channels, and initiate increased frequency of Primary Heat Transport sampling. This metric has improved from 0.001580 uCi/gram in 2014 to 0.000193 in Q3 2016, versus a WANO target of 0.0005.

Actions taken resulting in improvement since 2014 include:

- Developing a fuel defect guideline for Pickering
- Increasing scope of Heat Transport System (HTS) grab sampling and analysis
- Assessing and comparing Units 1, 4 and 5 to 8 power ramps
- Assessing impact of adjuster burn-out during operation
- Assessing impact of pressure tube creep on fuel performance
• Improving the methods of surveillance and elimination of the possibility of foreign materials entrance into the HTS due to Fuel Handling and Outage practices
• Fuel bundle manufacturing assessment
• 3rd party examinations of unirradiated Pickering fuel bundle
• Irradiated fuel inspections and examinations
• Improving capability of detecting the defected fuel bundles during the discharge from the fuelling machines
• Improving the capability of the in-bay inspection of the suspected defective fuel bundles.

**Darlington**
Darlington has seen a reduction in the number of new fuel defects and was defect free from August 2014 to January 2016. Darlington is currently defect free.

The steps taken that have led to improved FRI performance and prevent the potential of fuel defects are the following:
• New fuel with tighter tolerances for mass was received and is currently being used (received in July 2015);
• Installed a new fuel inspection facility and completed inspections in East Fuelling Facility Auxiliary Area; confirmed defects in all suspect bundles and all fuel defects originated from one batch of bundles;
• OPG-supplier co-operation resulted in installation of an automatic loader of fuel pallets complete with a “go/no go” pallet diameter monitor;
• Close monitoring of existing fuel bundle inventory and core load; and
• Projects in progress on Gaseous Fission Products (GFP) and feeder scanners to improve ability to locate defects on power and during outages.

c) **Pickering**
Collective Radiation Exposure (CRE) is directly linked to the scope and duration of outages. The outage durations are generally driven by the dose intensive nuclear components inspection and maintenance program. At Pickering, there has been an increase in the inspection program performed to ensure fitness for service and continued safe operations. This has resulted in longer outages from 2016 to 2018 and an increase in CRE. In particular, there will be incremental fuel channel and feeder work, and heat transport maintenance requiring low level drain in 2017 and 2018. This will directly contribute to an increase in CRE.

Improvement initiatives going forward include:
• Continuing to focus on individual dose goals and dose reductions plans.
• Commissioning technological solutions including Machine Delivered Scrape (Dose intensive work currently being performed manually), Nanofiber filter and Dose reducing resin trials
• Work method improvements – particularly in scaffolding, insulation, heat transport and moderator maintenance
• Improved worker oversight and monitoring by both Radiation Protection and line supervision

Darlington

Darlington has seen an increase in dose required to support Nuclear Refurbishment pre-requisite work (D2O islanding, Shield Tank Overpressure Protection piping and platform) and life extension project installations (i.e., SDC Hx replacement and vault ACU coil replacements). There is also increased dose resulting from plant aging management issues like closure plug leakage and CSA inspections (fuel channel, feeder and boiler inspections). The following list presents some of the CRE initiatives that are being undertaken to improve this safety metric:

• Establishment and tracking of daily dose goals;
• Use of remote monitoring to provide RP coverage for radioactive work;
• Use of remote monitoring to communicate radiological hazards;
• Use of specialized resins to reduce source term (Lanxess resin trial for Unit 2);
• Improving human performance in RP fundamentals through the Dynamic Learning Activities (targeted on gap behaviors at the station); and
• Use of robots to perform plant functions in high dose environments (i.e. recent example where water leakage in the moderator room from Unit 1 Moderator Heat Exchanger #2, where a robot was used to close a drain valve saving 1.5 rem).

d) The majority of the safety benchmarked targets are set at the WANO maximum NPI points since these industry targets are recognized as a measure of desirable performance. However, OPG often exceeds these industry threshold targets as can be seen in the Reactor Trip Rate, Auxiliary Feedwater System Unavailability, Emergency AC Power Unavailability and High Pressure Safety Injection Unavailability.
**SEC Interrogatory #5**

**Issue Number: 6.2**

**Issue:** Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

**Interrogatory**

**Reference:**

Please provide a copy of all benchmarking analysis, reports, opinions and/or assessments, undertaken by OPG or for OPG since 2014, regarding any aspect that directly or indirectly relates to costs or activities of its nuclear business, or those that are indirectly are allocated to the nuclear payment amounts, that has not already been included in the pre-filed evidence.

**Response**

OPG declines to answer this question. The question does not recognize proportionality considerations which underlie the interrogatory process, in that it is overly broad and all encompassing.

The question contemplates the production of every benchmarking analysis, every report and every opinion and/or assessment produced by OPG since 2014 that directly or indirectly relates to OPG’s nuclear operations or the costs allocated to its nuclear operations. OPG’s business requires an extensive quantity of documents that may be captured by the question asked in this interrogatory.

If the question was refined to reference specific materials relating to an issue on the approved issues list, OPG could undertake to find relevant materials.
SEC Interrogatory #63

Issue Number: 6.2

Issue: Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

Interrogatory

Reference:
[F2/1/1, Attach 1] With respect to the 2015 Nuclear Benchmarking Report:

a. Please provide a copy of the 2014 and 2016 versions of the report.

b. Please provide a full breakdown of the calculation of the 3-Year Total Generation Cost per MWh (TGC/MWh) for both Darlington and Pickering. Please explain which of the categories of costs that OPG is seeking to recover in this application are included and which are not included.

c. [p.6] Please provide disaggregated information for Pickering A and Pickering B.

d. [p.6] Please provide the benchmark Results – Plant Level Summary table for each year since 2010.

Response

a. The 2014 Nuclear Benchmarking Report is attached as Attachment 1. The 2016 Nuclear Benchmarking Report is attached as Attachment 3.

b. The breakdown of the calculation of the 3-Year Total Generation Cost per MWh (TGC/MWh) for Darlington and Pickering is provided in Chart 1 below. OPG seeks to recover all categories of costs in this application.

c. Pickering A and B ceased to exist as separate stations when all Pickering units were combined into a single facility in 2011. As such, OPG does not track the requested metrics separately for the former A and B stations. Moreover, since none of the costs that form part of OPG’s requested payment amounts are categorized based on the former Pickering A and B stations, OPG fails to see the relevance of the requested breakdown.

d. See Attachment 2.
### Chart 1 ($M, unless otherwise stated)

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<tr>
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<td>Stations</td>
<td>615.9</td>
<td>398.8</td>
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<td>377.8</td>
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</table>
# Table of Contents

1.0 EXECUTIVE SUMMARY ..................................................................................................................................... 1

2.0 SAFETY ............................................................................................................................................................ 6

  METHODLOGY AND SOURCES OF DATA ............................................................................................................ 6
  ALL INJURY RATE .............................................................................................................................................. 7
  ROLLING AVERAGE INDUSTRIAL SAFETY ACCIDENT RATE ............................................................................ 9
  ROLLING AVERAGE COLLECTIVE RADIATION EXPOSURE ........................................................................... 12
  AIRBORNE TRITIUM EMISSIONS PER IN SERVICE UNIT .................................................................................. 18
  FUEL RELIABILITY INDEX .................................................................................................................................. 21
  2-YEAR UNPLANNED AUTOMATIC REACTOR TRIPS ....................................................................................... 24
  3-YEAR AUXILIARY FEEDWATER SAFETY SYSTEM UNAVAILABILITY ............................................................ 28
  3-YEAR EMERGENCY AC POWER SAFETY UNAVAILABILITY ....................................................................... 31
  3-YEAR HIGH PRESSURE SAFETY INJECTION ................................................................................................. 35

3.0 RELIABILITY .................................................................................................................................................... 39

  METHODLOGY AND SOURCES OF DATA ............................................................................................................ 39
  WANO NUCLEAR PERFORMANCE INDEX ........................................................................................................ 40
  ROLLING AVERAGE FORCED LOSS RATE .......................................................................................................... 45
  ROLLING AVERAGE UNIT CAPABILITY FACTOR ............................................................................................... 50
  ROLLING AVERAGE CHEMISTRY PERFORMANCE INDICATOR ...................................................................... 55
  1-YEAR ON-LINE DEFICIENT MAINTENANCE BACKLOG .................................................................................. 59
  1-YEAR ON-LINE CORRECTIVE MAINTENANCE BACKLOG .............................................................................. 61

4.0 VALUE FOR MONEY ...................................................................................................................................... 63

  METHODLOGY AND SOURCES OF DATA ............................................................................................................ 63
  3-YEAR TOTAL GENERATING COST PER MWH ............................................................................................... 64
  3-YEAR NON-FUEL OPERATING COST PER MWH .......................................................................................... 68
  3-YEAR FUEL COST PER MWH ........................................................................................................................ 72
  3-YEAR CAPITAL COST PER MW DER ............................................................................................................ 75

5.0 HUMAN PERFORMANCE ............................................................................................................................ 78

  METHODLOGY AND SOURCES OF DATA ............................................................................................................ 78
  18-MONTH HUMAN PERFORMANCE ERROR RATE ........................................................................................ 78

6.0 MAJOR OPERATOR SUMMARY .................................................................................................................... 81

  PURPOSE ............................................................................................................................................................ 81
  WANO NUCLEAR PERFORMANCE INDEX ANALYSIS ...................................................................................... 81
  UNIT CAPABILITY FACTOR ANALYSIS ............................................................................................................ 83
  TOTAL GENERATING COST/MWH ANALYSIS ................................................................................................... 84

7.0 APPENDIX .......................................................................................................................................................... 87
1.0 EXECUTIVE SUMMARY

Background

This report presents a comparison of Ontario Power Generation (OPG) Nuclear’s performance to that of nuclear industry peer groups both in Canada and worldwide. The report was prepared as part of OPG Nuclear’s commitment to “performance informed” business management. The results of this report are used during business planning to drive top-down target setting with business improvement as the objective.

Benchmarking involves three key steps: (a) identifying key performance metrics to be benchmarked, (b) identifying the most appropriate industry peer groups for comparison, and (c) preparing supporting analyses and charts. OPG Nuclear personnel responsible for specific performance metrics assisted in the development of the supporting analyses by providing insight into the factors contributing to current OPG Nuclear operational performance.

Performance Indicators

Good performance indicators used for benchmarking are defined as metrics with standard definitions, reliable data sources, and utilization across a good portion of the industry. Good indicators allow for benchmarking to be repeated year after year in order to track performance and improvement. Additionally, when selecting an appropriate and relevant set of metrics, a balanced approach covering all key areas of the business is essential. As such, 20 key performance indicators have been selected for comparison to provide a balanced view of performance and for which consistent, comparable data is available. These indicators are listed in Table 1 and are divided into four categories aligned with OPG Nuclear’s four cornerstones: safety, reliability, value for money, and human performance.

Industry Peer Groups

Peer groups were selected based on performance indicators widely utilized within the nuclear industry. Overall, six different peer groups were used as illustrated in Table 1 and panel members are detailed in Tables 7-12 of Section 7.0.
Table 1: Industry Peer Groups

<table>
<thead>
<tr>
<th></th>
<th>WANO / COG CANDUs</th>
<th>All North American PWRs and PHWRs (WANO)</th>
<th>INPO AP-928 Workgroup</th>
<th>INPO</th>
<th>CEA</th>
<th>EUCG North American Plants (U.S. and Canada)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>All Injury Rate</td>
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<td>X</td>
</tr>
<tr>
<td>Rolling Average Industrial Safety Accident Rate*</td>
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<td>X</td>
</tr>
<tr>
<td>Rolling Average Collective Radiation Exposure*</td>
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<td>X</td>
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<tr>
<td>Airborne Tritium Emissions per Unit</td>
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<td>X</td>
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<tr>
<td>Fuel Reliability Index*</td>
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<td>X</td>
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<tr>
<td>2-Year Reactor Trip Rate*</td>
<td></td>
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<td>X</td>
</tr>
<tr>
<td>3-Year Auxiliary Feedwater System Unavailability*</td>
<td></td>
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<td>X</td>
</tr>
<tr>
<td>3-Year Emergency AC Power Unavailability*</td>
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<td></td>
<td>X</td>
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<tr>
<td>Reliability</td>
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<tr>
<td>WANO NPI</td>
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<td></td>
<td>X</td>
</tr>
<tr>
<td>Rolling Average Forced Loss Rate*</td>
<td></td>
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<td>X</td>
</tr>
<tr>
<td>Rolling Average Unit Capability Factor*</td>
<td></td>
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<td>X</td>
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<tr>
<td>Rolling Average Chemistry Performance Indicator*</td>
<td></td>
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<td>X</td>
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<tr>
<td>1-Year On-line deficient Maintenance Backlog</td>
<td></td>
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<tr>
<td>1-Year On-line corrective Maintenance Backlog</td>
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<td>X</td>
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<tr>
<td>Value for Money</td>
<td></td>
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<tr>
<td>3-Year Total Generating Cost / MWh</td>
<td></td>
<td></td>
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<td>X</td>
</tr>
<tr>
<td>3-Year Non-Fuel Operating Cost (OM&amp;A) / MWh</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
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<tr>
<td>3-Year Fuel Cost (OM&amp;A) / MWh</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3-Year Capital Cost / MW DER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Human Performance</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Human Performance Error Rate</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>X</td>
</tr>
</tbody>
</table>

Data provided by the World Association of Nuclear Operators (WANO) is the primary source of benchmarking data for operational performance indicators. Eleven out of twenty benchmarking metrics have been compared to the WANO/COG CANDU panel. All WANO performance indicators are measured at the unit and plant levels. Industrial Safety Accident Rate and Emergency AC Power Unavailability are only measured at the plant level.

For a few of the specialized operating metrics, different peer groups were used since WANO data was not available. For comparing maintenance work order backlogs, the peer group consists of all plants participating in the Institute of Nuclear Power Operations (INPO) AP-928 working group. For All Injury Rate comparison, the Canadian Electricity Association (CEA) panel was used.

For financial performance comparisons, data compiled by the Electric Utility Cost Group (EUCG) was used. EUCG is a nuclear industry operating group and the recognized source for cost benchmark information. EUCG cost indicators are presented at the plant level and compared on a net megawatt hour generated basis (to be referred to as MWh subsequently) and a per megawatt (MW) design electrical rating (DER) basis. The only CANDU operators reporting data to EUCG in 2013 were OPG Nuclear and Bruce Power which is not a sufficiently large panel to provide a basis for comparison. Should more CANDU operators choose to join EUCG in the future, comparisons to a CANDU specific panel will be reconsidered.

For human performance comparisons, data is obtained from INPO. All data provided by the peer groups (WANO, INPO, CEA, and EUCG) is confidential.
Benchmarking Results – Plant Level Summary

Table 2 provides a summary of OPG Nuclear’s performance compared to benchmark results.

### Table 2: Plant Level Performance Summary

<table>
<thead>
<tr>
<th>Metric</th>
<th>NPI Max</th>
<th>2013 Actuals</th>
<th>Best Quartile</th>
<th>Median</th>
<th>Pickering</th>
<th>Darlington</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Injury Rate (#/200k hours worked)</td>
<td>0.37</td>
<td>0.21</td>
<td>0.00</td>
<td>0.03</td>
<td>0.02</td>
<td>0.07</td>
</tr>
<tr>
<td>Rolling Average Industrial Safety Accident Rate (#/200k hours worked)</td>
<td>0.20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rolling Average Collective Radiation Exposure (Person-rem per unit)</td>
<td>80.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Airborne Tritium Emissions (Curies) per Unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel Reliability Index (microcuries per gram)</td>
<td>0.000500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-Year Reactor Trip Rate (# per 7,000 hours)</td>
<td>0.50</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3-Year Auxiliary Feedwater System Unavailability (#)</td>
<td>0.0200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Year Emergency AC Power Unavailability (#)</td>
<td>0.0250</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Year High Pressure Safety Injection Unavailability (#)</td>
<td>0.0200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WANO NPI (Index)</td>
<td>90.7</td>
<td>80.1</td>
<td>67.5</td>
<td>90.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rolling Average Forced Loss Rate (%)</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Rolling Average Unit Capability Factor (%)</td>
<td>92.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rolling Average Chemistry Performance Indicator (Index)</td>
<td>1.01</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1-Year On-line Deficient Maintenance Backlog (work orders per unit)</td>
<td>209</td>
<td>280</td>
<td>215</td>
<td>184</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-Year On-line Corrective Maintenance Backlog (work orders per unit)</td>
<td>17</td>
<td>30</td>
<td>124</td>
<td>32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value for Money</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Year Total Generating Cost per MWh ($ per Net MWh)</td>
<td>38.79</td>
<td>44.89</td>
<td>67.18</td>
<td>34.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Year Non-Fuel Operating Cost per MWh ($ per Net MWh)</td>
<td>22.76</td>
<td>25.83</td>
<td>57.15</td>
<td>26.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Year Fuel Cost per MWh ($ per Net MWh)</td>
<td>7.87</td>
<td>8.63</td>
<td>5.48</td>
<td>4.98</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Year Capital Cost per MW DER (k$/per MW)</td>
<td>50.88</td>
<td>66.83</td>
<td>29.47</td>
<td>21.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-Month Human Performance Error Rate (# per 10k ISAR hours)</td>
<td>0.00200</td>
<td>0.00500</td>
<td>0.01050</td>
<td>0.00670</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

1. 2012 data is used because 2013 results were unavailable at the time of benchmarking.

Green = maximum NPI results achieved or 1st quartile performance
White = 2nd quartile performance
Yellow = 3rd quartile performance
Red = 4th quartile performance

Declining Benchmark Quartile Performance vs. 2012
Improving Benchmark Quartile Performance vs. 2012
Since achievement of maximum WANO Nuclear Performance Index (NPI) results is recognized within the industry as a measure of desirable performance, performance gaps are assessed against full WANO NPI result thresholds in addition to median and best quartile performance. Green shaded boxes indicate that maximum WANO NPI performance results were achieved or that performance is at or better than the best quartile threshold, white shaded boxes indicate that performance is between the best quartile and median thresholds, yellow shaded boxes indicate that performance is between the median and worst quartile thresholds, and red shaded boxes indicate that performance is below the worst quartile threshold. Table 2 also identifies, by Nuclear cornerstone, where there has been either improving or declining benchmarking quartile performance relative to 2012.

For Safety, OPG’s nuclear generating stations continue to achieve strong overall performance. OPG nuclear continues to demonstrate strong performance for the all injury rate and the industrial safety accident rate. Pickering improved in several Safety cornerstone metrics. Pickering showed improvement again in its benchmark performance relative to 2012 for Reactor Trip Rate. Darlington achieved maximum NPI results or best quartile performance for all metrics under the Safety cornerstone except for Fuel Reliability Index which saw a decline in industry benchmark ranking due to an increase in the fuel defect rate. Pickering and Darlington continue to improve in Tritium emission performance. The Pickering station did experience a decline in quartile performance for Collective Radiation Exposure.

For Reliability, Pickering remained in the fourth quartile in 2013 when compared to other CANDU plants for the WANO Nuclear Performance Index, Forced Loss Rate (FLR) and Chemistry Performance Indicator, and declined to the fourth quartile for the Unit Capability Factor (UCF). Industry best quartile performance for NPI results declined in 2013. Although Darlington NPI performance declined overall, the station performed in the industry top quartile for 2013, an improvement from 2012. Darlington FLR performance remained in the third quartile compared to 2012. Darlington performance for UCF declined to the industry second quartile ranking when compared to 2012. Year over year quartile ranking improved for the Chemistry Performance Indicator at Darlington in 2013. As for Deficient Maintenance Backlogs, Darlington maintained its top quartile ranking and Pickering maintained its second quartile ranking. Darlington improved to third quartile ranking for Corrective Maintenance backlogs in 2013.

Under the Value for Money cornerstone, Pickering remained in the worst quartile for performance in Total Generating Cost per MWh and Non-Fuel Operating Cost per MWh. Pickering sustained best quartile performance in Fuel Cost per MWh and Capital Cost per MW DER. Darlington’s Total Generating Cost per MWh maintained best quartile performance in 2013. Third quartile performance in Non-Fuel Operating Cost per MWh was offset by sustained top quartile performance in Fuel Cost per MWh and Capital Cost per MW DER at Darlington in 2013. Darlington had the second lowest Fuel Cost per MWh in its industry peer group, followed by Pickering (third lowest).

In the area of Human Performance, Pickering moved down to the industry worst quartile ranking. Although Darlington improved its human performance error rate, it remained in the third quartile due in part to a greater improvement in industry quartile thresholds.

In 2013, reporting criteria changed for Human Performance Error Rate. Non-utility personnel which includes contractor, supplemental personnel assigned to perform work activities on site or
other buildings, that directly support station operations, are now included in the calculation of the Human Performance Error Rate. 2013 rolling averages reflect these changes.

OPG’s ranking in WANO Nuclear Performance Index, Unit Capability Factor, and Total Generating Cost per MWh improved from 2012 compared to other major operators in North America and/or International CANDUs.

Report Structure

Sections 2.0 to 5.0 of the report are structured to focus on the four OPG Nuclear cornerstone areas, with detailed comparisons at the plant, and where applicable, unit level. Each indicator is displayed graphically from best to worst (in bar chart format) for the most recent year in which data is available. Zero values are excluded from all calculations except where zero is a valid result.

Next, the historical trend was graphed (in line chart format) using data for the last few years (depending upon availability and metric). Each graph also includes median and best quartile results, and for some WANO operating metrics, the graph also shows the values required to achieve full WANO NPI results.

Following the graphical representation, performance observations were documented as well as insights into the key factors driving performance at OPG’s nuclear generating stations.

Section 6.0 of the report is designed to provide an operator level summary across a few key metrics. The operator level analysis looks at fleet operators, primarily across North America, utilizing a simple average of the results (mean) from each of their units/plants. Operations related results were averaged at the unit level and cost related results were averaged at the plant level. The list and ranking of operators, for the Nuclear Performance Index and Unit Capability Factor, have been restated to reflect existing operators and plants.

Section 7.0 provides an appendix of supporting information, including common acronyms, definitions, panel composition details and a WANO NPI plant level performance summary of OPG nuclear stations against the North American panel.
2.0 SAFETY

Methodology and Sources of Data

The majority of safety metrics were calculated using data from WANO. Data labelled as invalid by WANO was excluded from all calculations. Indicator values of zero are not plotted or included in calculations except in cases where zero is a valid result. Current data is obtained and consolidated with previous benchmarking data.

The All Injury Rate was calculated using data from the Canadian Electricity Association (CEA). Median information and individual company information was not available for this metric; therefore only trend and best quartile information is presented. The peer group for this metric is limited to Group I members of CEA (Section 7.0, Table 10).

Airborne Tritium Emissions per unit data was collected from the CANDU Owners Group (COG) for 2007 to 2012 as displayed in the historical trend line chart. Industry data for 2013 was unavailable at the time of benchmarking. The peer group for this metric is all CANDUs which are members of COG. The bar chart associated with this metric displays graphically plant performance from best to worst using 2012 data (most recent benchmark data) for those stations that were in service.

Discussion

Nine metrics are included in this benchmarking report to reflect safety performance, including seven of the ten metrics which comprise the WANO Nuclear Performance Index: Industrial Safety Accident Rate, Collective Radiation Exposure, Fuel Reliability Index, Unplanned Automatic Reactor Trips, Auxiliary Feedwater Safety System Unavailability, Emergency AC Power Safety System Unavailability, and High Pressure Safety Injection Unavailability. The remaining WANO NPI metrics are included in Section 3.0 under the Reliability cornerstone. In addition to the WANO sub-indicators listed above, the CEA All Injury Rate and the COG Airborne Tritium Emissions per unit are included in this section of the report.

Overall, OPG Nuclear’s performance in the WANO NPI safety measures is strong. Pickering continues to show top performance for the All Injury Rate and maximum WANO NPI results or top quartile performance for six other metrics under the Safety cornerstone, second quartile performance for one indicator, and worst quartile performance for Collective Radiation Exposure. Darlington showed strong performance, achieving maximum NPI results (and/or best quartile ranking for 2013) for all safety metrics except for the Fuel Reliability Index.
All Injury Rate

All Injury Rate (per 200k Worked Hours)
Canadian Electricity Association Groups I & II Members (2008-2010) and Group I Members Only (2011-2013)

NOTE: Best quartile line has been redacted.
**Observations – All Injury Rate (AIR) (Canadian Electricity Association – CEA)**

**2013 (Annual Value)**
- Pickering, Darlington, and OPG Nuclear as a fleet all performed better than the CEA top quartile by a significant margin when compared to 2013 industry results.
- Darlington’s AIR injuries decreased from five in 2012 to three in 2013. Two of these were hand injuries.
- Pickering’s AIR injuries decreased from eight in 2012 to seven in 2013. This is the lowest number of annual AIR injuries ever recorded at Pickering in OPG’s history.
- OPG benchmarks against CEA Group 1, which includes mostly large provincial utilities.

**Trend**
- Pickering, Darlington and OPG Nuclear as a fleet have all maintained their significant step improvement in performance since 2011, over a three-year period. This step upgrade was achieved even when the industry top quartile benchmark did not show the same degree of improvement.

**Factors Contributing to Performance**
- OPG encourages a proactive reporting culture that seeks to identify hazards and address them before they lead to employee injuries.
- A large portion of this step improvement in AIR performance can be attributed to a reduction in musculoskeletal disorder (MSD) injuries, also known as repetitive strain injuries. OPG executed a large campaign to reduce MSD injuries which has lead to almost a 90% reduction. This performance has been sustained over the past four years.
- OPG Nuclear’s MSD reduction program has been benchmarked by other industry peers.
- OPG Nuclear is implementing a program to improve “Situational Awareness” which works to support employees in identifying and addressing changing and/or distracted work conditions that could lead to hazardous situations.
Rolling Average Industrial Safety Accident Rate

2013 Rolling Average Industrial Safety Accident Rate (per 200,000 man-hours worked)
North American PWR & PHWR Plant Level Benchmarking

- Pickering
- Median: 0.03
- Darlington

Max. NPI Threshold = 0.2

Accidents per 200,000 Man-Hours Worked

- 9 -
Rolling Average Industrial Safety Accident Rate (per 200k man-hours worked)
North American PWR & PHWR Plant Level Benchmarking

- 10 -
Observations – Rolling Average Industrial Safety Accident Rate (ISAR) (World Association of Nuclear Operators - WANO)

2013 (Rolling Average)
- The Industrial Safety Accident Rate (ISAR) incorporates all lost time injuries and restricted work injuries incurred by employees working on the site.
- For reporting the ISAR, a 2-year rolling average was used for all panel members with the exception of the Darlington station which follows a 3-year outage cycle. This is consistent with the World Association of Nuclear Operators (WANO) Nuclear Performance Index (NPI) reporting guidelines.
- WANO top quartile in 2013 was 0.00 (i.e. zero ISAR events). Median performance was 0.03. These metrics were unchanged from 2012.
- Both Pickering and Darlington achieved maximum NPI results for the ISAR in 2013.
- Pickering ISAR performance improved from 2012 to 2013. Its performance was better than the WANO median but worse than WANO top quartile in 2013.
- Darlington ISAR improved from 2012 to 2013. Its performance was worse than the WANO median in 2013.

Trend
- The ISAR median and best quartiles have steadily improved over the past six years. The industry best quartile has been at zero for the past three years.
- Pickering’s ISAR rolling average has improved for five consecutive years, and currently stands at 0.02.
- Darlington has sustained the same number of ISAR injuries (two) for the past four years. Fluctuations in performance is attributable to changes in the number of hours worked. Darlington accumulated more hours worked in 2013 for the same number of ISAR injuries.
- Both Pickering and Darlington produced improvements in their ISAR rolling average from 2012 to 2013.

Factors Contributing to Performance
- ISAR is a measure of “permanent utility personnel” and does not include contractors. Many of the utilities in the benchmarking group utilize contractors to a greater extent than OPG Nuclear for higher risk work activities (e.g. outages). Therefore this can negatively impact OPG Nuclear’s ISAR in comparison to the reported industry benchmark quartiles.
- OPG Nuclear continues to monitor performance trends in the area of conventional safety and implements action plans to support continuous improvement. A current major initiative is to improve “Situational Awareness”, which works to support employees in identifying and addressing changing and/or distracted work conditions that could lead to hazardous situations.
Rolling Average Collective Radiation Exposure

2013 Rolling Average Collective Radiation Exposure (Person-Rem per Unit) CANDU Plant Level Benchmarking

- Best Quartile: 57.64
- Median: 63.70
- Max. NPI Threshold = 80

Darlington
Pickering
2013 Rolling Average Collective Radiation Exposure (Person-Rem per Unit) CANDU Unit
Level Benchmarking

- Median: 62.59
- Best Quartile: 49.02

Max. NPI Threshold = 80

- Pickering 1
- Pickering 4
- Darlington 1
- Darlington 3
- Darlington 2
- Pickering 7
- Darlington 4
- Pickering 6
- Pickering 5
- Pickering 8
- Pickering 1

Person-Rem per Unit
Observations – Rolling Average Collective Radiation Exposure (CANDU)

- Collective Radiation Exposure (CRE) is an industry composite indicator encompassing external and internal collective whole body radiation dose. The industry recognized CRE performance measures for CANDU reactors is the WANO method for assigning points for the calculation of the Nuclear Performance Index (NPI); full NPI points (10) at less than 80 person-rem/unit and zero points at greater than 140 person-rem/unit.
- The industry uses a two or three year rolling average (based on the site outage cycle) to define the CRE performance for a given year. Darlington follows a 3-year outage cycle and Pickering and other panel members are on a 2-year outage cycle. The following factors play a significant role in the CANDU reactors’ CRE performance: planned outage scope and duration, tritiated ambient air in accessible and access controlled areas, effectiveness of mitigation measures and initiatives being implemented to reduce identified sources of radiological hazards, and human performance during execution of radiological tasks.

2013 (Rolling Average)

- The Pickering plant level rolling average performance was below the industry median of 63.70 person-rem/unit.
- The Pickering unit level rolling average performance was below the median of 62.59 person-rem/unit, for Units 1, 5, 6, 7 and 8, but better than best quartile for Unit 4.
- Planned outage scope and duration significantly contributed to this level of plant and unit rolling average CRE performance. Deferral of the Pickering Unit 4 P1341 outage to 2014 contributed to Unit 4 better than best quartile performance. In general, Pickering has three major planned outages per year; Darlington averages 1.3 outages per year over the three year outage cycle.
- The Darlington plant level performance reached maximum NPI results. The rolling average performance was below the industry median of 63.70 person-rem/unit.
- The Darlington unit level rolling average performance was better than the median of 62.59 person-rem/unit for Units 1 and 3 and below the median for Units 2 and 4.
- Darlington planned outage extensions and forced outages on Units 2 and 4 contributed to this level of plant and CRE performance at Darlington during 2013.

Trend

- The industry median CRE at the plant level has decreased sharply (improving performance) year after year from 2011. This is compared to a steady industry median increase from 2008 to 2011.
- Pickering plant level performance improved from 2012 to 2013, but the rolling average is still worse than median due to significant scope increases during outages, long outage duration and Unit 1 source term increase (see below).
- Pickering unit level performance has remained relatively flat from 2011 to 2013 with the following exceptions: Unit 1 rolling average CRE has increased due to increased outage scope and higher than expected dose rates on that unit. A crud burst at the start of the P1211 planned maintenance outage resulted following a Heat Transport System Test, which caused a significant impact on CRE performance. Unit 4 rolling average CRE has decreased due to the deferral of the P1341 outage to 2014.
Factors Contributing to Performance - Rolling Average Collective Radiation Exposure (CANDU)

- Darlington plant level performance for 2013 was worse than the industry median level due to planned outage extensions and forced outages on Units 2 and 4.
- Darlington unit level performance has trended worse than the median for Units 2 and 4, but better than the median for Units 1 and 3. Planned outage extensions due to work scope increase and high Forced Loss Rate (FLR) involving significant radioactive work scope on Units 2 and 4 contributed to the worse than median performance. Low FLR on Units 1 and 3 contributed to better than median performance. The performance of an online Moderator Pump seal replacement averted additional dose that would have been incurred by performing the work during a forced unit outage.

Best Practices
- The following list represents common practices that demonstrate continuous improvement and help maintain good CRE performance for CANDU type reactors:
  - Robust Site ALARA Committee, chaired by Facility Senior Vice President
  - Reactor face shielding to reduce dose rates
  - Use of full size vault platforms to improve workflow
  - Teledosimetry
  - Process fluid detritiation
  - Use of Munters driers to enhance existing measures to minimize ambient airborne tritium levels
  - Optimization of Fuelling Machine purification using Ion Exchange with annual resin replacement and/or sub-micron filters
  - Sub-micron filtration in the Primary Heat Transport system
  - Use of independent radiological oversight for higher risk work to improve human performance during execution of radiological tasks
  - Daily accounting of dose, and work group focus on Radiation Protection Fundamentals
- OPG establishes internal administrative limits to ensure that dose to each exposed individual is managed and maintained well below individual regulatory limits.

Initiatives
- OPG Nuclear fleet-wide and site specific initiatives have been implemented to incorporate the industry best practices noted above.
- Specific key site initiatives are described below.

Pickering
- Source term reduction, including improvements to process fluid filtration and a dose reducing resin trial.
- Source term mitigation, including optimization of shielding for reactor face work and tritium management.
- Human performance, including involvement and oversight by Radiation Protection staff of work with elevated radiological risk.
Factors Contributing to Performance - Rolling Average Collective Radiation Exposure (CANDU) (CONT’D)

Darlington
- Develop and implement a reactor face shielding strategy to reduce dose while at the same time minimize the risks of personnel injury during shielding installation.
- Implement an improved feeder ice jacket including the application of long handle tools for jacket installation and remote data acquisition.
- Effective utilization of teledosimetry to reduce Radiation Protection Coordinator dose. Use of Teledose as a coaching tool to improve worker radiation protection practices and reduce dose.
- Tritium mitigation strategies were developed and implemented to reduce air-borne tritium concentrations inside containment.
- Work Group specific dose reduction initiatives were developed and implemented by line management.
Airborne Tritium Emissions per In Service Unit

2012 Airborne Tritium Emissions (Curies) per In Service Unit

COG CANDUs

- Darlington
- Pickering

Best Quartile: 1,014

Median: 2,410

Tritium Emission (Curies) per In Service Unit

0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000 9,000 10,000
Airborne Tritium Emissions (Curies) per In Service Unit

COG CANDUs

Tritium Emissions (Curies) per In Service Unit

2007  2008  2009  2010  2011  2012

0  500  1,000  1,500  2,000  2,500  3,000  3,500  4,000  4,500

Good

DN  Median  Best Quartile  PN
Observations – Airborne Tritium Emissions (Curies) per In Service Unit

2012 (Annual Value)
- The 2012 preliminary industry results collected from the CANDU Owners Group (COG) are included in this report as the most up to date figures available for benchmarking performance.
- Tritium emissions from each facility are compared per in service reactor unit to allow consideration of decreased emissions resulting from generating units undergoing major refurbishment work campaigns.
- Curies per in service unit at top quartile CANDU plants was 1,014 or lower.
- Darlington performed in the best quartile with an Airborne Tritium Emissions of 885 Curies per In Service Unit.
- Pickering performed at the industry median threshold of 2,410 curies per in service unit.

Trend
- Ongoing focus on dryer performance, leak management and source term reduction has helped Darlington sustain its strong performance over the review period and enabled the Pickering station to consistently improve its performance since 2008.
- The industry trend line graph shows that industry best quartile performance continues to trend downward.

Factors Contributing to Performance
- Facilities with access to a tritium removal facility (e.g., Darlington and Pickering) fare better in this measure, having the benefit of a reduced source term.
- OPG is consistently pursuing moderator swaps, thereby taking full advantage of access to detritiation capabilities in order to improve Pickering’s performance and allow Darlington to sustain best quartile performance.
- In 2012, the downward trend was observed mainly due to increased station focus on tritium reduction initiatives including confinement dryer heat exchanger cleaning, heavy water leaks minimization, continuous operation of confinement dryer, and improved performance of releases from the tritium removal facility at the Darlington site.
- Other improvement initiatives which began in 2012 include OPG’s participation in a COG environmental benchmarking of selected CANDU stations to determine the best environmental practices, and the formation of a Pickering Nuclear “Green Team” consisting of staff at the working level to seek continual improvements in the areas of Radiation Protection, Waste and Environment.
Fuel Reliability Index

2013 Fuel Reliability Index (Microcuries per Gram)
CANDU Plant Level Benchmarking

Best Quartile: 0.000002
Median: 0.000165

Pickering
Darlington

Max. NPI Threshold = 0.0005
Fuel Reliability Index (Microcuries per Gram)

CANDU Plant Level Benchmarking

Fuel Reliability Index (Microcuries per Gram)

CANDU Unit Level Benchmarking

Darlington 1
Darlington 2
Darlington 3
Darlington 4
Darlington 5
Darlington 6
Darlington 7
Darlington 8
Pickering 1
Pickering 2
Pickering 3
Pickering 4
Pickering 5
Pickering 6
Pickering 7
Pickering 8
Median
Max. NPI
Best Quartile
PN
DN
Good

Microcuries per Gram

2008 2009 2010 2011 2012 2013
Observations – Fuel Reliability Index (CANDU) (FRI)  
2013 (Most Recent Operating Quarter)

- Fuel reliability at Pickering during 2013 reached NPI maximum performance. Post-discharge fuel inspections and post-irradiation hot cell examinations of a sampling of fuel discharged in the last five years of operation indicate that the overall condition of fuel inspected was acceptable and consistent. However, there is continuing evidence of iron oxide sheath deposits at Unit 1. Mitigating strategies have been implemented to address this ongoing issue. There were three defect indications in 2013 at Pickering, however, no fuel defects could be confirmed following subsequent fuel inspections. Iodine-131 levels remained below the station shutdown limits in 2013. Pickering FRI was above the CANDU median but remained well below the WANO recommended acceptance target of 0.0005 $\mu$Ci/g (NPI maximum threshold) during 2013.

- At Darlington, the 2013 frequency of fuel defects indicate changes at the station and/or at the fuel manufacturing facility. Efforts were made to investigate improvements in: foreign material exclusion to avoid debris induced fuel defects; fuel bundle manufacturing to improve quality; and in reactor operation to mitigate fuel bundle power ramping. Also, low internal element clearances are potentially impacting fuel performance. A fuel expert prepared correlation was identified between recent fuel defect experience and the power ramp of long bundles with low internal clearances. Mitigating actions were taken to avoid placing heavy long bundles in low internal fuel channel positions. To further assist in determining the cause, significant improvements were made to streamline and advance post irradiation examinations (PIE) of defective fuel bundles with an aggressive PIE plan extending in to 2014. Discussions with the fuel manufacturer are ongoing to explore and evaluate operating margin improvements that can be incorporated into fuel bundle manufacturing.

Trend

- Darlington station FRI score trended higher (worsening performance) in 2013 and was above the maximum NPI threshold. Pickering also trended slightly higher year over year in 2013 but remained well below the maximum NPI threshold.

Factors Contributing to Performance

- The general reasons for worsening FRI score at Darlington is an increase in fuel defect rate. The average time to locate and defuel defected bundles at Darlington has not decreased compared to previous years.

- The FRI score at Pickering has not changed significantly.

- Pickering and Darlington employ common practices used by top operating plants to achieve best quartile performance for FRI are:
  - Reduction in foreign material in the heat transport system.
  - Conservative operation of fuel power and power ramping.
  - Quality practices during fuel manufacturing.
  - Careful monitoring via inspection programs and continuous improvement programs.
2-Year Unplanned Automatic Reactor Trips

2013 2-Year Unplanned Automatic Reactor Trips
CANDU Plant Level Benchmarking

- Best Quartile: 0.000
- Median: 0.119
- Max. NPI Threshold = 0.0005

Darlington

Max. NPI Threshold = 0.5

Pickering

# per 7,000 Hours Critical
Observations – 2-Year Unplanned Automatic Reactor Trips (CANDU)

2013 (2-Year Rolling Average)

- The 2-year rolling average unplanned automatic reactor trip best quartile for CANDU plants was zero with a median of 0.119. For individual CANDU units, the best quartile and median values for unplanned reactor trip were zero.
- At the plant level, Pickering’s trip rate of 0.443 reached maximum NPI results. On an individual unit basis, Unit 6, with a trip rate of zero, was at best quartile. Units 4, 5, 7 and 8 achieved maximum NPI points. Unit 1, with trip rate of 0.690, was worse than the third quartile threshold of 0.510.
- At the plant level Darlington’s trip rate of 0.117 was slightly better than median and reached maximum NPI results. On an individual unit basis, Units 1, 3 and 4, with trip rates of zero, performed at the best quartile level. Darlington Unit 2’s trip rate achieved maximum NPI points.

Trend

- The unplanned automatic reactor trip best quartile for CANDU plants has been zero since 2011. The median value improved from 2008 to 2012, but performance declined in 2013. On an individual unit basis, the industry best quartile and median has remained at zero since 2008.
- At the plant level, Pickering station performance in 2013 has been fluctuating from a 0.630 trip rate in 2008 to 0.443 in 2013. On an individual unit basis, Unit 1 performance has improved since 2011. Unit 4 performance has decreased from 2011 to 2012, before slightly improving in 2013. Unit 5 performance improved from 2008 to 2010, then decreased from 2011 to 2013. Unit 6 has consistently performed at a zero trip rate since 2008. Unit 7 performance improved from 2012 but has fluctuated around its current rate of 0.48. Unit 8 performance remained flat around 0.5 with the unit’s best performance achieved in 2012 with a zero trip rate.
- At the plant level, Darlington station performance has been improving since 2011. On an individual unit basis, Unit 1 has consistently performed at a zero trip rate since 2008. Units 3 and 4 performed at a zero trip rate in 2013 with both units improving from previous years’ performances. Unit 2 has performed slightly worse compared to year-over-year trends but reached maximum NPI points.

Factors Contributing to Performance

- Key performance drivers for this metric include: general equipment reliability, material condition, and human performance.
- In 2013, Pickering had 3 unplanned automatic reactor trips (2 on Unit 5,1 on Unit 1). There were no unplanned automatic reactor trips at Darlington in 2013.
3-Year Auxiliary Feedwater Safety System Unavailability

2013 3-Year Auxiliary Feedwater Safety System Performance
(Unavailability)
CANDU PlantLevel Benchmarking

Darlington

Best Quartile: 0.0000
Median: 0.0009

Pickering

Max. NPI Threshold = 0.02

Hours Unavailable/Total Hours required to be Available
2013 3-Year Auxiliary Feedwater Safety System Performance (Unavailability)
CANDU Unit Level Benchmarking

- Pickering 5
- Pickering 4
- Darlington 3
- Darlington 2
- Darlington 1

Best Quartile: 0.0000
Median: 0.0000

Max. NPI Threshold = 0.02
3-Year Auxiliary Feedwater Safety System Performance (Unavailability)
CANDU Plant Level Benchmarking

3-Year Auxiliary Feedwater Safety System Performance (Unavailability)
CANDU Unit Level Benchmarking
Observations – 3-Year Auxiliary Feedwater System (CANDU)

2013 (3-Year Rolling Average)

- Auxiliary feedwater (AFW) safety system performance at best quartile CANDU plants was zero with a median of 0.0009. For individual CANDU units, the best quartile and the median were zero.
- At the plant level, Pickering station, with an unavailability of 0.0174 reached NPI maximum points. On an individual unit basis, all Pickering units achieved maximum NPI points for AFW unavailability except for Units 1 and 5.
- Darlington station achieved best quartile performance of zero unavailability at both the station and unit levels in 2013. Darlington earned 10 out of 10 WANO NPI points for 2013.

Trend

- The 3-year auxiliary feedwater unavailability best quartile of CANDU plants improved from 2008 to 2010, then maintained zero unavailability from 2011 to 2013. The plant level industry median has fluctuated slightly over the review period but has remained well below the NPI maximum threshold. At the unit level, the industry best quartile has remained at zero over the review period and the median value at or close to zero over the review period.
- At plant level, Pickering station performance has declined since 2010 and is approaching the NPI maximum threshold. On an individual unit basis, Units 6 and 7 have consistently performed at a zero unavailability rate over the review period. All Pickering units have achieved maximum NPI points over the review period except for Unit 1 and 5 which recently declined in performance (below maximum NPI threshold).
- Darlington station and unit level performance has been at zero unavailability since 2009.

Factors Contributing to Performance

- Key performance drivers for this metric include: general equipment reliability, material condition, and human performance.
- On January 21, 2013 Pickering Unit 5 Auxiliary Boiler Feed Pump was declared unavailable due to a high water in oil content of the in-board bearing housing oil. The pump’s mechanical seal was replaced on January 21, 2013. Following maintenance and testing, the pump was returned to service on January 23, 2013.
2013 3-Year Emergency AC Power Safety System Performance (Unavailability)
CANDU Plant Level Benchmarking

Darlington

Best Quartile: 0.0009

Pickering

Median: 0.0042

Max. NPI Threshold = 0.025
3-Year Emergency AC Power Safety System Performance (Unavailability)
CANDU Plant Level Benchmarking

- 33 -
Observations – 3-Year Emergency AC Power Safety System (CANDU)

2013 (3-Year Rolling Average)

- 3-Year Emergency AC Power Safety System performance at best quartile CANDU plants was 0.0009. The industry median value was 0.0042.
- Pickering achieved maximum NPI results and performed in the median quartile.
- Darlington was the best performing station in the CANDU peer group, achieving zero unavailability, best quartile performance and maximum NPI results.

Trend

- The 3-year Emergency AC Power Safety System unavailability industry best quartile for CANDU plants has steadily improved since 2008 but with a slight decline in 2013. The industry median value improved over the review period, with a slight decline in 2013.
- Pickering station performance has improved over the review period until reaching its best performance in 2012 and continuing this rate into 2013.
- Darlington station performance improved from 2011 before achieving zero unavailability in 2012 and 2013.

Factors Contributing to Performance

- Key performance drivers for this metric include: general equipment reliability, material condition, and human performance.
3-Year High Pressure Safety Injection

2013 3-Year High Pressure Injection (ECI) Safety System Performance (Unavailability)
CANDU Plant Level Benchmarking

Darlington

Best Quartile: 0.0000

Pickering

Median: 0.0001

Max. NPI Threshold = 0.02

Hours Unavailable/Total Hours Required to be Available
2013 3-Year High Pressure Injection (ECI) Safety System Performance (Unavailability)
CANDU Unit Level Benchmarking

- Pickering 8
- Pickering 7
- Pickering 6
- Pickering 5
- Pickering 1
- Darlington 4
- Darlington 3
- Darlington 2
- Darlington 1

Best Quartile: 0.0000
Median: 0.0000

Max. NPI Threshold = 0.02

HoursUnavailable/Total Hours Required to be Available

- Filed: 2016-10-26
- EB-2016-0152
- Exhibit L, Tab 6.2
- Schedule 15 SEC-063
- Attachment 1
- Page 38 of 101
Observations – 3-Year High Pressure Safety Injection Unavailability (CANDU)

2013 (3-Year High Pressure Safety Injection Unavailability)

- The 3-year High Pressure Safety Injection Unavailability performance at best quartile CANDU plants was zero with a median of 0.0001. For individual CANDU units, both the best quartile and the median were zero.
- At the plant level, Pickering station, with unavailability of 0.0001, performed in the median quartile and achieved maximum NPI results. On an individual unit basis, Units 1, 5, 6, 7 and 8 achieved best quartile performance at zero unavailability in 2013. Unit 4 had an unavailability of 0.0007, achieving maximum NPI points.
- Darlington achieved best quartile performance of zero unavailability at both the station and unit levels in 2013.

Trend

- The 3-Year High Pressure Safety Injection unavailability best quartile performance of CANDU plants has been at zero since 2008. The industry median value improved from 2008 to 2012, but declined slightly in 2013. At the unit level, best quartile remained at zero over the last five years. The median remained at zero since 2010.
- At the plant level, Pickering station performance has consistently improved over the review period. On an individual unit basis, Unit 1 has consistently improved from 2008 to 2010, achieving zero unavailability from 2011 to 2013. Units 5 and 7 have been at the best quartile since 2008. Units 6 and 8 remained at best quartile since 2010. Unit 4 performance remained at zero from 2008 to 2010, but slightly declined from 2010 to 2013.
- At the plant level, Darlington station performance has improved since 2008 and has maintained best quartile performance from 2011 to 2013. On an individual unit basis, Units 1, 3 and 4 have been at the best quartile since 2008. Unit 2 improved from 2008 before achieving the best quartile from 2011 to 2013.

Factors Contributing to Performance

- Key performance drivers for this metric include: general equipment reliability, material condition, and human performance.
- The main contributor for Pickering occurred in May 2013 due to a human performance event during routine testing, which resulted in safety system unavailability for Pickering Units 1 and 4.
3.0 RELIABILITY

Methodology and Sources of Data

The majority of reliability metrics were calculated using the data from WANO. Any data labelled as invalid by WANO was excluded from all calculations. Indicator values of zero are not plotted or included in calculations except in cases where zero is a valid result. Complete data for the review period was obtained and averages are as provided by WANO.

The two backlog metrics, Deficient and Corrective maintenance, are also included within this section and the data comes from an industry sponsored INPO AP-928 subcommittee. Data points benchmarked are a single point in time, not a rolling average. All of the data is self-reported. Industry backlog benchmark standards changed with Revision 3 of AP-928 Work Management Practices at INPO in June of 2010. The new standard created an alignment between engineering criticality coding and backlog classification that allows improved focus on the more critical outstanding work. This standard also sets a more consistent foundation for classification of backlogs such that comparisons between utilities will be more meaningful. All OPG nuclear stations converted to the new standard on January 24, 2011. The latest 2013 industry backlog benchmark data was collected for December 31, 2013. The results and supporting analysis associated with the backlog metrics reflect this industry development.

Discussion

The primary metric within the reliability section is the WANO Nuclear Performance Index (NPI). The WANO NPI is an operational performance indicator comprised of 10 metrics, three of which are analyzed in this section: Forced Loss Rate, Unit Capability Factor, and Chemistry Performance Indicator. The remainder of the WANO NPI components are analyzed in the safety section (Section 2.0).

Darlington improved quartile rankings for three metrics compared to 2012. Darlington performed well for WANO NPI achieving top quartile ranking, and reaching maximum in NPI results for Chemistry Performance Indicator. Darlington also improved in Corrective Maintenance Backlogs to third quartile ranking and maintained top quartile ranking in Deficient Maintenance Backlogs. Darlington dropped quartile rankings for Unit Capability Factor from top quartile in 2012 to second quartile in 2013. The Pickering station performed at the same quartile rankings when compared to 2012 except for Unit Capability Factor which dropped to bottom quartile ranking. All Pickering Reliability metrics are in the bottom quartile aside from Deficient Maintenance Backlogs which is in the second quartile.
WANO Nuclear Performance Index

2013 WANO Nuclear Performance Index
CANDU Plant Level Benchmarking

Darlington

Best Quartile:
90.72

Median: 80.10
Observations – WANO Nuclear Performance Index (NPI) (CANDU)

2013
- The 2013 best quartile of the CANDU plant comparison panel for WANO NPI is 90.7. This represents a decrease of 7.6 points below the 2012 best quartile largely due to CANDU units undertaking major outage campaigns.
- The median of the CANDU plant comparison panel fell 9.0 points, compared to last year, to 80.1 in 2013.
- Darlington regained the top quartile NPI performance in 2013, while Pickering’s NPI performance remained below median.

Trend
- The best quartile of the CANDU plant comparison panel, which had shown a downward trend from 2009 to 2010, reversed in 2011 and 2012, with the best quartile performance rising to its highest level in the reporting period in 2012. However, this performance was not sustained in 2013.
- The median value of the CANDU plant comparison panel continued to rise from 2009 to 2012, indicating that the performers in the lower quartiles are performing better. Again, this performance was not sustained in 2013.
- Although Pickering has performed below median during the review period, Pickering showed modest improvement in 2009, and has remained relatively steady from 2010 to 2013.
- As the strongest OPG performer, Darlington achieved best quartile performance over most of the review period, falling to slightly below top quartile in 2012, but regaining top quartile results in 2013.

Factors Contributing to Performance
- The WANO NPI is a composite index reflecting the weighted sum of the scores of 10 separate performance measures. A maximum score of 100 is possible. All of the sub-indicators in this index are reviewed separately in this benchmarking report.

Pickering
- For 2013, all Pickering units achieved maximum scores for 4 out of 10 NPI sub-indicators.
- For the key safety system related metrics of high pressure injection and emergency alternating current (AC) power, the station received 10 of 10 points.
- Pickering also achieved perfect scores for industrial safety accident rate (5 of 5) and fuel reliability (10 of 10).
- Pickering earned 9.7 of 10 points for reactor trips.
- Pickering achieved 3.2 of 5 points for chemistry performance, 5.9 of 10 points for collective radiation exposure, and 7.5 of 10 points for auxiliary feedwater.
- Due to forced outages and forced extensions to planned outages, Pickering received 0.8 of 15 points for unit capability factor and 5.5 of 15 points for forced loss rate.
Factors Contributing to Performance (CONT’D)

Darlington

- For 2013, all Darlington units achieved maximum scores for 5 out of 10 NPI sub-indicators.
- For each of the key safety system related metrics, high pressure injection, auxiliary feedwater, and emergency alternating current (AC) power, Darlington received 10 of 10 points.
- Darlington also achieved perfect scores for reactor trip rate (10 of 10), and industrial safety accident rate (5 of 5).
- Darlington earned 9.8 out of 10 points for collective radiation exposure, 6.8 out of 10 points for fuel reliability, and 4.9 out of 5 points for chemistry performance.
- Darlington achieved 12.6 out of 15 points for unit capability factor and 11.7 out of 15 points for forced loss rate due to the forced outages and forced extensions to planned outages.

Please refer to Table 13 of the Appendix for an NPI plant level performance summary of OPG nuclear stations against the North American panel.
Rolling Average Forced Loss Rate

2013 Rolling Average Forced Loss Rate
CANDU Plant Level Benchmarking

Best Quartile: 0.58
Median: 1.70

Max. NPI Threshold = 1.0

Pickering
Darlington
2013 Rolling Average Forced Loss Rate
CANDU Plant Level Benchmarking

Max. NPI
Threshold = 1.0

Best Quartile: 0.94

Median: 2.10

Darlington 1
Darlington 4
Darlington 2
Pickering 5
Pickering 6
Pickering 7
Pickering 8
Pickering 4
Pickering 1

%
Rolling Average Forced Loss Rate
CANDU Plant Level Benchmarking

Rolling Average Forced Loss Rate
CANDU Unit Level Benchmarking
Observations – Rolling Average Forced Loss Rate (CANDU)

2013 (Rolling Average)

- Pickering Forced Loss Rate (FLR) performance was at 8.50, which was worse than median at the plant level. At the unit level, Pickering Units 5 and 6 were slightly better than median.
- As a station, Darlington has slipped in its ranking from being slightly better than median (ranked fifth in 2012 report) to being worse than the median (ranked seventh in 2013 and 2014 report) year-over-year rolling average.
- Darlington Unit 3 dropped from the best quartile however it was still above the median. The other three units performed below the median FLR threshold.

Trend

- Pickering’s performance has been steadily improving over the review period, from 18.64% in 2009 to 8.5% in 2013.
- Overall, the industry median has been steady or increasing over the same time period, from 1.14 in 2009 to 1.70% in 2013.
- In 2013, Pickering’s gap to median performance improved by 1.4% FLR from the gap in 2012, from 8.20% to 6.90%.
- The largest contributor to Pickering’s FLR was Unit 1, which experienced a high number of forced outages in 2012 and 2013. However, Pickering Unit 5 FLR was 1.55%, performing better than the industry (unit level) median.
- Darlington’s overall performance decreased slightly from 2.02% to 2.52% due to a drop in year-over-year performance of Unit 2 (2012 FLR of 1.82% to 2013 FLR of 3.59%) and Unit 3 (2012 FLR of 0.29% to 2013 FLR of 1.45%).

Factors Contributing to Performance

- Equipment reliability, human performance and vendor quality issues have contributed to the gap between Pickering performance and industry median.
- Pickering’s FLR was most heavily impacted by fuel handling reliability, turbine equipment, and heat transport pumps.
- Pickering is executing an extensive list of high-priority work orders between 2012 and 2014 to improve reliability and reduce operator burdens.
- Pickering has teams focused on reducing corrective and deficient work order backlogs, and is focusing on preventing the inflow of emergent work through proactive equipment replacement, or minor modifications to improve design.
- A list of equipment reliability projects has been established at Pickering aiming to prevent new forced loss events in key plant health areas.
Observations – Rolling Average Forced Loss Rate (CANDU) (CONT’D)

- The largest contributors to Darlington’s Forced Loss were the five forced outages in 2013. There were three forced outages on Unit 4 and one each on Unit 2 and 3.
- Unit 1 was also de-rated for a significant period due to reduced fuelling capability.
- Darlington has significantly reduced the number of power de-rates due to Neutron Overpower (NOP) through replacement of NOP detectors, improved fuel design, and analysis.
- Darlington is completing work that is aimed to improve plant reliability through system health reporting. Included in the Plant Reliability List are work orders to improve system health and work that is identified as ‘operations critical work’.
- Through system health reporting, Darlington is implementing actions to reduce the incoming rate of critical corrective and deficient work orders. This is aimed to improve plant reliability as well as improve the execution of preventive maintenance activities.
Rolling Average Unit Capability Factor

2013 Rolling Average Unit Capability Factor
CANDU Plant Level Benchmarking

Best Quartile: 92.03
Median: 89.05

Max. NPI Threshold = 92
2013 Rolling Average Unit Capability Factor
CANDU Unit Level Benchmarking

Median: 87.66
Best Quartile: 93.06

Max. NPI Threshold = 92
Rolling Average Unit Capability Factor
CANDU Plant Level Benchmarking

Rolling Average Unit Capability Factor
CANDU Unit Level Benchmarking

Darlington 1  Darlington 2  Darlington 3
Darlington 4  Pickering 1  Pickering 4
Pickering 5  Pickering 6  Pickering 7
Pickering 8  Median  Best Quartile
Max. NPI
Observations – Rolling Average Unit Capability Factor (CANDU)

2013 (Rolling Average)

- Pickering performed below the median at both the plant and unit level.
- Pickering’s gap to best quartile performance in Unit Capability Factor (UCF) was 16.26% for the rolling average period ending in 2013.
- Darlington performed above the industry median at the plant level (90.44 vs. 89.05). Overall Darlington’s capacity factor dropped from 92.01 to 90.44 in 2013 however the industry median also dropped from 92.08 to 89.05.
- Darlington Unit 3 continued in the best quartile for the unit level comparison.
- Darlington’s gap to best quartile performance in UCF was 1.6% for the rolling average period ending in 2013.

Trend

- 2013 was the best performing year (over the review period) for Pickering, and was slightly better than 2012 performance.
- Pickering’s largest improvements came from Unit 4 and Unit 5. However, Unit 1 declined in 2013 compared to 2012.
- Industry median and top quartile declined slightly in 2013 compared with 2012, resulting in a narrower gap between Pickering and top quartile.
- Darlington’s UCF has been trending up in the past several years prior to 2013. Darlington’s UCF dropped in 2013 from 92.01 to 90.44.

Factors Contributing to Performance

- Equipment reliability, human performance and vendor quality issues have contributed to the gap between Pickering performance and industry median.
- Darlington and more so Pickering observed a higher number of planned outage days. The higher number of planned outage days contributes to a lower UCF compared to CANDU industry peers.
- Forced outages and forced extensions to planned outages have also negatively impacted the Capability Factor at Pickering and Darlington.
- Pickering has planned short mid-cycle outages to complete critical maintenance activities to improve the reliability of the plant. The mid-cycle outages allow for further backlog reduction and reliability improvements, with the intent to improve overall unit and station performance in the long term.
### Observations – Rolling Average Unit Capability Factor (CANDU) (CONT’D)

- Pickering is executing an extensive list of high-priority work orders between 2012 and 2014 to improve reliability, and reduce operator burdens. To date over 2000 work orders have been executed of the planned 3000.
- Pickering has teams focused on reducing corrective and deficient work backlogs, and is focusing on preventing the inflow of emergent work through proactive equipment replacement, or minor modifications to improve design.
- Darlington planned outage days have been decreasing due to outage initiatives to reduce planned outage duration.
- Darlington had extensions to the two planned outages in 2013 as well as having five forced outages.
- Darlington is completing work that will improve plant reliability through system health reporting. Included in the Plant Reliability List are work orders to improve system health and work that is identified as ‘operations critical work’.
- Through system health reporting, Darlington is implementing actions to reduce the incoming rate of critical corrective and deficient work orders. This is an effort to improve plant reliability as well as allow maintenance to complete preventative maintenance.
Rolling Average Chemistry Performance Indicator

2013 Rolling Average Chemistry Performance Indicator
CANDU Plant Level Benchmarking

Best Quartile: 1.00

Median: 1.01

Max. NPI Threshold = 1.01

Pickering
2013 Rolling Average Chemistry Performance Indicator
CANDU Unit Level Benchmarking

Median: 1.01
Best Quartile: 1.00
Max. NPI Threshold = 1.01
### Rolling Average Chemistry Performance (CPI)
**CANDU Plant Level Benchmarking**

![Graph of Rolling Average Chemistry Performance (CPI) for CANDU Plant Level Benchmarking]

**Indicator**
- Good

### Rolling Average Chemistry Performance Indicator (CPI)
**CANDU Unit Level Benchmarking**

![Graph of Rolling Average Chemistry Performance Indicator (CPI) for CANDU Unit Level Benchmarking]

**Indicator**
- Darlington 1
- Darlington 2
- Darlington 3
- Darlington 4
- Pickering 1
- Pickering 2
- Pickering 3
- Pickering 4
- Pickering 5
- Pickering 6
- Pickering 7
- Pickering 8
- Median
- Best Quartile
- Max. NPI
Observations – Rolling Average Chemistry Performance Indicator (CANDU)

2013 (Rolling Average)

- The industry uses a two or three year rolling average (based on the site outage schedule) to define the Chemistry Performance Indicator (CPI) values. Darlington follows a three-year outage cycle. Pickering and other panel members are on a two-year outage cycle.
- The CANDU plant and unit level medians are both 1.01.
- The industry best quartile for the CANDU panel was 1.00 at both the plant and unit level.
- The Pickering plant and unit level performance were worse than the CANDU plant and unit level median CPI (1.01).
- Pickering plant performance for the calendar year 2013 improved substantially to 1.04, however, the two-year rolling average remained unchanged at 1.10 compared to 2012.
- Pickering unit performance for the calendar year 2013 improved markedly on Units 4, 6, 7 and 8 whereas performance on the remaining units declined (Units 1 and 5). The CPI results were impacted primarily by multiple unit start-ups from both planned and unplanned outages, a Unit 7 condenser tube leak, Unit 8 boiler blowdown partial unavailability and elevated feed water copper on Unit 1.
- Darlington plant performance reached 1.01 for the rolling average in 2013. Darlington obtained maximum NPI results for CPI at the station level in 2013. At the unit level, three of four units achieved maximum NPI points in 2013.

Trend

- Pickering’s station rolling average performance has remained flat around 1.10 for the three previous reporting years.
- Darlington’s overall station performance continues to remain strong and cycling between 1.00 and 1.01.

Factors Contributing to Performance

- Pickering performance is challenged by numerous unit transients.
- Best practices among top performing plants include use of dispersants to reduce iron transport corrosion product build-up in steam generators, condenser inspections, and, if necessary, cleaning to remove sources of corrosion products. These inspections and cleans are now being performed at both Pickering and Darlington. Darlington has implemented morpholine addition to reduce iron transport. Pickering continues to employ morpholine addition. Darlington’s corrosion product reduction plan also includes start-up filtration, dry lay-up and sampling improvements.
- Fleetwide and station initiatives which have or are expected to improve performance include:
  - Planned blowdown piping improvements at Pickering.
  - Morpholine addition to reduce iron transport at Darlington (completed)
  - Planned Engineering changes to reduce iron transport at Darlington.
  - Pre-startup condenser cleaning to reduce iron and copper transport at both Pickering and Darlington completed.
1-Year On-line Deficient Maintenance Backlog

2013 On-line Deficient Maintenance Backlog
All Participating Plants (AP-928 Working Group)

- Darlington
- Pickering

Best Quartile: 209
Median: 280

Deficient Maintenance Backlog Work Orders per Unit
Observations – On-line Deficient Maintenance Backlog

2013
- The data in this panel was gathered by an independent industry peer group, the INPO AP-928 group.
- The last backlog benchmark was taken on December 31, 2013 and this observation utilizes this data.
- This review was performed using Revision 3 of INPO AP-928 Work Management Practices (effective June 2010). The industry best quartile and median thresholds were 209 and 280 work orders per unit respectively for On-line Deficient Maintenance Backlogs.
  - Darlington is performing above best quartile at 184 work orders/unit.
  - Pickering is performing near the best quartile threshold at 215 work orders/unit.

Trend
- In comparison to the 2012 benchmarking data:
  - Darlington has had improved performance (from 203 to 184 work orders/unit).
  - Pickering has had improved performance (from 232 to 215 work orders/unit).
- Darlington and Pickering have shown improvements in reducing backlogs since 2011. Trending prior to 2011 is not practical due to the change in benchmarking criteria (revision 3 of INPO AP-928 in June 2010).

Factors Contributing to Performance
- For Darlington and Pickering, factors that impact improvement of deficient maintenance backlogs include the following:
  - Forced outages and forced outage extensions, negatively affected backlog reduction efforts.
  - Gaps in the work package preparation and walkdown processes (for example: incomplete inventory parts staging, work protection not applied, and scaffolding not installed) contribute to delays in execution of backlog work orders.

Darlington
- Darlington performance is currently within best quartile (184 deficient work orders/unit). This is a 9.4% reduction in backlogs compared to 2012. To support continuous improvement with this metric:
  - Additional resources (Fix-It-Now team) are being dedicated to reduce the backlog by addressing emergent issues.
  - Increased emphasis on reducing long standing work orders (high average age).
  - Short-term actions planned for Work Management and Maintenance work execution based on the “INPO Cumulative Impact” document are in progress and will continue beyond 2014.

Pickering
- Pickering performed near the best quartile (209 work orders/unit) with 215 work orders/unit. This is a 7.3% reduction in backlogs compared to 2012. To support improvement:
  - The ongoing 3K3 initiative is a program to complete high priority work that improves station reliability, incoming work, and backlog reduction.
  - Additional resources (Fix-It-Now team) are being dedicated to reduce the backlog by addressing emergent issues.
  - Short-term actions planned for Work Management and Maintenance work execution based on the “INPO Cumulative Impact” document are in progress and will continue beyond 2014.
1-Year On-line Corrective Maintenance Backlog

2013 On-line Corrective Maintenance Backlog
All Participating Plants (AP-928 Working Group)
Observations – On-line Corrective Maintenance Backlog

2013

- The data in this panel was gathered by an independent industry peer group, the INPO AP-928 group.
- The last backlog benchmark was on December 31, 2013 and this observation utilizes that data.
- This review was performed using Revision 3 of INPO AP-928 Work Management Practices (effective June 2010). Based on this standard, the industry best quartile and median thresholds were 17 and 30 work orders/unit respectively for On-line Corrective Maintenance Backlogs.
  - Darlington is performing near the median threshold at 32 work orders/unit.
  - Pickering is performing below median at 124 work orders/unit.

Trend

- In comparison to the 2012 benchmarking data:
  - Darlington has improved performance (from 66 to 32 work orders/unit).
  - Pickering has slightly worsened since 2012 (from 118 to 124 work orders/unit).
- Darlington and Pickering are showing an improving trend since 2011, with Darlington having significant improvement and Pickering having less improvement. Trending prior to 2011 is not practical due to the change in benchmarking criteria (revision 3 of INPO AP-928 in June 2010).

Factors Contributing to Performance

- For Darlington and Pickering, the factors that impact improvement of corrective maintenance backlogs include the following:
  - Forced outages and forced outage extensions, negatively affected backlog reduction efforts.
  - Gaps in the work package preparation and walkdown processes (for example: incomplete inventory parts staging, work protection not applied, and scaffolding not installed) contribute to delays in execution of backlog work orders.

Darlington

- Darlington is currently near the median threshold (32 corrective work orders/unit). This is significant improvement from 2012 and reduction by over half of the number of backlogs. On-going initiatives to support improvement with corrective maintenance backlogs include:
  - Increased emphasis on backlog items with high age.
  - Short-term actions planned for Work Management and Maintenance work execution based on the “INPO Cumulative Impact” document are in progress and will continue beyond 2014.

Pickering

- Pickering is currently below median (124 corrective work orders/unit) and performance in this metric has degraded by from 2012. On-going initiatives to support performance improvement with corrective maintenance backlogs include:
  - Effectiveness and efficiency of Fix-It-Now teams will reduce corrective backlog work.
  - Short-term actions planned for Work Management and Maintenance work execution based on the “INPO Cumulative Impact” document are in progress and will continue beyond 2014.
  - The ongoing 3K3 initiative is a program to complete high priority work that improves station reliability, incoming work, and backlog reduction.
4.0 VALUE FOR MONEY

Methodology and Sources of Data

The source for cost indicators and benchmarking data is the Electric Utility Cost Group (EUCG) database. Data was collected for three-year rolling averages for all financial metrics covering the review period from 2008-2013. Zero values for cost indicators are excluded from all calculations. All data submitted to and subsequently extracted from EUCG by OPG is presented in Canadian dollars.

Effective January 2009 (but applied retroactively to EUCG historical data), EUCG automatically applies a purchasing power parity (PPP) factor to adjust all values across national borders. The primary function of the PPP value is to adjust for currency exchange rate fluctuations but it also adjusts for additional cross-border factors which may impact purchasing power of companies in different jurisdictions. As a result, cost variations between plants is limited, as much as possible, to real differences and not advantages of utilizing one currency over another.

The benchmarking panel utilized for value for money metrics is made up of all North American plants reporting to EUCG. Within that panel, there is only one other CANDU technology plant reporting, Bruce Power. The remaining plants are Boiling Water Reactors or Pressurized Water Reactors. For that reason, some of the gaps in performance are associated with technology differences rather than comparable performance.

All metrics include cost information normalized by some factor (MWh or MW DER) to allow for comparison across plants.

Discussion

Four value for money metrics are benchmarked in this report. They are the Total Generating Cost per MWh, Non-Fuel Operating Cost per MWh, Fuel Cost per MWh, and Capital Cost per MW DER. The relationship underlying the value for money metrics is shown in the illustration below. The Total Generating Cost per MWh is the sum of Non-Fuel Operating Cost, Fuel Cost and Capital Cost measured on a per MWh basis for benchmarking purposes. Given the differences between OPG’s nuclear generating stations and most North American plants with respect to both fuel costs and the different treatments of non-fuel and capital costs, the best overall financial comparison metric for OPG facilities is the Total Generating Cost per MWh.

Diagram of Summary Relationship of Value for Money Metrics
3-Year Total Generating Cost per MWh

2013 3-Year Total Generating Costs per MWh
EUCG Benchmarking North American Plants (U.S. and Canada)

PICKERING
Median: 44.89
Best Quartile: 38.79

DARLINGTON
Median: 44.89
Best Quartile: 38.79

Canadian $/MWh
Observations – 3-Year Total Generating Cost per MWh (All North American Plants)

2013 (3-Year Rolling Average)
- The best quartile level for Total Generating Cost per MWh (TGC/MWh) among North American EUCG participants was $38.79/MWh while the median level was $44.89/MWh.
- Darlington achieved best quartile performance with a Total Generating Cost of $34.42/MWh.
- Pickering Total Generating Cost was $67.18/MWh, worse than the median of $44.89/MWh.

Trend
- Best quartile and median Total Generating Cost per MWh have escalated from 2008 to 2013. The best quartile cost rose by $9.30/MWh while the median cost rose by $11.57/MWh.
- Darlington’s costs trended upward from 2008 to 2010 with a decrease in 2012 to below 2009 cost levels, but with an 8.7% increase in 2013 from 2012 levels. Even with this increase in 2013, Darlington has maintained its best quartile ranking from 2011. The growth in Darlington’s TGC/MWh was $4.09/MWh compared to a $9.30/MWh increase in the industry best quartile over the 2008-2013 review period. The 2013 increase in Darlington’s cost per MWh is due to higher OM&A and capital costs; and lower Unit Capability Factor leading to lower generation. The 2013 increase also reflects labour cost escalation increases.
- Pickering’s costs have consistently trended above the median but have decreased in 2009 and 2010 with a slight increase in 2011 and 2012. There was minimal change in 2013 from 2012. Increases in labour cost escalation were partly offset by improved generation performance and staff savings. Over the 2008-2013 review period, Pickering maintained a relatively stable cost profile, showing almost no compound annual growth rate while the industry median quartile experienced a growth rate of approximately 6% over the same timeframe.

Factors Contributing to Performance
- For technological reasons, Fuel Costs per MWh is an advantage for all CANDUs and the OPG plants performed within the best quartile.
- Non-Fuel Operating Cost per MWh, for all OPG plants as a whole, yielded results that are worse than median for the most recent data point compared to the North American EUCG panel.
- OPG Capital Costs are below industry levels. Capital expenditures reported by the peer group include costs for life extension, reactor head replacement, steam generator replacement, uprates, and spent fuel storage. These are costs not incurred or reported by OPG.
Observations – 3-Year Total Generating Cost per MWh (All North American Plants) (CON’T)

Pickering
- Pickering performed within the best quartile for Fuel Cost per MWh and Capital Cost per MW DER while performing worse than the median for Non-Fuel Operating Cost per MWh.
- For Non-Fuel Operating Cost, the largest performance gap drivers for Pickering during the review period is CANDU technology, capability factor, smaller unit sizes, age of the plant, corporate cost allocations, and the fact that Pickering was built based on first generation CANDU technology. While OPG’s ten nuclear units are all CANDU reactors, they reflect three generations of design philosophy and technology which impacts the extent and nature of operations and maintenance activity.

Darlington
- Darlington performed within the best quartile for Fuel Cost per MWh and Capital Cost per MW DER while performing slightly worse than the median for the Non-Fuel Operating Cost per MWh.
- For Non-Fuel Operating Cost, a large performance gap driver for Darlington during the review period is CANDU technology. The larger equipment inventory in a CANDU unit compared to the pressurized water reactor’s and boiling water reactor’s units represents a net increase in maintenance and operations workload which requires additional staff.
- Darlington’s capability factor and large unit sizes contribute positively due to strong generation performance.
3-Year Non-Fuel Operating Cost per MWh

2013 3-Year Non-Fuel Operating Costs per MWh
EUCG Benchmarking North American Plants (U.S. and Canada)

Best Quartile: 22.76
Median: 25.83

Canadian $/MWh
Non-Fuel Operating Costs per MWh
EUCG Benchmarking North American Plants (U.S. and Canada)

Canadian $/MWh

2008 2009 2010 2011 2012 2013

20 25 30 35

10 15 20 25 30

0 5 10 15 20

2008 2009 2010 2011 2012 2013

DN  Median  Best Quartile  PN

Good
## Good Observations

### 3-Year Non-Fuel Operating Cost per MWh (All North American Plants)

#### 2013 (3-Year Rolling Average)
- Best quartile plants had Non-Fuel Operating Costs per MWh (NFOC/MWh) better than $22.76/MWh.
- The median plant level threshold is $25.83/MWh.
- Compared to North American EUCG plants, the Non-Fuel Operating Costs per MWh of all participating Canadian CANDU plants are worse than industry median performance, with Darlington marginally worse.
- Darlington’s costs, at $26.69/MWh, were $3.93/MWh higher than best quartile and just $0.86/MWh higher than the median.
- Pickering’s costs, at $57.15/MWh, were $34.39/MWh higher than best quartile and $31.32/MWh higher than median.

#### Trend
- Both best quartile and median levels increased over the 2008-2013 period with a compound annual growth rate of 4% for best quartile and median.
- Pickering Non-Fuel Operating Cost per MWh has slightly decreased compared to industry since 2008 with a slight increase in 2012. The slight increase in 2012 was partly attributable to investments in the Pickering Continued Operations program. Pickering’s NFOC/MWh in 2013 was almost identical to 2012 levels, reflecting continued improved performance with respect to both generation and costs. Generation has been steady since 2008 while operating costs only increased moderately. Higher electricity production levels are largely due to the successful implementation of equipment reliability program improvement initiatives and strategic investments to resolve degraded or obsolete equipment issues which helped reduce Pickering’s forced loss rate. Pickering’s annual Non-Fuel Operating Cost, over the 2008-2013 review period, is being managed through the continuous pursuit of efficiency improvements enabled by initiatives such as the amalgamation of the Pickering A and Pickering B stations into one Pickering site. The company-wide business transformation project launched in 2011 is also helping streamline, eliminate and reduce work to leverage attrition profiles while sustaining safety and reliability performance excellence.
- Darlington Non-Fuel Operating Cost per MWh increased faster than the industry best quartile and median from 2008 to 2009, but this increase was lower than the industry for 2010 and Darlington’s NFOC/MWh decreased in 2011 and 2012 while industry costs continued to increase. Cost decreases in 2011 and 2012 are primarily due to higher station production. This trend reversed to some extent in 2013. Darlington’s NFOC/MWh increased by almost 8% from 2012 levels while the best quartile and median levels increased by 5%. The 2013 increase in Darlington’s cost per MWh is due to higher OM&A costs and lower Unit Capability Factor leading to lower generation.
Factors Contributing to Performance – 3-Year Non-Fuel Operating Cost per MWh (CONT’D)

Factors Contributing to Performance

- Performance in Non-Fuel Operating Cost per MWh drives the majority of OPG’s financial performance. Overall, the biggest drivers are: capability factor, station unit size, CANDU technology, corporate cost allocation, and staff levels. The biggest drivers are further expanded below:
  - The ‘capability factor’ driver is related specifically to generation performance of the station in relation to the overall potential for the station (results are discussed under the Reliability section within the Rolling Average Unit Capability Factor metric).
  - The ‘station size’ driver is the combined effect of number of units and size of units which can have a significant impact on plant cost performance.
  - The ‘CANDU technology’ driver relates specifically to the concept that CANDU technology results in some specific cost disadvantages related to the overall engineering, maintenance, and inspection costs. In addition, this factor is influenced by the fact that CANDU plants have less well-developed user groups to share and adopt competitive advantage information, than do longer-established user groups for Pressurized Water Reactors (PWR) and Boiling Water Reactors (BWR). Though quantification of CANDU technology impact to cost remains most difficult of all drivers, a recent staff benchmarking analysis recognized a significant reduction in the gap between OPG staff levels and the industry benchmark. OPG undertook a staffing study through a third-party consultant which concluded that technology, design and regulatory differences exist between CANDU and PWR reactor units and that such factors drive staffing differences. The study established that CANDU technology was a contributor to explaining higher staffing levels for CANDU versus PWR plants which also contributed to OPG’s performance in Non-Fuel Operating Cost. The study also found that labour for CANDU stations is approximately 20% higher than in benchmarked PWR stations.
  - The ‘corporate cost allocations’ driver relates directly to the allocated corporate support costs charged to the nuclear group.
  - Other costs are continuously being reviewed for opportunities in reducing them.
  - The major contributing factors for Darlington performance for Non-Fuel Operating Cost per MWh were reviewed within the Total Generating Cost per MWh section.
  - The only additional contributing factor which appears within Non-Fuel Operating Cost is capitalization policy and ‘repair vs. replace strategies’.
  - The impact of differing capitalization policies is removed when looking at Total Generating Cost per MWh (i.e., the sum of Non-Fuel Operating Cost, Fuel Cost, and Capital Cost).
3-Year Fuel Cost per MWh

2013 3-Year Fuel Costs per MWh
EUCG Benchmarking North American Plants (U.S. and Canada)

Canadian $/MWh

DARLINGTON
PICKERING

Best Quartile: 7.87

Median: 8.63
Fuel Costs per MWh
EUCG Benchmarking North American Plants (U.S. and Canada)
Observations – 3-Year Fuel Cost per MWh (All North American Plants)

2013 (3-Year Rolling Average)

- Fuel Cost per MWh for all Canadian CANDU plants are better than the best quartile threshold for the panel of North American EUCG plants.
- The three CANDU plants in the peer panel ranked as the three lowest fuel cost plants in the North American panel.

Trend

- The best quartile 3-year Fuel Cost per MWh has been rising since 2008 with the biggest increase in 2012.
- Since 2008, Fuel Cost per MWh for all OPG plants has been rising with the biggest increase in 2010. This can be attributed primarily to uranium contracts entered into in the 2006/2007 timeframe when uranium prices peaked. OPG’s uranium acquisition costs peaked in 2010 and have since declined; OPG’s use of weighted average cost accounting delays the impact on overall fuel costs. The rate of increase in the Fuel Cost per MWh has moderated over the 2011 to 2013 period, due primarily to lower input uranium costs. However, Annual Uranium Conversion and Fuel Bundle Manufacturing base prices, which are indexed to inflation, continue to increase overall fuel cost albeit at a moderate rate; along with higher fuel disposal provision costs. Fuel Cost per MWh, at the two OPG Nuclear plants converged in 2010 but are currently slightly higher for Pickering.

Factors Contributing to Performance

- Fuel cost, primarily driven by the technological differences in CANDU technology, are lower for OPG than for most North American Pressurized Water Reactors or Boiling Water Reactors (PWR/BWR) reactors as CANDUs do not require enriched uranium like BWRs and PWRs. This provides a significant advantage for OPG and other CANDUs in this cost category.

Best quartile fuel cost performance noted above is due to the following factors:

- **Uranium fuel costs**: Raw uranium is processed directly into uranium dioxide to make fuel pellets, without the cost and process complexity of enriching the fuel as required in light water reactors. The advantage due to fuel costs also includes transportation, handling and shipping costs.
- **Reactor core efficiency**: CANDU is the most efficient of all reactors in using uranium, requiring about 15% less uranium than PWRs for each megawatt hour of electricity.
3-Year Capital Cost per MW DER

2013 3-Year Capital Costs per MW DER
EUCG Benchmarking North American Plants (U.S. and Canada)

Median: 66.83
Best Quartile: 50.88
Capital Costs per MW DER
EUCG Benchmarking North American Plants (U.S. and Canada)
Observations – 3-Year Capital Cost per MW DER (All North American Plants)

2013 (3-Year Rolling Average)

- First quartile threshold for Capital Cost per MW DER across the North American EUCG peer panel plants was k$50.88/MW DER.
- Median cost for the panel was k$66.83/MW DER.
- Both Pickering and Darlington had lower Capital Cost/MW DER than the first quartile.

Trend

- First quartile and median Capital Cost per MW DER declined in 2013. This is being driven by reduced investment in enhancements in the US fleet, particularly uprates and steam generator replacements, offset by increased spending in regulatory assets for Fukushima response activities.
- Pickering’s Capital Cost per MW DER decreased steadily since 2008 with the biggest decrease in 2009.
- Darlington’s Capital Cost per MW DER increased moderately in 2013 due to increased spending on sustaining and infrastructure investments.

Factors Contributing to Performance

- Both Darlington and Pickering are performing within the first quartile for the panel.
- A review of the capitalization policies submitted to the EUCG shows that 66% of the North American peer group base their capitalization decision on the type and size of component whereas 28% use a materiality limit and 6% use a mixture of the two. Basing capitalization decisions on the size and type of component can result in more capitalization of life-expired and obsolete equipment replacement. OPG’s assets are grouped by systems and groups of systems rather than by type of component. Application of the policy for classifying projects is biased towards expensing work as Operations, Maintenance & Administration (OM&A).
- Another factor is that the capital expenditures reported by the peer group include costs that are not incurred or reported by OPG. The peer group reports costs for life extension, reactor head replacement, steam generator replacement, uprates, and spent fuel storage. Excluding these costs, the first quartile threshold was k$39.30/MW DER and the median cost was k$51.37/MW DER.
- An analysis of capital spending versus DER indicates that only 13.7% of capital spending correlates with the design output of the plant. The only part of a capital project that is highly correlated with the DER is the material cost of the equipment, which typically are 15 to 20% of total capital project cost. Other project costs, such as design and project management, are not highly correlated with the size of the unit.
5.0 HUMAN PERFORMANCE

Methodology and Sources of Data

The Human Performance Error Rate metric has been selected to benchmark the performance of OPG’s Nuclear fleet against other INPO utilities in the area of Human Performance. This will ensure a continued focus on improving Human Performance by comparing OPG Nuclear stations to industry quartiles through the use of consistent and comparable data.

18-Month Human Performance Error Rate

![Graph showing 2013 18-Month Human Performance Error Rate]
18-Month Human Performance Error Rate (Events per 10k ISAR Hours)

INPO North American Plant Level Benchmarking

- 79 -
Observations – 18 Month Human Performance Error Rate (INPO North American Plants)

2013 (18 Month Rolling Average)
- 18-month Human Performance Error Rate (HPER) industry quartiles for all North American INPO plants at the end of 2013:
  - Best Quartile: \( \leq 0.00200 \)
  - Median: \( > 0.00200 \) but \( \leq 0.00500 \)
  - Third Quartile: \( > 0.00500 \) but \( \leq 0.00700 \)
  - Fourth Quartile: \( > 0.00700 \)
- Compared to INPO peer group at the end of 2013, Darlington station declined to third quartile and Pickering Station declined to fourth quartile performance.
- As of January 2013, OPGN reporting frequency included contractor hours. Calculations were adjusted back allowing for an 18-month rolling average. The 2013 data point reflects this change.

Trend

- Industry top quartile and median benchmarks improved over the review period.
- OPGN fleet performance declined in 2012 and 2013 to third and fourth quartile.

Factors Contributing to Performance

- Line management engagement in sites’ human performance program processes with multiple managers and initiatives is being undertaken to improve performance.
- Other areas impacting human performance:
  - Supervisors to monitor and reinforce standards.
  - Worker adherence to standards, improvement in risk perception and risk tolerance, and improvements in decision making.
  - Low level reporting not consistently performed resulting in lost opportunities to correct minor issues and predict future breakthrough events.
6.0 MAJOR OPERATOR SUMMARY

Purpose

This section supplements the Executive Summary, providing more detailed comparison of the major operators of nuclear plants for three key metrics: WANO Nuclear Performance Index (NPI), Unit Capability Factor (UCF), and Total Generating Cost (TGC) per MWh. Although the benchmarking study has been primarily focused on operational performance comparison to COG CANDUs, this section of the report contemplates the larger industry by capturing OPG Nuclear’s performance against North American PWR and PHWR operators in addition to the international CANDU panel. Operator level summary results are the average (mean) of the results across all plants managed by the given operator. These comparisons provide additional context, but the detailed data in the previous sections provide a more complete picture of plant by plant performance. The WANO NPI and UCF are calculated as the mean of all unit performance for a specific operator. The TGC per MWh is the mean of plant level data because costs are not allocated to specific units within the EUCG industry panel.

WANO Nuclear Performance Index Analysis

The WANO Nuclear Performance Index (NPI) results for the operators in 2013 are illustrated in the graph below. OPG Nuclear performance ranking improved slightly from 2012 as shown in Table 3.

*See Table 7 in the Appendix for listing of operators and plants.
In 2013, OPG ranked 22nd, with an NPI of 76.8. Although an improvement in overall rank from 2012, OPG dropped slightly in NPI performance from the previous reporting year. Darlington performed better overall than Pickering, achieving top quartile results against the CANDU panel in 2013. Refer to Section 3.0 for further information.

The NPI rankings of the major operators from 2008 to 2013 are listed in Table 3. The list and ranking of operators has been updated to reflect industry developments.

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<td>28</td>
<td>N/A*</td>
<td>27</td>
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</table>

*N/A: Not applicable due to multi-year refurbishment of the generating Station.

Note: Three operators are no longer shown in the ranking as of 2013 (reason for 28 operators shown in 2008 to 2011 vs. 25 in 2013). These operators were removed as a result of plant acquisitions or closures. All 2008-2012 rankings and numbers are carried over from previous benchmarking reports.
Unit Capability Factor Analysis

Unit Capability Factor (UCF) is the ratio of available energy generation over a given time period to the reference energy generation of the same time period, expressed as a percentage. Reference energy generation is the energy that could be produced if the unit were operating continuously at full power under normal conditions. Since nuclear generation plants are large fixed assets, the extent to which these assets generate reliable power is the key to both their operating and financial performance.

A comparison of UCF values for major nuclear operators is presented in the graph below. UCF is expressed as a two-year average for all operators except for OPG Nuclear, which includes a three-year average for the Darlington station and a two-year average for Pickering. OPG Nuclear achieved a rolling average UCF of 81.6% and ranked 19 out of 25 operators in the WANO data set. The list and ranking of operators has been updated to reflect industry developments.

* See Table 7 in the Appendix for listing of operators and plants.
**OPG unit values averaging to a rolling average UCF of 81.6% in 2013 are shown below:

<table>
<thead>
<tr>
<th>Unit</th>
<th>2013 Rolling Average UCF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pickering 1</td>
<td>56.2</td>
</tr>
<tr>
<td>Pickering 4</td>
<td>80.3</td>
</tr>
<tr>
<td>Pickering 5</td>
<td>78.6</td>
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<tr>
<td>Pickering 6</td>
<td>82.4</td>
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<tr>
<td>Pickering 7</td>
<td>81.0</td>
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<tr>
<td>Pickering 8</td>
<td>76.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit</th>
<th>2013 Rolling Average UCF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darlington 1</td>
<td>92.3</td>
</tr>
<tr>
<td>Darlington 2</td>
<td>86.9</td>
</tr>
<tr>
<td>Darlington 3</td>
<td>93.3</td>
</tr>
<tr>
<td>Darlington 4</td>
<td>89.3</td>
</tr>
</tbody>
</table>
Rankings for the major operators for UCF over the past five years are provided in Table 4 below. OPG Nuclear’s performance has gradually improved from 26\textsuperscript{th} (out of 28 operators) in 2008 to 19\textsuperscript{th} (out of 25 operators) at the end of 2013.

### Table 4: Rolling Average Unit Capability Factor Rankings

<table>
<thead>
<tr>
<th>Operator</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
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<td>22</td>
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<td>26</td>
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</tbody>
</table>

**Notes:** Three operators are no longer shown in the ranking as of 2013 (reason for 28 operators shown in 2008 to 2011 vs. 25 in 2013). These operators were removed as a result of plant acquisitions or closures. All 2008-2012 rankings and numbers are carried over from previous benchmarking reports.

### Total Generating Cost/MWh Analysis

The 3-year Total Generating Cost results for the major operators in 2013 are displayed in the graph below. Total Generating Costs are defined as total operating costs plus capital costs of all plants that the operator operates in 2011-2013. This value is divided by the total net generation of all plants that the operator operates for the same period and is provided as a three-year average. OPG Nuclear ranked 8\textsuperscript{th}, with a 3-year Total Generation Cost of $48.24 per MWh.
*OPG plant values of 3-year rolling average TGC per MWh are shown below:

<table>
<thead>
<tr>
<th>Unit</th>
<th>2013 3-Year TGC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darlington</td>
<td>$34.42/MWh</td>
</tr>
<tr>
<td>Pickering</td>
<td>$67.18/MWh</td>
</tr>
</tbody>
</table>

Table 5: Three-Year Total Generating Cost per MWh Rankings

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
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<td>14</td>
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</tr>
</tbody>
</table>

Note: An operator has been removed from the panel due to an acquisition by another operator in the panel. An additional operator was added to the panel to maintain year-over-year panel size.
Total Generating Cost is comprised of: (a) Non-Fuel Operating Costs, plus (b) Fuel Costs, plus (c) Capital Costs. Table 6 below shows the relative contribution of these cost components to Total Generating Cost and compares OPG’s costs to those of all EUCG operators.

**Table 6: EUCG Indicator Results Summary (Operator Level)**

<table>
<thead>
<tr>
<th>EUCG Indicator Results Summary</th>
<th>OPG Average</th>
<th>EUCG Major Operators*</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Yr. Non-Fuel Operating Costs per MWh</td>
<td>$ 39.54</td>
<td>$ 27.68</td>
<td>$ 22.89</td>
</tr>
<tr>
<td>3-Yr. Fuel Costs per MWh</td>
<td>$ 5.19</td>
<td>$ 8.49</td>
<td>$ 7.46</td>
</tr>
<tr>
<td>3-Yr. Capital Costs per MWh</td>
<td>$ 3.52</td>
<td>$ 10.03</td>
<td>$ 5.45</td>
</tr>
<tr>
<td>3-Yr. Total Generating Costs per MWh</td>
<td>$ 48.24</td>
<td>$ 46.20</td>
<td>$ 35.81</td>
</tr>
</tbody>
</table>

*See Table 8 in the appendix for list of operators included.

Notes: This summary contains the average of all plant results per operator. Numbers may not add due to rounding.
7.0 APPENDIX

Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>ALARA</td>
<td>As Low As Reasonably Achievable</td>
</tr>
<tr>
<td>BWR</td>
<td>Boiling Water Reactor</td>
</tr>
<tr>
<td>CANDU</td>
<td>CANada Deuterium Uranium (type of PHWR)</td>
</tr>
<tr>
<td>CEA</td>
<td>Canadian Electricity Association</td>
</tr>
<tr>
<td>COG</td>
<td>CANDU Owners Group</td>
</tr>
<tr>
<td>DER</td>
<td>Design Electrical Rating</td>
</tr>
<tr>
<td>EUCG</td>
<td>Electric Utility Cost Group</td>
</tr>
<tr>
<td>INPO</td>
<td>Institute of Nuclear Power Operators</td>
</tr>
<tr>
<td>OPG</td>
<td>Ontario Power Generation</td>
</tr>
<tr>
<td>PHWR</td>
<td>Pressurized Heavy Water Reactor</td>
</tr>
<tr>
<td>PWR</td>
<td>Pressurized Water Reactor</td>
</tr>
<tr>
<td>WANO</td>
<td>World Association of Nuclear Operators</td>
</tr>
</tbody>
</table>

Safety and Reliability Definitions

The following definitions are summaries extracted from industry peer group databases.

**All Injury Rate** is the average number of fatalities, total temporary disabilities, permanent total disabilities, permanent partial disabilities and medical attention injuries per 200,000 hours worked.

**Industrial Safety Accident Rate** is defined as the number of accidents for all utility personnel (permanently or temporarily) assigned to the station, that result in one or more days away from work (excluding the day of the accident) or one or more days of restricted work (excluding the day of the accident), or fatalities, per 200,000 man-hours worked. The selection of 200,000 man-hours worked or 1,000,000 man-hours worked for the indicator will be made by the country collecting the data, and international data will be displayed using both scales. Contractor personnel are not included for this indicator.

**Collective Radiation Exposure**, for purposes of this indicator, is the total external and internal whole body exposure determined by primary dosimeter (thermoluminescent dosimeter (TLD) or film badge), and internal exposure calculations. All measured exposure should be reported for station personnel, contractors, and those personnel visiting the site or station on official utility business.

Visitors, for purposes of this indicator, include only those monitored visitors who are visiting the site or station on official utility business.
Airborne Tritium Emissions per Unit: Tritium emissions to air are one of the sites’ leading components of dose to the public. By specific tracking of tritium emissions, the sites can maintain or reduce dose. Reducing OPG Nuclear’s dose to the public demonstrates continuous improvement in operations.

Fuel Reliability Index is inferred from fission product activities present in the reactor coolant. Due to design differences, this indicator is calculated differently for different reactor types. For PHWR’s, the indicator is defined as the steady-state primary coolant iodine-131 activity (Becquerels/gram or Microcuries/gram), corrected for the tramp uranium contribution and power level, and normalized to a common purification rate.

Unplanned automatic reactor trips (SCRAMS) is defined as the number of unplanned automatic reactor trips (reactor protection system logic actuations) that occur per 7,000 hours of critical operation. The indicator is further defined as follows:

- Unplanned means that the trip was not an anticipated part of a planned test.
- Trip means the automatic shutdown of the reactor by a rapid insertion of negative reactivity (e.g., by control rods, liquid injection shutdown system, etc.) that is caused by actuation of the reactor protection system. The trip signal may have resulted from exceeding a setpoint or may have been spurious.
- Automatic means that the initial signal that caused actuation of the reactor protection system logic was provided from one of the sensors’ monitoring plant parameters and conditions, rather than the manual trip switches or, in certain cases described in the clarifying notes, manual turbine trip switches (or pushbuttons) provided in the main control room.
- Critical means that, during the steady-state condition of the reactor prior to the trip, the effective multiplication factor ($k_{eff}$) was essentially equal to one.
- The value of 7,000 hours is representative of the critical hours of operation during a year for most plants, and provides an indicator value that typically approximates the actual number of scrams occurring during the year.

The safety system performance indicator is defined for the many different types of nuclear reactors within the WANO membership. To facilitate better understanding of the indicator and applicable system scope for these different type reactors a separate section has been developed for each reactor type.

Also, because some members have chosen to report all data on a system train basis versus the "standard" overall system approach, special sections have also been developed for those reactor types where train reporting has been chosen. (The resulting indicator values resulting from these methods are essentially the same.)

Each section is written specifically for that reactor type and reporting method. If a member desires to understand how a different member is reporting or wishes to better understand that member’s indicator, it should consult the applicable section.

The safety systems monitored by this indicator are the following:
PHWRs

Although the PHWR safety philosophy considers other special safety systems to be paramount to public safety, the following PHWR safety and safety-related systems were chosen to be monitored in order to maintain a consistent international application of the safety system performance indicators:

- Auxiliary boiler feedwater system
- Emergency AC power
- High pressure emergency coolant injection system

These systems were selected for the safety system performance indicator based on their importance in preventing reactor core damage or extended plant outage. Not every risk important system is monitored. Rather, those that are generally important across the broad nuclear industry are included within the scope of this indicator. They include the principal systems needed for maintaining reactor coolant inventory following a loss of coolant, for decay heat removal following a reactor trip or loss of main feedwater, and for providing emergency AC power following a loss of plant off-site power. (Gas cooled reactors have an additional decay heat removal system instead of the coolant inventory maintenance system)

Except as specifically stated in the definition and reporting guidance, no attempt is made to monitor or give credit in the indicator results for the presence of other systems at a given plant that add diversity to the mitigation or prevention of accidents. For example, no credit is given for additional power sources that add to the reliability of the electrical grid supplying a plant because the purpose of the indicator is to monitor the effectiveness of the plant's response once the grid is lost.

The **Nuclear Performance Index** Method 4 is an INPO sponsored performance measure, and is a weighted composite of ten WANO Performance Indicators related to safety and production performance reliability.

The NPI is used for trending nuclear station and unit performance, and comparing the results to the median or quartile values of a group of units, to give an indication of relative performance. The quarterly NPI has also been used to trend the performance and monitor the effectiveness of various improvement programs in achieving top quartile performance and allows nuclear facilities to benchmark their achievements against other nuclear plants worldwide.

The **Forced Loss Rate (FLR)** is defined as the ratio of all unplanned forced energy losses during a given period of time to the reference energy generation minus energy generation losses corresponding to planned outages and any unplanned outage extensions of planned outages, during the same period, expressed as a percentage.

Unplanned energy losses are either unplanned forced energy losses (unplanned energy generation losses not resulting from an outage extension) or unplanned outage extension of planned outage energy losses.

Unplanned forced energy loss is energy that was not produced because of unplanned shutdowns or unplanned load reductions due to causes under plant management control when the unit is
considered to be at the disposal of the grid dispatcher. Causes of forced energy losses are considered to be unplanned if they are not scheduled at least four weeks in advance. Causes considered to be under plant management control are further defined in the clarifying notes.

Unplanned outage extension energy loss is energy that was not produced because of an extension of a planned outage beyond the original planned end date due to originally scheduled work not being completed, or because newly scheduled work was added (planned and scheduled) to the outage less than four weeks before the scheduled end of the planned outage.

Planned energy losses are those corresponding to outages or power reductions which were planned and scheduled at least four weeks in advance (see clarifying notes for exceptions).

Reference energy generation is the energy that could be produced if the unit were operated continuously at full power under reference ambient conditions throughout the given period. Reference ambient conditions are environmental conditions representative of the annual mean (or typical) ambient conditions for the unit.

Unit Capability Factor is defined as the ratio of the available energy generation over a given time period to the reference energy generation over the same time period, expressed as a percentage. Both of these energy generation terms are determined relative to reference ambient conditions.

Available energy generation is the energy that could have been produced under reference ambient conditions considering only limitations within control of plant management, i.e., plant equipment and personnel performance, and work control.

Reference energy generation is the energy that could be produced if the unit were operated continuously at full power under reference ambient conditions.

Reference ambient conditions are environmental conditions representative of the annual mean (or typical) ambient conditions for the unit.

The Chemistry Performance Indicator compares the concentration of selected impurities and corrosion products to corresponding limiting values. Each parameter is divided by its limiting value, and the sum of these ratios is normalized to 1.0. For BWRs and most PWRs, these limiting values are the medians for each parameter, based on data collected in 1993, thereby reflecting recent actual performance levels. For other plants, they reflect challenging targets. If an impurity concentration is equal to or better than the limiting value, the limiting value is used as the concentration. This prevents increased concentrations of one parameter from being masked by better performance in another. As a result, if a plant is at or below the limiting value for all parameters, its indicator value would be 1.0, the lowest chemistry indicator value attainable under the indicator definition. The following is used to determine each unit’s chemistry indicator value:

- PWRs with recirculating steam generators and VVERs
  - Steam generator blowdown chloride
  - Steam generator blowdown cation conductivity
  - Steam generator blowdown sulphate
  - Steam generator blowdown sodium
- Final feedwater iron
- Final feedwater copper (not applicable to PWRs with I-800 steam generator tubes)
- Condensate dissolved oxygen (only applicable to PWRs with I-800 steam generator tubes)
- Steam generator molar ratio target range (by reporting the upper and lower range limits (as "from" and "to" values when using molar ratio control)
- Steam generator actual molar ratio (if reporting molar ratio control data)
- Feedwater oxygen
- Feedwater pH value at 270deg. C

- PWRs with once through steam generators
  - Final feedwater chloride
  - Final feedwater sulfate
  - Final feedwater sodium
  - Final feedwater iron
  - Final feedwater copper
  -

- Pressurized heavy water reactors (PHWRs)
  - *Inconel-600 or Monel tubes
    - Steam generator blowdown chloride
    - Steam generator blowdown sulfate
    - Steam generator blowdown sodium
    - Final feedwater iron
    - Final feedwater copper
    - Final feedwater dissolved oxygen
  - Incoloy-800 tubes
    - Steam generator blowdown chloride
    - Steam generator blowdown sulfate
    - Steam generator blowdown sodium
    - Final feedwater iron
    - Final feedwater dissolved oxygen

- PHWRs on molar ratio control
  - Steam generator blowdown chloride
  - Steam generator blowdown sulfate
  - Final feedwater iron
  - Final feedwater copper
  - Feedwater dissolved oxygen
  - Steam generator molar ratio target range (by reporting the upper and lower range limits (as "from" and "to" values)
  - Steam generator actual molar ratio

**Online Deficient Maintenance Backlog** is the average number of active on-line maintenance work orders per operating unit classified as Deficient Critical (DC) or Deficient Non-Critical
(DN) that can be worked on without requiring the unit shutdown. This metric identifies deficiencies or degradation of plant equipment components that need to be remedied, but which do not represent a loss of functionality of the component or system.

**Online Corrective Maintenance Backlog** is the average number of active on-line maintenance work orders per operating unit classified as Corrective Critical (CC) or Corrective Non-Critical (CN) that can be worked on without requiring the unit shutdown. This metric identifies deficiencies or degradation of components that need to be remedied, and represents a loss of functionality of a major component or system.

On-line maintenance is maintenance that will be performed with the main generator connected to the grid.

**Value for Money Definitions**

The following definition summaries are taken from the *January 2013 EUCG Nuclear Committee Nuclear Database Instructions*.

**Capital Costs ($)**

All costs associated with improvements and modifications made during the reporting year. These costs should include design and installation costs in addition to equipment costs. Other miscellaneous capital additions such as facilities, computer equipment, moveable equipment, and vehicles should also be included. These costs should be fully burdened with indirect costs, but exclude AFUDC (interest and depreciation).

**Fuel ($)**

The total cost associated with a load of fuel in the reactor which is burned up in a given year.

**Net Generation (Gigawatt Hours)**

The gross electrical output of the unit measured at the output terminals of the turbine-generator minus the normal station service loads during the hours of the reporting period, expressed in Gigawatt hours (GWh). Negative quantities should not be used.

**Design Electrical Rating (DER)**

The nominal net electrical output of a unit, specified by the utility and used for plant design (DER net expressed in MWe). Design Electrical Rating should be the value that the unit was certified/designed to produce when constructed. The value would change if a power uprate was completed. After a power uprate, the value should be the certified or design value resulting from the uprate.

**Operating Costs ($)**

The operating cost is to identify all relevant costs to operate and maintain the nuclear operations in that company. It includes the cost of labour, materials, purchased services and other costs, including administration and general.

**Total Generating Costs ($)**

The sum of total operating costs and capital costs as above.
Total Operating Costs ($)  
The sum of operating costs and fuel costs as above.

Note: Capital costs, fuel costs, operating costs and Total Generating Costs are divided by net generation as above to obtain per MWh results. Capital costs are also divided by MW DER to obtain MW results.

**Human Performance Definitions**

The following definition summary is taken from the Institute of Nuclear Power Operations (INPO) database.

**Human Performance Error Rate (# per ISAR Hours)**

The Human Performance Error Rate metric represents the number of site level human performance events in an 18-month period per 10,000 ISAR hours worked (including on site supplemental personnel). The formula used is:

\[
\frac{\text{(Number of S-EFDRs)}}{\text{(Total ISAR Hours + Total Contractor Hours)}} \times 10,000 \text{ Hours} \quad \text{(Calculated as an 18-month rolling average)}
\]

INPO guidelines define non utility personnel to include contractor, supplemental personnel assigned to perform work activities on site or at other buildings that directly support station operation. This includes personnel who deliver and receive equipment, deliver fuel oil, remove trash and radioactive waste, and provide building and grounds maintenance within the owner-controlled areas or facilities that support the station.

INPO defines an event to occur as a result of the following:

An initiating action (error) by an individual or group of individuals (event resulting from an active error) or an initiating action (not an error) by an individual or group of individuals during an activity conducted as planned (event resulting from a flawed defense or latent organizational weakness). They may be related to Nuclear Safety, Radiological Safety, Industrial Safety, Facility Operations or considered to be a Regulatory Event reportable to a regulator or governing agency. OPG Nuclear’s criteria for defining station event free day resets have been developed based on INPO guidelines. However, the definition may differ slightly due to adaptation resulting from technological differences.
## Table 7: WANO Panel

<table>
<thead>
<tr>
<th>Operator</th>
<th>Plant</th>
<th>Operator</th>
<th>Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>AmerenUE</td>
<td>CALLAWAY</td>
<td>International CANDU</td>
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<td>American Electric Power Co. Inc.</td>
<td>COOK</td>
<td>CERNAVODA</td>
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<td>PALO VERDE</td>
<td>EMBALSE</td>
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<td>Bruce Power</td>
<td>BRUCE NUCLEAR A</td>
<td>QINSHAN 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BRUCE NUCLEAR B</td>
<td>WOLSONG A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>WOLSONG B</td>
<td></td>
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<td>New Brunswick Power</td>
<td>POINT LEPREAU</td>
</tr>
<tr>
<td></td>
<td>NORTH ANNA SURRY</td>
<td></td>
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<tr>
<td>Duke Power</td>
<td>CATAWBA</td>
<td>NextEra Energy Resources</td>
<td>POINT BEACH</td>
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<td>SEABROOK</td>
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<td>INDIAN POINT</td>
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<td>PICKERING</td>
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<td>DIABLO CANYON</td>
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<td>Progress Energy</td>
<td>HARRIS</td>
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<td></td>
<td>LLC</td>
<td>BRUNSWICK</td>
</tr>
<tr>
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<td></td>
<td>BYRON</td>
<td>V.C. SUMMER</td>
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<td>THREE MILE ISLAND</td>
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<td>CALVERT CLIFFS</td>
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<td>GINNA</td>
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<td></td>
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<td>DAVIS-BESSE</td>
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<td>VOGTLE</td>
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<td>Florida Power &amp; Light Co. (FPL)</td>
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<td>TURKEY POINT</td>
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<tr>
<td></td>
<td></td>
<td>Tennessee Valley Authority (TVA)</td>
<td>SEQUOYA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>WATTS BAR</td>
</tr>
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<td>Wolf Creek Nuclear Operating Corp. (WNOC)</td>
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### Table 8: EUCG Panel

<table>
<thead>
<tr>
<th>Major Operator</th>
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<th>Major Operator</th>
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<tr>
<td>Bruce Power</td>
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<td>Florida Power &amp; Light Co. (FPL)</td>
<td>ST LUCIE TURKEY POINT</td>
</tr>
<tr>
<td>Dominion Resources</td>
<td>MILLSTONE NORTH ANNA SURRY</td>
<td>NextEra Energy Resources</td>
<td>DUANE ARNOLD POINT BEACH SEABROOK</td>
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<td></td>
<td></td>
<td>Northern States Power Company</td>
<td>MONTICELLO PRAIRIE ISLAND</td>
</tr>
<tr>
<td>Duke</td>
<td>CATAWBA MCGUIRE OCONEE</td>
<td>Ontario Power Generation (OPG)</td>
<td>DARLINGTON PICKERING</td>
</tr>
<tr>
<td>Entergy</td>
<td>ARKANSAS NUCLEAR ONE (ANO)</td>
<td>Progress Energy</td>
<td>BRUNSWICK HARRIS ROBINSON</td>
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<tr>
<td></td>
<td>FITZPATRICK GRAND GULF</td>
<td>Public Service Enterprise Group (PSEG)</td>
<td>HOPE CREEK SALEM</td>
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<td>INDIAN POINT PALISADES PILGRIM RIVER BEND VERMONT YANKEE WATERFORD</td>
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<td></td>
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<tr>
<td>Exelon</td>
<td>BRAIDWOOD BYRON CALVERT CLIFFS CLINTON DRESDEN LASALLE LIMERICK OYSTER CREEK PEACH BOTTOM QUAD CITIES GINNA THREE MILE ISLAND NINE MILES</td>
<td>Southern</td>
<td>FARLEY HATCH VOGTLE</td>
</tr>
<tr>
<td>First Energy</td>
<td>BEAVER VALLEY DAVID-BESSE PERRY</td>
<td>Tennessee Valley Authority (TVA)</td>
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### Remaining EUCG Members

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<td>AmerenUE</td>
<td>Callaway</td>
<td>Nebraska Public Power District</td>
<td>Cooper</td>
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<td>Arizona Public Service Co.</td>
<td>Palo Verde</td>
<td>PPL Susquehanna</td>
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<tr>
<td>Detroit Edison Co.</td>
<td>Fermi</td>
<td>South Carolina Electric &amp; Gas Company (SCE&amp;G)</td>
<td>V.C. Summer</td>
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<tr>
<td>Energy Northwest</td>
<td>Columbia</td>
<td>STP Nuclear Operating Co.</td>
<td>South Texas</td>
</tr>
<tr>
<td>Luminant Generation</td>
<td>Comanche Peak</td>
<td>Wolf Creek Nuclear Operations Corp.</td>
<td>Wolf Creek</td>
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- 95 -
Table 9: COG CANDUs

<table>
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<th>Operator</th>
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<tr>
<td>Bruce Power</td>
<td>BRUCE NUCLEAR A</td>
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<tr>
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<td>BRUCE NUCLEAR B</td>
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<tr>
<td>China (CNNP)</td>
<td>QINSHAN 3</td>
</tr>
<tr>
<td>NASA</td>
<td>EMBALSE</td>
</tr>
<tr>
<td>Korea (KHNP)</td>
<td>WOLSONG A</td>
</tr>
<tr>
<td></td>
<td>WOLSONG B</td>
</tr>
<tr>
<td>New Brunswick Power</td>
<td>POINT LEPREAU</td>
</tr>
<tr>
<td>OPG</td>
<td>DARLINGTON</td>
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<tr>
<td></td>
<td>PICKERING</td>
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<td>Romania</td>
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Table 10: CEA Members

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<tr>
<th>Companies</th>
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<td>AltaLink</td>
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<td>ATCO Electric</td>
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<td>ATCO Power</td>
<td>Maritime Electric Company</td>
</tr>
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<td>BC Hydro and Power Authority</td>
<td>Nalcor Energy</td>
</tr>
<tr>
<td>Brookfield Renewable Energy Group</td>
<td>New Brunswick Power</td>
</tr>
<tr>
<td>Capital Power Corporation</td>
<td>Newfoundland Power</td>
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<td>City of Medicine Hat, Electric Utility</td>
<td>Northwest Territories Power Corp.</td>
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<tr>
<td>Columbia Power Corporation</td>
<td>Nova Scotia Power</td>
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<td>Emera Inc.</td>
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<td>Ontario Power Generation</td>
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<td>EPCOR</td>
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<td>FortisAlberta Inc.</td>
<td>Saskatoon Light &amp; Power</td>
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<tr>
<td>FortisBC Inc.</td>
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<td>Hydro One</td>
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<td>Yukon Energy Corp.</td>
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Table 11: INPO Members for Human Performance Error Rate

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<th>Plant</th>
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<tr>
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<td>Braidwood</td>
<td>Nine Mile Point</td>
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<td>Browns Ferry</td>
<td>North Anna</td>
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<td>Brunswick</td>
<td>Oconee</td>
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<td>Byron</td>
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<td>Perry</td>
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<td>Point Beach</td>
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<td>Cook</td>
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<td>Duane Arnold</td>
<td>Seabrook</td>
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<td>St. Lucie</td>
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<td>Vogtle</td>
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<td>McGuire</td>
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<td>Plant</td>
<td>Plant</td>
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<td>----------------------</td>
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<tr>
<td>Arkansas Nuclear One (ANO)</td>
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<td>Beaver Valley</td>
<td>Nine Mile Point</td>
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<td>Braidwood</td>
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<td>St. Lucie</td>
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<td>McGuire</td>
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Table 13: NPI Plant Level Performance Summary (North American Panel)

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<th>Indicator</th>
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<th>Median</th>
<th>Pickering</th>
<th>Darlington</th>
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<tr>
<td>Rolling Average Industrial Safety Accident Rate (#/200k hours worked)</td>
<td>0.20</td>
<td>0.00</td>
<td>0.03</td>
<td>0.02</td>
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<tr>
<td>Rolling Average Collective Radiation Exposure (person-rem per unit)</td>
<td>80.00</td>
<td>31.66</td>
<td>44.75</td>
<td>107.60</td>
<td>64.80</td>
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<td>Fuel Reliability Index (microcuries per gram)</td>
<td>0.000500</td>
<td>0.000001</td>
<td>0.00003</td>
<td>0.000212</td>
<td>0.001888</td>
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<td>2-Year Reactor Trip Rate (# per 7,000 hours)</td>
<td>0.50</td>
<td>0.125</td>
<td>0.360</td>
<td>0.443</td>
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<td>3-Year Auxiliary Feedwater System Unavailability (#)</td>
<td>0.0200</td>
<td>0.0024</td>
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<td>3-Year Emergency AC Power Unavailability (#)</td>
<td>0.0250</td>
<td>0.0104</td>
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<td>0.0037</td>
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<td>3-Year High Pressure Safety Injection Unavailability (#)</td>
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<td>0.0022</td>
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<td>Rolling Average Forced Loss Rate (%)</td>
<td>1.00</td>
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<td>Rolling Average Unit Capability Factor (%)</td>
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<td>Rolling Average Chemistry Performance Indicator (Index)</td>
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<td>1.00</td>
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## 2010 Plant Level Performance Summary

### 2010 Actuals

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<th>Median</th>
<th>Pickering A</th>
<th>Pickering B</th>
<th>Darlington</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Injury Rate (#/200K hours worked)</td>
<td>0.83</td>
<td>N/A</td>
<td>0.77</td>
<td>0.80</td>
<td>0.74</td>
</tr>
<tr>
<td>Rolling Average Industrial Safety Accident Rate (#/200K hours worked)</td>
<td>0.05</td>
<td>0.10</td>
<td>0.14</td>
<td>0.07</td>
<td>0.09</td>
</tr>
<tr>
<td>Rolling Average Collective Radiation Exposure (Pent/s per unit)</td>
<td>68.64</td>
<td>96.73</td>
<td>138.30</td>
<td>93.00</td>
<td>11.55</td>
</tr>
<tr>
<td>Airborne Tritium Emissions (Curies) per unit</td>
<td>2,041</td>
<td>3,784</td>
<td>3,790</td>
<td>1,953</td>
<td>969</td>
</tr>
<tr>
<td>Fuel Reliability (micromoles per gram)</td>
<td>0.00000500</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-Year Reactor Trip Rate (# per 7,000 hours)</td>
<td>0.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Year Auxiliary Feedwater System Unavailability (%)</td>
<td>0.02000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Year Emergency AC Power Unavailability (%)</td>
<td>0.02500</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Year High Pressure Safety Injection Unavailability (%)</td>
<td>0.02000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WANO NPI (Index)</td>
<td>86.70</td>
<td>77.40</td>
<td>47.70</td>
<td>72.60</td>
<td>94.10</td>
</tr>
<tr>
<td>Rolling Average Forced Loss Rate (%)</td>
<td>1.40</td>
<td>3.35</td>
<td>22.52</td>
<td>5.06</td>
<td>1.84</td>
</tr>
<tr>
<td>Rolling Average Unit Capability Factor (%)</td>
<td>91.70</td>
<td>83.70</td>
<td>63.30</td>
<td>80.20</td>
<td>69.40</td>
</tr>
<tr>
<td>Rolling Average Chemistry Performance Indicator (Index)</td>
<td>1.000</td>
<td>1.02</td>
<td>1.24</td>
<td>1.29</td>
<td>1.03</td>
</tr>
<tr>
<td>1-Year Online Electric Maintenance work orders per unit²</td>
<td>213</td>
<td>261</td>
<td>333</td>
<td>244</td>
<td>281</td>
</tr>
<tr>
<td>1-Year Online Corrective Maintenance work orders per unit²</td>
<td>2</td>
<td>4</td>
<td>14</td>
<td>29</td>
<td>9</td>
</tr>
<tr>
<td>Value for Money</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Year Fuel Generating Costs per MWh ($ per Net MWh)</td>
<td>32.54</td>
<td>38.53</td>
<td>90.21</td>
<td>54.79</td>
<td>33.55</td>
</tr>
<tr>
<td>3-Year Non-Fuel Operating Costs per MWh ($ per Net MWh)</td>
<td>19.00</td>
<td>23.13</td>
<td>75.51</td>
<td>48.49</td>
<td>27.09</td>
</tr>
<tr>
<td>3-Year Fuel Costs per MWh ($ per Net MWh)</td>
<td>5.92</td>
<td>6.37</td>
<td>3.70</td>
<td>3.70</td>
<td>3.71</td>
</tr>
<tr>
<td>5-Year Capital Costs per MW DER (k$ per MW)</td>
<td>46.30</td>
<td>62.80</td>
<td>62.80</td>
<td>17.41</td>
<td>21.28</td>
</tr>
<tr>
<td>Human Performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-Month Human Performance Error Rate (# per 10k IEAR hours)</td>
<td>0.007800</td>
<td>0.01000</td>
<td>0.01156</td>
<td>0.009200</td>
<td>0.007000</td>
</tr>
</tbody>
</table>

**Notes:**
1. No median benchmark available.
2. 2008 data is used for non-OPG CANDU plants because 2010 data is unavailable at the time of benchmarking.
3. Last backlog benchmark in 2010 was as of June 1, 2010.

**Legend:**
- **Green** = maximum NPI points achieved or best quartile performance
- **White** = 2nd quartile performance
- **Yellow** = 3rd quartile performance
- **Red** = worst quartile performance

- **Declining Benchmark Quartile Performance vs. 2009**
- **Improving Benchmark Quartile Performance vs. 2009**
# 2011 Plant Level Performance Summary

## Safety

<table>
<thead>
<tr>
<th>Metric</th>
<th>NPI Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Injury Rate (h/200k hours worked)</td>
<td>0.00</td>
</tr>
<tr>
<td>Rolling Average Industrial Safety Accident Rate (h/200k hours worked)</td>
<td>0.20</td>
</tr>
<tr>
<td>Rolling Average Collectie Radiation Exposure (Person-rem per unit)</td>
<td>40.00</td>
</tr>
<tr>
<td>Atmospheric Tritium Emissions (Curies) per Unit</td>
<td>59.60</td>
</tr>
<tr>
<td>Fuel Reliability Index (microcuries per gram)</td>
<td>969</td>
</tr>
<tr>
<td>2-Year Reactor Trip Rate (# per 7,000 hours)</td>
<td>0.00</td>
</tr>
<tr>
<td>3-Year Auxiliary Feedwater System Unavailability (%)</td>
<td>0.0200</td>
</tr>
<tr>
<td>3-Year Emergency AC Power Unavailability (%)</td>
<td>0.0005</td>
</tr>
<tr>
<td>5-Year High Pressure Safety Injection Unavailability (%)</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

## Reliability

<table>
<thead>
<tr>
<th>Metric</th>
<th>NPI Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>WANO NPI (Index)</td>
<td>91.4</td>
</tr>
<tr>
<td>Rolling Average Forced Loss Rate (%)</td>
<td>1.14</td>
</tr>
<tr>
<td>Rolling Average Unit Capability Factor (%)</td>
<td>90.5</td>
</tr>
<tr>
<td>Rolling Average Chemistry Performance Indicator (Index)</td>
<td>1.00</td>
</tr>
<tr>
<td>1-Year On-line Definitive Maintenance Backlog (work orders per unit)</td>
<td>290</td>
</tr>
<tr>
<td>1-Year On-line Corrective Maintenance Backlog (work orders per unit)</td>
<td>33</td>
</tr>
</tbody>
</table>

## Value for Money

<table>
<thead>
<tr>
<th>Metric</th>
<th>NPI Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Year Total Generating Cost per MWh ($ per Net MWh)</td>
<td>34.21</td>
</tr>
<tr>
<td>3-Year Non-Fuel Operating Cost per MWh ($ per Net MWh)</td>
<td>20.76</td>
</tr>
<tr>
<td>2-Year Fuel Cost per MWh ($ per Net MWh)</td>
<td>6.50</td>
</tr>
<tr>
<td>5-Year Capital Cost per MW DER ($/MW)</td>
<td>48.39</td>
</tr>
</tbody>
</table>

## Human Performance

<table>
<thead>
<tr>
<th>Metric</th>
<th>NPI Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-Month Human Performance Error Rate (#/per 15K SAH hours)</td>
<td>0.00500</td>
</tr>
</tbody>
</table>

## Notes

1. No median benchmark available.
2. 2010 data is used because 2011 results were unavailable at the time of benchmarking.
4. New metrics have been implemented industry-wide to ensure more effective and accurate comparisons between utilities. Data collected is as of September 2011.

Green = maximum NPI points achieved or best quartile performance
White = 2nd quartile performance
Yellow = 3rd quartile performance
Red = worst quartile performance

Declining Benchmark Quartile Performance vs. 2010
Improving Benchmark Quartile Performance vs. 2010
# 2012 Plant Level Performance Summary

## Metric Details

<table>
<thead>
<tr>
<th>Metric</th>
<th>NPI Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td></td>
</tr>
<tr>
<td>All Injury Rate (#/200h hours worked)</td>
<td></td>
</tr>
<tr>
<td>Rolling Average Industrial Safety-Accident Rate (#/200h hours worked)</td>
<td>0.20</td>
</tr>
<tr>
<td>Rolling Average Collective Radiation Exposure (Person-rem per unit)</td>
<td>80.00</td>
</tr>
<tr>
<td>Airborne Tritium Emissions (Curies per unit)</td>
<td></td>
</tr>
<tr>
<td>Fuel Reliability Index (microcuries per gram)</td>
<td>0.000500</td>
</tr>
<tr>
<td>2-Year Reactor Trip Rate (# per 7,000 hours)</td>
<td>0.50</td>
</tr>
<tr>
<td>3-Year Auxiliary Feedwater System Unavailability (%)</td>
<td>0.0200</td>
</tr>
<tr>
<td>3-Year Emergency AC Power Unavailability (%)</td>
<td>0.0250</td>
</tr>
<tr>
<td>3-Year High Pressure Safety Injection Unavailability (%)</td>
<td>0.0200</td>
</tr>
<tr>
<td>Reliability</td>
<td></td>
</tr>
<tr>
<td>WANO NPI (Index)</td>
<td></td>
</tr>
<tr>
<td>Rolling Average Forced Loss Rate (%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Rolling Average Unit Capability Factor (%)</td>
<td>92.0</td>
</tr>
<tr>
<td>Rolling Average Chemistry Performance Indicator (Index)</td>
<td>1.01</td>
</tr>
<tr>
<td>1-Year On-line Deficient Maintenance Backlog (work orders per unit)</td>
<td></td>
</tr>
<tr>
<td>1-Year On-line Corrective Maintenance Backlog (work orders per unit)</td>
<td>222</td>
</tr>
<tr>
<td>Value for Money</td>
<td></td>
</tr>
<tr>
<td>3-Year Total Generating Cost per MWh ($ per Net MWh)</td>
<td></td>
</tr>
<tr>
<td>3-Year Non-Fuel Operating Cost per MWh ($ per Net MWh)</td>
<td>21.76</td>
</tr>
<tr>
<td>3-Year Fuel Cost per MWh ($ per Net MWh)</td>
<td>7.24</td>
</tr>
<tr>
<td>3-Year Capital Cost per MW DER ($3 per kW)</td>
<td>52.46</td>
</tr>
<tr>
<td>Human Performance</td>
<td></td>
</tr>
<tr>
<td>18-Month Human Performance Error Rate (# per 10k (5,545 hours))</td>
<td>0.00400</td>
</tr>
</tbody>
</table>

## 2012 Actuals

<table>
<thead>
<tr>
<th>Metric</th>
<th>Best Quartile</th>
<th>Median</th>
<th>Pickering</th>
<th>Darlington</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Injury Rate (#/200h hours worked)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rolling Average Industrial Safety-Accident Rate (#/200h hours worked)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rolling Average Collective Radiation Exposure (Person-rem per unit)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Airborne Tritium Emissions (Curies per unit)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel Reliability Index (microcuries per gram)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-Year Reactor Trip Rate (# per 7,000 hours)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Year Auxiliary Feedwater System Unavailability (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Year Emergency AC Power Unavailability (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Year High Pressure Safety Injection Unavailability (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Notes

1. No median benchmark available.
2. 2011 data is used because 2012 results were unavailable at the time of benchmarking.

New metrics have been implemented industry-wide to ensure more effective and accurate comparisons between utilities. Data collected is as of December.

- **Green** = maximum NPI points achieved or best quartile performance
- **White** = 2nd quartile performance
- **Yellow** = 3rd quartile performance
- **Red** = worst quartile performance

| Declining Benchmark Quartile Performance vs. 2011 |
| Improving Benchmark Quartile Performance vs. 2011 |
# 2013 Plant Level Performance Summary

## Safety

<table>
<thead>
<tr>
<th>Metric</th>
<th>NPI Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Injury Rate (#/200k hours worked)</td>
<td>0.20</td>
</tr>
<tr>
<td>Rolling Average Industrial Safety Accident Rate (#/200k hours worked)</td>
<td>80.00</td>
</tr>
<tr>
<td>Rolling Average Collective Radiation Exposure (Person-cm per unit)</td>
<td>57.64</td>
</tr>
<tr>
<td>Airborne Tritium Emissions (Curies per unit)</td>
<td>1.014</td>
</tr>
<tr>
<td>Fuel Reliability Index (microcuries per gram)</td>
<td>0.000500</td>
</tr>
<tr>
<td>2-Year Reactor Trip Rate (#/7,000 hours)</td>
<td>0.50</td>
</tr>
<tr>
<td>3-Year Auxiliary Feedwater System Unavailability (%)</td>
<td>0.0200</td>
</tr>
<tr>
<td>5-Year Emergency AC Power Unavailability (%)</td>
<td>0.0250</td>
</tr>
<tr>
<td>5-Year High Pressure Safety Injection Unavailability (%)</td>
<td>0.0200</td>
</tr>
</tbody>
</table>

## Reliability

<table>
<thead>
<tr>
<th>Metric</th>
<th>NPI Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>WANO NPI Index (Index)</td>
<td>90.7</td>
</tr>
<tr>
<td>Rolling Average Forced Loss Rate (%)</td>
<td>0.58</td>
</tr>
<tr>
<td>Rolling Average Unit Capability Factor (%)</td>
<td>92.0</td>
</tr>
<tr>
<td>Rolling Average Chemistry Performance Indicator (Index)</td>
<td>1.01</td>
</tr>
<tr>
<td>1-Year On-line Deficient Maintenance Backlog (work orders per unit)</td>
<td>209.0</td>
</tr>
<tr>
<td>1-Year On-line Corrective Maintenance Backlog (work orders per unit)</td>
<td>17.0</td>
</tr>
</tbody>
</table>

## Value for Money

<table>
<thead>
<tr>
<th>Metric</th>
<th>NPI Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Year Total Generating Cost per MWh ($/per Net MWh)</td>
<td>38.79</td>
</tr>
<tr>
<td>3-Year Non-Fuel Operating Cost per MWh ($/per Net MWh)</td>
<td>22.76</td>
</tr>
<tr>
<td>3-Year Fuel Cost per MWh ($/per Net MWh)</td>
<td>7.87</td>
</tr>
<tr>
<td>3-Year Capital Cost per MW DER ($/per MW)</td>
<td>50.88</td>
</tr>
</tbody>
</table>

## Human Performance

<table>
<thead>
<tr>
<th>Metric</th>
<th>NPI Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-Month Human Performance Error Rate (# per 10k ISAR hours)</td>
<td>0.00200</td>
</tr>
</tbody>
</table>

### Notes

1. No median benchmark available.
2. 2012 data is used because 2013 results were unavailable at the time of benchmarking.

Colors:
- Green = maximum NPI results achieved or 1st quartile performance
- White = 2nd quartile performance
- Yellow = 3rd quartile performance
- Red = 4th quartile performance

Declining Benchmark Quartile Performance vs. 2012
- Improving Benchmark Quartile Performance vs. 2012
# 2014 Plant Level Performance Summary

## Safety

<table>
<thead>
<tr>
<th>Metric</th>
<th>NPI Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Injury Rate (#/200k hours worked)</td>
<td>0.20</td>
</tr>
<tr>
<td>Rolling Average² Industrial Safety Accident Rate (#/200k hours worked)</td>
<td>0.00</td>
</tr>
<tr>
<td>Rolling Average² Collective Radiation Exposure (Person-rem per unit)</td>
<td>42.25</td>
</tr>
<tr>
<td>Arsine Tritium Emissions (Curies) per Unit⁰</td>
<td>1.014</td>
</tr>
<tr>
<td>Fuel Reliability Index (microcuries per gram)</td>
<td>0.0000500</td>
</tr>
<tr>
<td>2-Year Reactor Trip Rate (# per 7,000 hours)</td>
<td>0.00</td>
</tr>
<tr>
<td>3-Year Auxiliary Feedwater System Unavailability (#)</td>
<td>0.0200</td>
</tr>
<tr>
<td>3-Year Emergency AC Power Unavailability (#)</td>
<td>0.0250</td>
</tr>
<tr>
<td>3-Year High Pressure Safety Injection Unavailability (#)</td>
<td>0.0200</td>
</tr>
</tbody>
</table>

## Reliability

<table>
<thead>
<tr>
<th>Metric</th>
<th>2014 Actuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>WANO NPI (Index)</td>
<td></td>
</tr>
<tr>
<td>Rolling Average² Forced Loss Rate (%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Rolling Average² Unit Capability Factor (%)</td>
<td>92.0</td>
</tr>
<tr>
<td>Rolling Average² Chemistry Performance Indicator (Index)</td>
<td>1.01</td>
</tr>
<tr>
<td>1-Year On-line Deficient Maintenance Backlog (work orders per unit)</td>
<td>159</td>
</tr>
<tr>
<td>1-Year On-line Corrective Maintenance Backlog (work orders per unit)</td>
<td>11</td>
</tr>
</tbody>
</table>

## Value for Money

<table>
<thead>
<tr>
<th>Metric</th>
<th>2014 Actuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Year Total Generating Cost per MWh ($/per Net MWh)</td>
<td>38.71</td>
</tr>
<tr>
<td>3-Year Non-Fuel Operating Cost per MWh ($/per Net MWh)</td>
<td>22.68</td>
</tr>
<tr>
<td>3-Year Fuel Cost per MWh ($/per Net MWh)</td>
<td>8.08</td>
</tr>
<tr>
<td>3-Year Capital Cost per MW DER ($/per MW)</td>
<td>49.08</td>
</tr>
</tbody>
</table>

## Human Performance

<table>
<thead>
<tr>
<th>Metric</th>
<th>2014 Actuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-Month Human Performance Error Rate (# per 10k IBAR and contractor hours)</td>
<td>0.002000</td>
</tr>
</tbody>
</table>

### Notes

1. No median benchmark available.
2. Indicates a 2-Year Rolling Average for Pickering and a 3-Year Rolling Average for Darlington.
3. 2013 data is used because 2013 and 2014 results were unavailable at the time of benchmarking.

### Color Coding
- Green = maximum NPI results achieved or best quartile performance
- White = 2nd quartile performance
- Yellow = 3rd quartile performance
- Red = 4th quartile performance

### Benchmark Quartile Performance
- → Declining Benchmark Quartile Performance vs. 2013
- ↑ Improving Benchmark Quartile Performance vs. 2013
### 2015 Plant Level Performance Summary

#### Metric | NPI Max | Best Quartile | Median | Pickering | Darlington
--- | --- | --- | --- | --- | ---
**Safety**
- All Injury Rate (#/200k hours worked) | 0.69 | N/A | 0.44 | 0.22 | 0.05 | 0.08
- Rolling Average Industrial Safety Accident Rate (#/200k hours worked) | 0.20 | 0.00 | 0.00 | 0.17 | 0.13 | 0.06 | 0.08
- Rolling Average Collective Radiation Exposure (Person-rem per unit) | 80.00 | 38.17 | 48.53 | 97.72 | 79.56
- Airborne Tritium Emissions (Curies) per Unit | 1,192 | 1,784 | 2,409 | 1,313 | 0.000001 | 0.000001 | 0.000001 | 0.000001 | 0.000421 | 0.000122
- Fuel Reliability Index (microcuries per gram) | 0.000500 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000
- 2-Year Reactor Trip Rate (# per 7,000 hours) | 0.50 | 0.00 | 0.00 | 0.17 | 0.13 | 0.06 | 0.08 | 0.000000 | 0.000000 | 0.000000 | 0.000000
- 3-Year Auxiliary Feedwater System Unavailability (#) | 0.0200 | 0.0200 | 0.0200 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000
- 3-Year Emergency AC Power Unavailability (#) | 0.0250 | 0.0250 | 0.0250 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000
- 3-Year High Pressure Safety Injection Unavailability (#) | 0.0200 | 0.0200 | 0.0200 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000

#### Reliability
- WANO NPI (Index) | 93.5 | 89.4 | 68.5 | 83.7 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00
- Rolling Average Forced Loss Rate (%) | 0.38 | 1.46 | 6.85 | 3.65 | 0.38 | 1.46 | 6.85 | 3.65 | 0.38 | 1.46 | 6.85 | 3.65
- Rolling Average Unit Capability Factor (%) | 92.0 | 91.31 | 88.05 | 83.96 | 92.0 | 91.31 | 88.05 | 83.96 | 92.0 | 91.31 | 88.05 | 83.96
- Rolling Average Chemistry Performance Indicator (Index) | 1.01 | 1.00 | 1.00 | 1.00 | 1.01 | 1.00 | 1.00 | 1.00 | 1.01 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00
- 1-Year On-line Deficient Maintenance Backlog (work orders per unit) | 116 | 160 | 251 | 174 | 116 | 160 | 251 | 174 | 116 | 160 | 251 | 174 | 116 | 160 | 251 | 174
- 1-Year On-line Corrective Maintenance Backlog (work orders per unit) | 7 | 15 | 125 | 24 | 7 | 15 | 125 | 24 | 7 | 15 | 125 | 24 | 7 | 15 | 125 | 24

#### Value for Money
- 3-Year Total Generating Cost per MWh ($) per Net MWh) | 38.93 | 44.38 | 67.36 | 44.38 | 38.93 | 44.38 | 67.36 | 44.38 | 38.93 | 44.38 | 67.36 | 44.38
- 3-Year Non-Fuel Operating Cost per MWh ($) per Net MWh) | 22.60 | 25.89 | 56.49 | 33.19 | 22.60 | 25.89 | 56.49 | 33.19 | 22.60 | 25.89 | 56.49 | 33.19
- 3-Year Fuel Cost per MWh ($) per Net MWh) | 7.97 | 8.73 | 5.71 | 5.18 | 7.97 | 8.73 | 5.71 | 5.18 | 7.97 | 8.73 | 5.71 | 5.18 | 7.97 | 8.73 | 5.71 | 5.18
- 3-Year Capital Cost per MW DER ($ per MW) | 47.33 | 63.63 | 33.86 | 43.52 | 47.33 | 63.63 | 33.86 | 43.52 | 47.33 | 63.63 | 33.86 | 43.52

#### Human Performance
- 18-Month Human Performance Error Rate (# per 10k ISAR and contractor hours) | 0.00100 | 0.00300 | 0.00550 | 0.00310 | 0.00100 | 0.00300 | 0.00550 | 0.00310

### Notes
1. No median benchmark available.
2. Indicates a 2-Year Rolling Average for Pickering and a 3-Year Rolling Average for Darlington.
3. 2014 data is used because 2015 results were unavailable at the time of benchmarking.

---

Green = maximum NPI results achieved or best quartile performance
White = 2nd quartile performance
Yellow = 3rd quartile performance
Red = 4th quartile performance

Declining Benchmark Quartile Performance vs. 2014
Improving Benchmark Quartile Performance vs. 2014
# Table of Contents

1.0 EXECUTIVE SUMMARY ...................................................................................................................................................... 1

2.0 SAFETY ................................................................................................................................................................................ 7

   METHODOLOGY AND SOURCES OF DATA .......................................................................................................................... 7

   ALL INJURY RATE ........................................................................................................................................................................ 8

   ROLLING AVERAGE INDUSTRIAL SAFETY ACCIDENT RATE ............................................................................................ 10

   ROLLING AVERAGE COLLECTIVE RADIATION EXPOSURE ...................................................................................................... 13

   AIRBORNE TRITIUM EMISSIONS PER IN SERVICE UNIT ........................................................................................................ 19

   FUEL RELIABILITY INDEX .......................................................................................................................................................... 22

   2-YEAR UNPLANNED AUTOMATIC REACTOR TRIPS .............................................................................................................. 26

   3-YEAR AUXILIARY FEEDWATER SAFETY SYSTEM UNAVAILABILITY ........................................................................... 31

   3-YEAR EMERGENCY AC POWER SAFETY UNAVAILABILITY ................................................................................................ 35

   3-YEAR HIGH PRESSURE SAFETY INJECTION ........................................................................................................................ 38

3.0 RELIABILITY .......................................................................................................................................................................... 42

   METHODOLOGY AND SOURCES OF DATA .............................................................................................................................. 42

   WANO NUCLEAR PERFORMANCE INDEX .............................................................................................................................. 43

   ROLLING AVERAGE FORCED LOSS RATE ............................................................................................................................... 48

   ROLLING AVERAGE UNIT CAPABILITY FACTOR ...................................................................................................................... 53

   ROLLING AVERAGE CHEMISTRY PERFORMANCE INDICATOR .............................................................................................. 57

   1-YEAR ON-LINE DEFICIENT MAINTENANCE BACKLOG ..................................................................................................... 62

   1-YEAR ON-LINE CORRECTIVE MAINTENANCE BACKLOG ................................................................................................... 64

4.0 VALUE FOR MONEY ................................................................................................................................................................. 66

   METHODOLOGY AND SOURCES OF DATA ................................................................................................................................. 66

   3-YEAR TOTAL GENERATING COST PER MWH .................................................................................................................... 67

   3-YEAR NON-FUEL OPERATING COST PER MWH ................................................................................................................ 72

   3-YEAR FUEL COST PER MWH ................................................................................................................................................. 76

   3-YEAR CAPITAL COST PER MW DER ................................................................................................................................... 79

5.0 HUMAN PERFORMANCE ......................................................................................................................................................... 83

   METHODOLOGY AND SOURCES OF DATA .................................................................................................................................. 83

   18-MONTH HUMAN PERFORMANCE ERROR RATE ............................................................................................................. 83

6.0 MAJOR OPERATOR SUMMARY ............................................................................................................................................... 87

   PURPOSE .................................................................................................................................................................................... 87

   WANO NUCLEAR PERFORMANCE INDEX ANALYSIS ........................................................................................................... 87

   UNIT CAPABILITY FACTOR ANALYSIS .................................................................................................................................. 89

   TOTAL GENERATING COST/MWH ANALYSIS ........................................................................................................................... 90

7.0 APPENDIX .................................................................................................................................................................................. 93
1.0 EXECUTIVE SUMMARY

Background

This report presents a comparison of Ontario Power Generation (OPG) Nuclear’s performance to that of nuclear industry peer groups both in Canada and worldwide. The report was prepared as part of OPG Nuclear’s commitment to “performance informed” business management. The results of this report are used during business planning to drive top-down target setting with business improvement as the objective.

Benchmarking involves three key steps: (a) identifying key performance metrics to be benchmarked, (b) identifying the most appropriate industry peer groups for comparison, and (c) preparing supporting analyses and charts. OPG Nuclear personnel responsible for specific performance metrics assisted in the development of the supporting analyses by providing insight into the factors contributing to current OPG Nuclear performance.

Performance Indicators

Good performance indicators used for benchmarking are defined as metrics with standard definitions, reliable data sources, and utilization across a representative portion of the industry. Good indicators allow for benchmarking to be repeated year after year in order to track performance and improvement. Additionally, when selecting an appropriate and relevant set of metrics, a balanced approach covering all key areas of the business is essential. In accordance with these criteria, 20 key performance indicators have been selected for comparison to provide a balanced view of performance and for which consistent, comparable data is available. These indicators are listed in Table 1 and are divided into four categories aligned with OPG Nuclear’s four cornerstones of safety, reliability, value for money, and human performance.

Industry Peer Groups

Peer groups were selected based on performance indicators widely utilized within the nuclear industry with consideration for plant technology to ensure suitable comparisons. Overall, six different peer groups were used as illustrated in Table 1 and panel members are detailed in Tables 7-12 of Section 7.0.
Data provided by the World Association of Nuclear Operators (WANO) is the primary source of benchmarking data for operational performance (Safety and Reliability) indicators. Eleven out of the twenty benchmarking metrics have been compared to the WANO/COG CANDU panel. All WANO performance indicators are presented at the unit and plant levels except the Industrial Safety Accident Rate and Emergency AC Power Unavailability which are only measured at the plant level.

Different peer groups were used for a few of the specialized operating metrics which are not tracked through WANO. For maintenance work order backlogs, the peer group consisted of all plants participating in the Institute of Nuclear Power Operations (INPO) AP-928 working group. For human performance comparisons, data was obtained from INPO. For the All Injury Rate metric, the Canadian Electricity Association (CEA) panel was used.

For financial performance comparisons, data compiled by the Electric Utility Cost Group (EUCG) was used. EUCG is a nuclear industry operating group and the recognized source for cost benchmark information. EUCG cost indicators are presented at the plant level and compared on a net megawatt hour generated basis (to be referred to as MWh subsequently) and on a per megawatt (MW) design electrical rating (DER) basis. The only CANDU operators reporting data to EUCG in 2015 were OPG Nuclear and Bruce Power which is not a sufficiently large panel to provide a basis for comparison; hence, the data sets were not limited to a CANDU specific panel. Should more CANDU operators choose to join EUCG in the future, comparisons to a CANDU specific panel will be reconsidered.

All data provided by the peer groups (WANO, INPO, CEA, and EUCG) is confidential. A redacted version of this report, which removes individual plant and unit names, is available from WANO/COG.
Nuclear Business Planning and Benchmarking should there be a requirement to publicly release this report.

Of the 20 metrics listed in Table 1, three are used to provide important information regarding major operator performance. These are the WANO Nuclear Performance Index (NPI), Unit Capability Factor (UCF), and Total Generating Cost (TGC) per MWh.

Further information on benchmarking of major operators is provided in Section 6.0 of this report.
Benchmarking Results – Plant Level Summary

Table 2 provides a summary of OPG Nuclear’s performance compared to benchmark results.

**Table 2: Plant Level Performance Summary**

<table>
<thead>
<tr>
<th>Metric</th>
<th>NPI Max</th>
<th>Best Quartile</th>
<th>Median</th>
<th>Pickering</th>
<th>Darlington</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Safety</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Injury Rate (#/200k hours worked)</td>
<td>0.69</td>
<td>0.66</td>
<td>0.44</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>Rolling Average² Industrial Safety Accident Rate (#/200k hours worked)</td>
<td>0.20</td>
<td>0.00</td>
<td>0.05</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>Rolling Average² Collective Radiation Exposure (Person-rem per unit)</td>
<td>80.00</td>
<td>48.53</td>
<td>97.72</td>
<td>79.55</td>
<td></td>
</tr>
<tr>
<td>Airborne Tritium Emissions (Curies) per Unit</td>
<td>1,192</td>
<td>1,784</td>
<td>2,409</td>
<td>1,313</td>
<td></td>
</tr>
<tr>
<td>Fuel Reliability Index (microcuries per gram)</td>
<td>0.000500</td>
<td>0.000001</td>
<td>0.000421</td>
<td>0.000122</td>
<td></td>
</tr>
<tr>
<td>2-Year Reactor Trip Rate (# per 7,000 hours)</td>
<td>0.50</td>
<td>0.00</td>
<td>0.17</td>
<td>0.13</td>
<td></td>
</tr>
<tr>
<td>3-Year Auxiliary Feedwater System Unavailability (#)</td>
<td>0.0200</td>
<td>0.0050</td>
<td>0.0115</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>3-Year Emergency AC Power Unavailability (#)</td>
<td>0.0250</td>
<td>0.0041</td>
<td>0.0030</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>3-Year High Pressure Safety Injection Unavailability (#)</td>
<td>0.0200</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td><strong>Reliability</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WANO NPI (Index)</td>
<td>93.5</td>
<td>89.4</td>
<td>68.5</td>
<td>83.7</td>
<td></td>
</tr>
<tr>
<td>Rolling Average² Forced Loss Rate (%)</td>
<td>0.38</td>
<td>1.46</td>
<td>6.85</td>
<td>3.65</td>
<td></td>
</tr>
<tr>
<td>Rolling Average² Unit Capability Factor (%)</td>
<td>92.00</td>
<td>88.05</td>
<td>77.32</td>
<td>83.96</td>
<td></td>
</tr>
<tr>
<td>Rolling Average² Chemistry Performance Indicator (Index)</td>
<td>1.01</td>
<td>1.00</td>
<td>1.06</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>1-Year On-line Deficient Maintenance Backlog (work orders per unit)</td>
<td>116</td>
<td>160</td>
<td>251</td>
<td>174</td>
<td></td>
</tr>
<tr>
<td>1-Year On-line Corrective Maintenance Backlog (work orders per unit)</td>
<td>7</td>
<td>15</td>
<td>125</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td><strong>Value for Money</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Year Total Generating Cost per MWh ($ per Net MWh)</td>
<td>38.93</td>
<td>44.38</td>
<td>67.36</td>
<td>44.38</td>
<td></td>
</tr>
<tr>
<td>3-Year Non-Fuel Operating Cost per MWh ($ per Net MWh)</td>
<td>22.60</td>
<td>25.89</td>
<td>56.49</td>
<td>33.19</td>
<td></td>
</tr>
<tr>
<td>3-Year Fuel Cost per MWh ($ per Net MWh)</td>
<td>7.97</td>
<td>8.73</td>
<td>5.71</td>
<td>5.18</td>
<td></td>
</tr>
<tr>
<td>3-Year Capital Cost per MW DER (k$ per MW)</td>
<td>47.33</td>
<td>63.63</td>
<td>33.86</td>
<td>43.52</td>
<td></td>
</tr>
<tr>
<td><strong>Human Performance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-Month Human Performance Error Rate (# per 10k ISAR and contractor hours)</td>
<td>0.0010</td>
<td>0.0030</td>
<td>0.0055</td>
<td>0.0031</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. No median benchmark available.
2. Indicates a 2-Year Rolling Average for Pickering and a 3-Year Rolling Average for Darlington.
3. 2014 Industry data is used because 2015 results were unavailable at the time of benchmarking.

**Legend:**
- Green = maximum NPI results achieved or best quartile performance
- White = 2nd quartile performance
- Yellow = 3rd quartile performance
- Red = 4th quartile performance
- Declining Benchmark Quartile Performance vs. 2014
- Improving Benchmark Quartile Performance vs. 2014
Since achievement of maximum WANO Nuclear Performance Index (NPI) results is recognized within the industry as a measure of desirable performance, performance gaps are assessed against the full WANO NPI result thresholds in addition to median and best quartile performance. Green shaded boxes indicate that maximum WANO NPI performance results were achieved or that performance is first quartile (also referred to in this report as “best” or “top” quartile), which is at or better than the best quartile threshold value. White shaded boxes indicate that performance is second quartile (also referred in this report as “median”), which is at or better than the median threshold value but below best quartile. Yellow shaded boxes indicate that performance is at third quartile, which is at or better than the last quartile threshold value but below the median value. Red shaded boxes indicate that performance is at fourth quartile (also referred in this report as “last”), which is below the third quartile threshold value. Table 2 also identifies, by Nuclear cornerstone, where there has been either improving or declining benchmarking quartile performance relative to 2014 benchmarking results.

For Safety, overall, OPG’s nuclear generating stations continue to demonstrate strong performance. OPG Nuclear continues to demonstrate strong performance for the All Injury Rate and the Industrial Safety Accident Rate. Pickering improved in several Safety cornerstone metrics such as the Fuel Reliability Index to top quartile and 2-Year Reactor Trip Rate from 0.36 to 0.17. The Pickering station remained in the last quartile for Collective Radiation Exposure. The Airborne Tritium Emissions indicator saw a decline in industry benchmark ranking at Pickering due to an increase in heavy water leaks, poor vapour recovery dryer performance and the unavailability of the Tritium Removal Facility. Darlington achieved maximum NPI results or best quartile performance for all NPI sub-metrics under the Safety cornerstone.

For Reliability, Pickering remained in the fourth quartile in 2015 when compared to other CANDU plants for the WANO Nuclear Performance Index, Forced Loss Rate (FLR), Unit Capability Factor (UCF) and Chemistry Performance Indicator. Darlington NPI performance fell from the second quartile in 2014 to the third quartile in 2015 as a result of higher FLR and the four unit Vacuum Building Outage resulting in lower unit capability factor. Darlington FLR performance remained in the third quartile when compared to 2014. The Darlington Chemistry Performance Indicator once again remained in best quartile and achieved maximum NPI points. As for the On-line Deficient Maintenance Backlogs, improvement in industry quartiles resulted in lower quartile rankings at both Pickering and Darlington. Darlington fell to the third quartile ranking for the On-line Corrective Maintenance backlogs in 2015 due to an increase in work orders per unit and improvement in industry median quartiles.

Under the Value for Money cornerstone, Pickering remained in the worst quartile for performance in Total Generating Cost (TGC) per MWh and Non-Fuel Operating Cost (NFOC) per MWh. Pickering maintained best quartile performance in Fuel Cost per MWh and Capital Cost per MW DER. Darlington’s TGC per MWh fell from the best quartile performance in 2014 to median quartile in 2015. The drop to the last quartile performance in NFOC per MWh was contrasted by sustained top quartile performance in Fuel Cost per MWh and Capital Cost per MW DER at Darlington in 2015. Darlington had the second lowest Fuel Cost per MWh in its industry peer group, while Pickering had the fourth lowest.
In the area of Human Performance, Pickering and Darlington improved their human performance error rate and Pickering improved to the third quartile in 2015, due to an increased focus on initiatives to drive performance.

Report Structure

Sections 2.0 to 5.0 of the report focus on the four OPG Nuclear cornerstone areas, with detailed comparisons at the plant, and where applicable, unit level. Each indicator is displayed graphically from best to worst plants/units (in bar chart format) for the most recent year in which data is available. Zero values are excluded from all calculations except where zero is a valid result.

Next, the historical trend is graphed (in line chart format) using data for the last few years (depending upon availability and metric). Each graph also includes median and best quartile threshold values, and for some WANO operating metrics, the values required to achieve full WANO NPI results.

Following the graphical representation, performance observations are documented as well as insights into the key factors driving performance at OPG’s nuclear generating stations.

Section 6.0 of the report provides an operator level summary across a few key metrics. The operator level analysis looks at fleet operators, primarily across North America, utilizing a simple average of the results (mean) from each of their units/plants. Operations related (WANO NPI and UCF) results were averaged at the unit level and cost related (TGC per MWh) results were averaged at the plant level. The list and ranking of operators, for the Nuclear Performance Index and Unit Capability Factor, have been updated to reflect industry developments.

Section 7.0 provides an appendix of supporting information, including common acronyms, definitions, panel composition details and a WANO NPI plant level performance summary of OPG nuclear stations against the North American panel.
2.0 SAFETY

Methodology and Sources of Data

The majority of safety metrics were calculated using data from WANO. Data labelled as invalid by WANO was excluded from all calculations. Indicator values of zero are not plotted or included in calculations except in cases where zero is a valid result. Current data is obtained and consolidated with previous benchmarking data.

The All Injury Rate was calculated using data from the Canadian Electricity Association (CEA). Median information and individual company information was not available for this metric; therefore, only trend and best quartile information is presented. The peer group for this metric is limited to Group I members of CEA for 2011-2015 and Group I and II members for the 2010 period (Section 7.0, Table 10).

Airborne Tritium Emissions per unit data was collected from the CANDU Owners Group (COG) for 2010 to 2014 as displayed in the historical trend line chart. Industry data for 2015 was unavailable at the time of benchmarking. The peer group for this metric is all CANDUs who are members of COG. The bar chart associated with this metric displays graphically the plant performance from best to worst results using 2015 data for OPG stations and 2014 data for all other benchmarked stations that were in service over that period of time. 2014 is the most recent benchmark data with the exception of the one plant, which 2012 is the most recent data. As such, the plant has been excluded from the Airborne Tritium Emissions benchmarking.

Discussion

Nine metrics are included in this benchmarking report to reflect safety performance, including seven of the ten metrics which comprise the WANO Nuclear Performance Index: Industrial Safety Accident Rate, Collective Radiation Exposure, Fuel Reliability Index, Automatic Reactor Trips, Auxiliary Feedwater Safety System Unavailability, Emergency AC Power Safety System Unavailability, and High Pressure Safety Injection Unavailability. The remaining WANO NPI metrics are included in Section 3.0 under the Reliability cornerstone. In addition to the WANO sub-indicators listed above, the CEA All Injury Rate and the COG Airborne Tritium Emissions per unit are included in this section of the report.

Although Pickering’s AIR performance declined in 2015, overall OPG’s performance was excellent achieving top quartile ranking. Pickering continued to show maximum WANO NPI results or top quartile performance for six other metrics under the Safety cornerstone, third quartile performance for Airborne Tritium Emissions, and worst quartile performance for the Collective Radiation Exposure. Darlington showed very strong performance, achieving maximum NPI results (and/or best quartile ranking for 2015) for all NPI safety metrics. Darlington Airborne Tritium Emissions remained in the second quartile in 2015.
All Injury Rate

All Injury Rate (per 200k Worked Hours)
Canadian Electricity Association Groups I & II Members (2010) and Group I Members Only (2011-2015)
Observations – All Injury Rate (AIR) (Canadian Electricity Association – CEA)

2015 (Annual Value)

- Pickering, Darlington, and OPG Nuclear as a fleet all performed better than the CEA top quartile of 0.69.
- Darlington’s AIR injuries decreased from four in 2014 to three in 2015 resulting in an improved AIR from 0.31 in 2014 to 0.22 in 2015.
- Pickering’s AIR injuries increased from four in 2014 to eight in 2015 resulting in a setback in AIR from 0.22 in 2014 to 0.44 in 2015. Four out of the eight AIR injuries seen in 2015 are associated with routine activities or situational awareness. Initiatives to improve performance in these areas are shown under ‘Factors Contributing to Performance’
- OPG benchmarks against CEA Group 1 (a sub-set of all CEA members), which incorporates 10 organizations with more than 1500 employees, including most provincial utilities.

Trend

- While the industry Best Quartile has improved steadily over the review period; it has not improved to the same extent as Pickering, Darlington and OPG Nuclear.
- OPG Nuclear recorded its best AIR performance in the company’s history in 2014. Its AIR performance has regressed in 2015 but it continues to demonstrate steady improvement when extended over the six year review period.
- Pickering, Darlington and OPG Nuclear as a fleet have all shown significant improvements in performance since 2010.
- Pickering Nuclear had a successful WANO evaluation in 2015 and Darlington Nuclear in 2016 with zero areas for improvement found for Industrial Safety.

Factors Contributing to Performance

- OPG encourages a proactive reporting culture that seeks to identify hazards and addresses them, before they lead to employee injuries. Proactive reporting is tracked, trended and managed via the Station Condition Record process.
- OPG Nuclear continues to utilize and promote its “Situational Awareness” program which works to support employees in identifying and addressing changing and/or distracted work conditions that could lead to hazardous situations.
- OPG launched the Total Health Program in 2014, which supports employees and their families in their efforts to achieve an optimal level of health and functioning, primarily through health education, health promotion, disease and injury prevention, and crisis intervention. The Total Health Program incorporates mental health as a key component.
- To further improve performance, OPG Nuclear is implementing an initiative in 2016 to address injuries that can result from ‘routine activities.’ Routine activities are being defined as those injuries that did not occur at a job site or while engaged in specific work task activities. The actions from this initiative aim to reduce distractions so that employees continue their focus on safety at all times.
Rolling Average Industrial Safety Accident Rate

2015 Rolling Average Industrial Safety Accident Rate (per 200,000 man-hours worked)

North American PWR & PHWR Plant Level Benchmarking

Accidents per 200,000 Man-Hours Worked
Rolling Average Industrial Safety Accident Rate (per 200k man-hours worked)
North American PWR & PHWR Plant Level Benchmarking

Restricted Duty + Lost Time Accidents per 200k Worked Hours

2010 2011 2012 2013 2014 2015

Good

DN Median Best Quartile Max. NPI PN
Observations – Rolling Average Industrial Safety Accident Rate (ISAR) (World Association of Nuclear Operators - WANO)

2015 (Rolling 2 Year Average Pickering, Rolling 3 Year Average Darlington)

- The Industrial Safety Accident Rate (ISAR) incorporates all lost time injuries and restricted work injuries incurred by OPG employees working on the site.
- For reporting the ISAR, a 2-year rolling average was used for all panel members with the exception of the Darlington station which follows a 3-year outage cycle. This is consistent with the World Association of Nuclear Operators (WANO) Nuclear Performance Index (NPI) reporting guidelines.
- WANO top quartile in 2015 remained unchanged from 2014 at 0.00 (i.e. zero ISAR events). Median performance was 0.00, which was an improvement from 0.02 in 2014.
- Both Pickering and Darlington achieved maximum NPI points for the ISAR in 2015.
- Pickering ISAR performance degraded from 2014 to 2015 (0.03 to 0.05).
- Darlington ISAR performance degraded from 2014 to 2015 (0.06 to 0.08).
- Darlington and Pickering ISAR did not meet the WANO median or top quartile in 2015.

Trend

- The ISAR median and best quartile has improved over the past six years. The industry best quartile has maintained the value of zero for the past five years and the median is at zero for the first time.
- Darlington’s ISAR rolling average has increased slightly to 0.08 but continues to show general improved performance over the past four years.
- Pickering’s ISAR rolling average increased slightly to 0.05 in 2015 due to the one ISAR injury in that year compared to zero injuries in 2013.

Factors Contributing to Performance

- ISAR is a measure of “permanent utility personnel” and does not include contractors. Many of the utilities in the benchmarking group utilize contractors to a greater extent than OPG Nuclear for higher risk work activities (e.g. outages). Therefore this can negatively impact OPG Nuclear’s ISAR in comparison to the reported industry benchmark quartiles.
- OPG Nuclear continues to monitor performance trends in the area of conventional safety and implements action plans to support continuous improvement. A new initiative to address injuries from ‘routine activities’ defined as those injuries that did not occur at a job site or while engaged in specific work task activities is underway for 2016.
- Additionally, an ongoing major initiative is to improve “Situational Awareness”, which works to support employees in identifying and addressing changing and/or distracted work conditions that could lead to hazardous situations.
Rolling Average Collective Radiation Exposure

2015 Rolling Average Collective Radiation Exposure (Person-Rem per Unit)
CANDU Plant Level Benchmarking

- Median: 48.53
- Best Quartile: 38.17

Pickering
Darlington

Max. NPI
Threshold = 80

Person-Rem per unit
2015 Rolling Average Collective Radiation Exposure (Person-Rem per Unit)
CANDU Unit Level Benchmarking

Median: 73.80

Best Quartile: 38.31

Max. NPI Threshold = 80
Observations – Rolling Average Collective Radiation Exposure (CANDU)

- Collective Radiation Exposure (CRE) is an industry composite indicator encompassing external and internal collective whole body radiation dose.
- The industry uses a two or three year rolling average (based on the site outage cycle) to define the CRE performance for a given year. Darlington follows a 3-year outage cycle and Pickering and other panel members are on a 2-year outage cycle. The following factors play a significant role in the CANDU reactors’ CRE performance: the number of planned outages, outage scope and duration, tritiated ambient air in accessible and access controlled areas, effectiveness of mitigation measures and initiatives being implemented to reduce identified sources of radiological hazards, and human performance during execution of radiological tasks.

2015 (Rolling 2 Year Average Pickering, Rolling 3 Year Average Darlington)

- The Pickering plant-level rolling average dose performance value of 97.72 person-rem/unit was worse than the industry plant-level median value of 48.53 person-rem/unit.
- The Pickering unit-level rolling average performance was worse than the industry unit-level median value of 73.80 person-rem/unit for five Pickering units while one unit achieved median performance.
- The number of planned outages, as well as scope and duration significantly contributed to this level of plant and unit rolling average CRE performance. In general, Pickering has three major planned outages per year; Darlington averages 1.3 outages per year over the three year outage cycle.
- The Darlington plant-level rolling average dose performance value of 79.55 person-rem/unit achieved maximum NPI points of 80.0 person-rem/unit. This result is worse than the industry plant-level median value of 48.53 person-rem/unit.
- The Darlington unit-level rolling average dose performance was worse than the industry unit-level median value of 73.80 person-rem/unit for three Darlington units while one unit achieved median performance.
Trend

- Pickering plant-level performance has improved sharply and steadily from 2012 to 2014, while performance declined in 2015. The rolling average is still worse than median due to scope increases during outages and long outage duration.
- Pickering unit-level performance has remained relatively flat over the review period.
- The Darlington plant-level dose has been increasing since 2012 and because the median value dose has significantly decreased in the same time period, Darlington now finds itself above the industry median. This performance is due to increased outage scope, including both planned and unplanned outages as well as prerequisite work associated with refurbishment activities.
- Darlington units as a whole have performed near the industry median over the review period.

Factors Contributing to Performance Rolling Average Collective Radiation Exposure (CANDU)

Best Practices

- The following list represents common practices that demonstrate continuous improvement and help maintain good CRE performance for CANDU type reactors:
  - Robust Site As Low as Reasonably Achievable (ALARA) Committee, chaired by Facility Senior Vice President.
  - Reactor face shielding to reduce dose rates.
  - Use of full size vault platforms to improve workflow.
  - Teledosimetry.
  - Process fluid detritiation.
  - Use of Munters driers to enhance existing measures to minimize ambient airborne tritium levels.
  - Optimization of Fuelling Machine purification using Ion Exchange with annual resin replacement and/or sub-micron filters.
  - Sub-micron filtration in the Primary Heat Transport system.
  - Use of independent radiological oversight for higher risk work to improve human performance during execution of radiological tasks.
  - Daily accounting of dose, and work group focus on Radiation Protection Fundamentals.

- OPG establishes internal administrative dose limits to ensure that dose to each exposed individual is managed and maintained well below individual regulatory limits.

Initiatives

- OPG Nuclear fleet-wide and site specific initiatives have been implemented to incorporate the industry best practices noted above.
- Specific key initiatives are described below.
Pickering
- Source term reduction, including improvements to process fluid filtration, a dose reducing resin trial, and detritiation.
- Source term mitigation, including optimization of shielding for reactor face work, improvements to the shielding canopy for reactor face work, and dryer modifications for improved performance and reliability.
- Human performance, including involvement and oversight by Radiation Protection (RP) staff of work with elevated radiation risk.
- Focus on dose to the individual through implementation of daily dose goals.
- Improving RP worker practices by driving individual accountability.
- Work Group specific dose reduction plans are being developed and implemented by line management with ALARA support.

Darlington
- The early efforts in source term reduction are generating lasting effects. A reduction of coolant pH factors from 10.8 to 10.1 minimizes crud migration from boilers to inlet feeders. The installation of sub micron heat transport filters effectively reduces the dose rates in our heat transport system and has contributed the success of Darlington’s external dose.
- Developed and implemented a reactor face shielding strategy to reduce dose while at the same time minimize the risks of personnel injury during shielding installation.
- Implemented an improved feeder ice jacket including the application of long handled tools for jacket installation and remote data acquisition.
- Effectively utilized Teledosimetry to reduce Radiation Protection Coordinator dose. Utilized Teledosimetry as a coaching tool to improve worker radiation protection practices and reduce dose.
- Tritium mitigation strategies have been developed and implemented to reduce airborne tritium concentrations inside containment and confinement rooms.
- Developed and implemented X-ray Fluorescence (XRF) spectroscopy to identify cobalt residues in an effort to reduce cobalt deposits in the moderator system during valve overhaul activities thus reducing overall radiation dose.
- Work Group specific dose reduction initiatives have been developed and implemented by line management.
Airborne Tritium Emissions per In Service Unit

2015 Airborne Tritium Emissions (Curies) per In Service Unit
COG CANDU Plant Level Benchmarking

* Industry data based on 2014 as it is the best available information at the time. Pickering and Darlington results are 2015.
**Airborne Tritium Emissions (Curies) per In Service Unit**

COG CANDUs

### Notes:
- Median and Best Quartiles are plotted till 2014 as the 2015 results were unavailable at the time of benchmarking.
- Darlington values have retroactively modified as of 2013 to exclude Tritium Removal Facilities emissions consistent with COG benchmarking results.
Observations – Airborne Tritium Emissions (Curies) per In Service Unit

2015 (Annual Value)

- Pickering achieved its best Airborne Tritium Emissions performance in 2013 as a result of increased focus on dryer performance, leak management and source term reduction.
- The 2014 industry results collected by the CANDU Owners Group (COG) are included in this report as the most up-to-date figures available for benchmarking performance. As of 2013, tritium emissions from Tritium Removal Facilities (TRF) are no longer included in COG benchmarking results.
- Airborne Tritium Emissions from each OPG facility for 2015 are compared per in service reactor unit.
- Curies per in service unit at top quartile CANDU plants was 1,192 or lower.
- Darlington performed better than the industry median threshold of 1,784 Curies per in service unit. Performance slipped from best quartile performance in 2013 to second quartile performance in 2014 and 2015.
- Pickering performed worse than the industry median threshold. Performance slipped from second quartile performance in 2013 to third quartile performance in 2014 and 2015.

Trend

- In 2014 and 2015, a worsening trend in performance at both Pickering and Darlington was observed due to heavy water leaks, poor vapour recovery dryer performance and unavailability of the Tritium Removal Facility (see below).
- The industry trend line graph shows that industry best quartile performance has worsened slightly since 2012. Industry median performance continues to improve.
- Darlington and Pickering tritium emissions to air continue to be less than one per cent of the regulatory limits.

Factors Contributing to Performance

- Key factors affecting performance at Darlington and Pickering include the following:
  - leaks within containment requiring outages for repair,
  - poor vapour recovery dryer performance,
  - operational issues of the Tritium Removal Facility impacting its availability,
  - increased unit tritium source term.
- Station focus on tritium emission reduction initiatives include dedicated teams to ensure daily emissions monitoring, sustaining and improving dryer performance, heavy water leak minimization, tritium program development and innovations, and availability and performance of the Tritium Removal Facility at the Darlington site.
- Other improvement initiatives include OPG’s ongoing participation in COG environmental benchmarking of participating CANDU stations to determine best environmental practices.
Fuel Reliability Index

2015 Fuel Reliability Index (Microcuries per Gram)
CANDU Plant Level Benchmarking

Best Quartile: 0.000001
Median: 0.000001
Observations – Fuel Reliability Index (CANDU - FRI)

2015 (Most Recent Operating Quarter)

- The best quartile and median values for Fuel Reliability Index (FRI) performance for CANDU plants were 0.000001. For individual CANDU units, the best quartile was 0.000001 and the median value was 0.000015.
- The Pickering plant level FRI performance at 0.000421 was worse than the CANDU plant median, but still achieved maximum NPI points.
- The Darlington plant level FRI performance at 0.000122 was worse than the CANDU plant median, but still achieved maximum NPI points.
- Post-discharge fuel inspections for Pickering indicated that the overall condition of fuel inspected was acceptable and consistent with previous years. Fuel inspections for Pickering confirmed two fuel defects in 2015.
- Post-discharge fuel inspections for Darlington indicated that the overall condition of fuel inspected was acceptable and consistent with previous years. Darlington was free of fuel defects in 2015. No fuel issues of significance arose at Darlington in 2015.

Trend

- The best quartile for CANDU plants remained relatively consistent at 0.000001 from 2010. The median values for CANDU plants has generally improved from 2010 and remained at 0.000001 since 2014.
- The Pickering station FRI performance has generally improved since 2010 despite a spike in 2014 due to increasing incidents of fuel defects. In 2015, the FRI performance has drastically improved with the reduction in fuel defect incidents, and as a result achieved maximum NPI points.
- The Darlington station FRI performance has generally improved since 2010 despite spikes in 2011 and 2013. The reactors were defect-free in 2015, which was an improvement from 2014 and remained to achieve maximum NPI points.

Factors Contributing to Performance

Fuel defects existed in the three units in Pickering in 2014. A team was formed to investigate the fuel defects incidents and a corrective action plan has been prepared to address the problem, which resulted in a reduction of defects totaling to two fuel defects in 2015.

Actions that were taken that drove this improvement since 2014 include:

- Developing a fuel defect guideline for Pickering,
- Increasing scope of Heat Transport System (HTS) grab sampling and analysis,
- Assessing and comparing Units 1, 4 and 5 to 8 power ramps,
- Assessing impact of adjuster burn-out during operation,
- Assessing impact of pressure tube creep on fuel performance,
- Improving the methods of surveillance and elimination of the possibility of foreign materials entrance into the HTS due to Fuel Handling and Outage practices,
- Fuel bundle manufacturing assessment,
- 3rd party examinations of unirradiated Pickering fuel bundle,
Observations – Fuel Reliability Index (CANDU - FRI)

- Irradiated fuel inspections and examinations,
- Improving capability of detecting the defected fuel bundles during the discharge from the fuelling machines, and
- Improving the capability of the in-bay inspection of the suspected fuel bundles to be defected.

Darlington has been defect free in 2015. The steps taken that have led to improved FRI performance and prevent the potential of fuel defects are the following:

- New fuel with tighter tolerances for mass was received and is currently being used,
- Installed a new fuel inspection facility and completed inspections in East Fuelling Facility Auxiliary Area; confirmed defects in all suspect bundles and all fuel defects originated from one batch of 2786 bundles,
- OPG-supplier co-operation resulted in installation of an automatic loader of fuel pallets complete with a “go/no go” pallet diameter monitor,
- Close monitoring of existing fuel bundle inventory and core load, and
- Projects in progress on Gaseous Fission Products (GFP) and feeder scanners to improve ability to locate defects on power and during outages.
2-Year Unplanned Automatic Reactor Trips

2015 2-Year Unplanned Automatic Reactor Trips
CANDU Plant Level Benchmarking

- Median: 0.064
- Best Quartile: 0.000

# per 7,000 Hours Critical

Max. NPI Threshold = 0.5
2015 2-Year Unplanned Automatic Reactor Trips
CANDU Unit Level Benchmarking

- Pickering 8
- Pickering 7
- Pickering 5
- Pickering 4
- Darlington 4
- Darlington 3
- Darlington 2
- Pickering 6
- Darlington 1
- Pickering 1

# per 7,000 Hours Critical

Max. NPI Threshold = 0.5

Best Quartile: 0.000
Median: 0.000
Observations – 2-Year Unplanned Automatic Reactor Trips (CANDU)

2015 (2-Year Rolling Average)

- The 2-year rolling average unplanned automatic reactor trip best quartile for CANDU plants was zero with a median of 0.064. For individual CANDU units, the best quartile and median values for unplanned reactor trip were zero.
- At the plant level, Pickering’s trip rate of 0.168 was better than the maximum NPI threshold value of 0.50. On an individual unit basis, Units 4, 5, 7, and 8 with trip rate of zero, were at best quartile. Unit 6, with trip rate of 0.48 and Unit 1, with trip rate of 0.53, were worse than the third quartile threshold of 0.45 and significantly better than the highest value in the benchmark of 2.18.
- At the plant level Darlington’s trip rate of 0.13 was better than the maximum NPI threshold value of 0.50. On an individual unit basis, Units 2, 3, and 4, with trip rates of zero, performed at the best quartile level. Unit 1, with trip rate of 0.51 was worse than the third quartile threshold of 0.45 and significantly better than the highest value in the benchmark of 2.18.

Trend

- The unplanned automatic reactor trip best quartile for CANDU plants has been zero since 2011. The median value improved from 2010 to 2012, performance declined in 2013, but improved in 2014 and declined in 2015 again. On an individual unit basis, the industry best quartile and median has remained at zero since 2010.
- At the plant level, Pickering station performance has continued to significantly improve from 2011. On an individual unit basis, Unit 1 performance has improved from 2011 to 2013, but decreased in 2014, and improved again in 2015. Unit 4 performance has decreased from 2011 to 2012, slightly improved in 2013, and achieved best performance in 2014 and 2015 with a zero trip rate. Unit 5 performance has been trending downwards since 2011, achieving a zero trip rate in 2015. Unit 6 has consistently performed at a zero trip rate since 2009, but decreased in 2015. Unit 7 performance improved from 2012 to 2013 and achieved the best performance in 2014 and 2015 with a zero trip rate. Unit 8 performance remained flat around 0.50, and in 2014 slightly decreased to 0.53, but the best performance with a zero trip rate was in 2012 and 2015.
- At the plant level, Darlington station performance has been improved since 2011, achieving the best result of a zero trip rate in 2014, but decreased in 2015. On an individual unit basis, Unit 1 has consistently performed at a zero trip rate since 2009, but the performance decreased in 2015. Units 3 and 4 performed at a zero trip rate in 2013 to 2015 with both units improving from previous years’ performance. Unit 2 performance has significantly improved in 2014 and 2015 from 2012 and 2013.

Factors Contributing to Performance

- Key performance drivers for this metric include: general equipment reliability, material condition, and human performance.
- In 2015, Pickering had 1 unplanned automatic reactor trip (1 on Unit 6).
  In 2015, Darlington had 1 unplanned automatic reactor trip (1 on Unit 1).
On-going due diligence by Station Operations, Engineering and Maintenance organizations. Operating Experience (OPEX) from each event has been shared at Pickering, Darlington and at external summits. Where necessary, training material has been revised based on OPEX. To improve human performance, technical procedures have been revised. To improve equipment reliability, where possible, like-for-like parts replacement has taken place. System health teams are involved in obsolescence issues.
3-Year Auxiliary Feedwater Safety System Unavailability

2015 3-Year Auxiliary Feedwater Safety System Performance (Unavailability)
CANDU PlantLevel Benchmarking

Darlington

Best Quartile: 0.0000

Median: 0.0050

Max. NPI Threshold = 0.02
Observations – 3-Year Auxiliary Feedwater System (CANDU)

**2015 (3-Year Rolling Average)**

- The best quartile auxiliary feedwater (AFW) safety system performance for CANDU plants was zero with a median value of 0.0050. For individual CANDU units, the best quartile was zero with a median of 0.0001.
- At the plant level, Pickering station, with an unavailability of 0.0115 is below maximum NPI threshold value of 0.0200. On an individual unit basis, Units 4, 6, 7 and 8 achieved maximum NPI points for AFW unavailability. Units 1 and 5 unavailability is above the NPI maximum threshold.
- Darlington station achieved best quartile performance of zero unavailability at both the station and unit levels in 2015.

**Trend**

- The 3-Year Auxiliary Feedwater unavailability best quartile performance of CANDU plants improved from 2010 and maintained zero unavailability from 2011 to 2015. The plant level industry median value has fluctuated slightly over the review period but has remained well below the NPI maximum threshold. At the unit level, the industry best quartile has remained at zero over the review period and the median value at or close to zero over the review period.
- At the plant level, Pickering station performance has declined since 2010 and approached the NPI maximum threshold in 2014, but improved in 2015. On an individual unit basis, Unit 6 has consistently performed at a zero unavailability rate over the review period. Unit 1 performance declined in 2014, but improved in 2015. Unit 4 performance was at zero unavailability rate in 2010 and 2011, decreased slightly in 2012 to 2014, and improved to zero unavailability in 2015. Unit 5 performance improved from 2013, but still remained below maximum NPI threshold. Unit 7 performances has consistently performed at a zero unavailability rate since 2009, but declined in 2014 and improved in 2015. Unit 8 performance declined from 2012 but improved in 2015.
- Darlington station and unit performance has been at zero unavailability since 2010.

**Factors Contributing to Performance**

- Key performance drivers for this metric include: general equipment reliability, material condition, and human performance.
- No Auxiliary Feedwater Safety System unavailability occurred during 2015 which led to improved performance relative to previous years.
3-Year Emergency AC Power Safety Unavailability

2015 3-Year Emergency AC Power Safety System Performance (Unavailability)
CANDU Plant Level Benchmarking

- Darlington
- Pickering

Best Quartile: 0.0006
Median: 0.0041

Max. NPI Threshold = 0.025
3-Year Emergency AC Power Safety System Performance (Unavailability)
CANDU Plant Level Benchmarking

![Graph showing 3-year emergency AC power safety system performance (unavailability). The graph compares the hours unavailable per total hours required to be available across different years, with indicators for median, best quartile, max. NPI, and PN.]
## Observations – 3-Year Emergency AC Power Safety System (CANDU)

### 2015 (3-Year Rolling Average)

- 3-Year Emergency AC Power Safety System performance at best quartile CANDU plants was 0.0006. The industry median value was 0.0041.
- At the plant level, Pickering station, with an unavailability of 0.0030 is below of maximum NPI threshold of 0.0250.
- Darlington was one of the best performing stations in the CANDU peer group, achieving zero unavailability, best quartile performance and maximum NPI results.

### Trend

- The 3-year Emergency AC Power Safety System unavailability industry best quartile for CANDU plants has steadily improved since 2010, with slight declines in 2013 and 2015. The industry median value improved over the review period, with slight declines in 2013 and 2015.
- Pickering station performance has improved over the review period, reaching its best performance in 2014 achieving zero unavailability, but station performance declined in 2015.
- Darlington station and unit performance improved from 2011, achieving zero unavailability in the last four years 2012 to 2015.

### Factors Contributing to Performance

- Key performance drivers for this metric include: general equipment reliability, material condition, and human performance.
- On February 15, 2015, Pickering ‘Ready to Start’ light extinguished due to malfunction of exhaust gas temperature input module in extreme cold ambient temperature. The reason being that the module was not configured to the design requirement of -30°C. It was concluded after investigation that it was not affecting 'standby’ mode of operation and, hence, standby generator (SG) 056-SG1 was available for emergency operation. This affected all 3 SGs on 056 Bank and 078-SG1 on 078 SG Bank. It did not impact 078-SG3 and the other SG; 078-SG2 was in outage.
- On March 12, 2015, Pickering 056-SG1 was taken out of service for gas producer swap. During post-maintenance testing, the issue of low generator voltage was discovered and it was diagnosed that Automatic Voltage Regulator tune up and adjustment was required prior to returning to service. However, 056-SG1 could not be returned to service in the first quarter of 2015 due to resource constraints, and was returned to service in the first week of second quarter of 2015.
3-Year High Pressure Safety Injection

2015 3-Year High Pressure Injection (ECI) Safety System Performance (Unavailability) CANDU Plant Level Benchmarking

Pickering
Darlington

Best Quartile: 0.0000
Median: 0.0000

Max. NPI Threshold = 0.02

Hours Unavailable/Total Hours Required to be Available
2015 3-Year High Pressure Injection (ECI) Safety System Performance (Unavailability) CANDU Unit Level Benchmarking

- Best Quartile: 0.0000
- Median: 0.0000

Hours Unavailable/Total Hours Required to be Available

Max. NPI Threshold = 0.02
3-Year High Pressure Injection (ECI) Safety System Performance (Unavailability)
CANDU Plant Level Benchmarking

3-Year High Pressure Injection (ECI) Safety System Performance (Unavailability)
CANDU Unit Level Benchmarking

Hours Unavailable/Total Hours Required to be Available

- Darlington 1
- Darlington 2
- Darlington 3
- Pickering 1
- Pickering 2
- Pickering 3
- Pickering 4
- Pickering 5
- Pickering 6
- Pickering 7
- Pickering 8
- Median
- Max. NPI
- Best Quartile

Good
Observations – 3-Year High Pressure Safety Injection Unavailability (CANDU)

2015 (3-Year Rolling Average)

- The best quartile and median values for the 3-Year High Pressure Safety Injection Unavailability performance for CANDU plants were zero. For individual CANDU units, both the best quartile and median value were zero.
- Pickering achieved best quartile performance of zero unavailability at both the station and unit levels in 2015.
- Darlington achieved best quartile performance of zero unavailability at both the station and unit levels in 2015.

Trend

- The 3-Year High Pressure Safety Injection unavailability best quartile performance of CANDU plants has been zero since 2010. The plant level industry median performance improved since 2010 and achieved zero unavailability in 2014 and 2015. At the unit level, the industry best quartile and median value have remained at zero over the review period.
- At the plant level, Pickering station performance has consistently improved over the review period achieving zero unavailability in 2014 and 2015. On an individual unit basis, Unit 1 has improved from 2010, achieving zero unavailability from 2011 to 2015. Unit 4 performance improved from 2011 and achieving zero unavailability in 2014 and 2015. Units 5, 6, 7, and 8 have been at the best quartile since 2010.
- At the plant level, Darlington station performance has improved since 2010 and has maintained best quartile performance from 2011 to 2015. On an individual unit basis, Units 1, 3, and 4 have been at the best quartile since 2010, while Unit 2 has been at the best quartile since 2011.

Factors Contributing to Performance

- Key performance drivers for this metric include: general equipment reliability, material condition, and human performance.
- On February 6, 2015, Pickering Unit 6 Emergency Coolant Injection (ECI) Level 2 Impairment was declared due to heat tracing alarm which resulted in 25 minutes of unavailability. This did not impact the numerical value of the NPI because the system unavailability was declared for a very short period of time.
- Key performance drivers for this metric include the continuous implementation and utilization of:
  o Modifications and key initiatives such as the Parts Improvement Initiative ensuring parts availability.
  o Plant Reliability Lists work programs to drive work execution.
  o Dashboard at Plant Health to provide coordination and support work completion from a cross-functional team.
  o Procedural Updates to continuously incorporate Operating Experience and to mitigate human performance events.
  o Enhanced System Health Team Focus and Effectiveness.
3.0 RELIABILITY

Methodology and Sources of Data

The majority of reliability metrics were calculated using the data from WANO. Any data labelled as invalid by WANO was excluded from all calculations. Indicator values of zero are not plotted or included in calculations except in cases where zero is a valid result. Complete data for the review period was obtained and averages are as provided by WANO.

The two backlog metrics, On-line Deficient and Corrective maintenance, are also included within this section and the data comes from an industry sponsored INPO AP-928 subcommittee. Data points benchmarked on backlogs are a single point in time, not a rolling average. All of the data is self-reported. Industry backlog benchmark standards changed with Revision 3 of AP-928 Work Management Practices at INPO in June of 2010. The new standard created an alignment between engineering criticality coding and backlog classification that allows improved focus on the more critical outstanding work. This standard also sets a more consistent foundation for classification of backlogs such that comparisons between utilities will be more meaningful. All OPG nuclear stations converted to the new standard on January 24, 2011. The On-line Deficient and Corrective maintenance backlog industry data was collected from INPO for 2015.

Discussion

The primary metric within the reliability section is the WANO Nuclear Performance Index (NPI). The WANO NPI is an operational performance indicator comprised of 10 metrics, three of which are analyzed in this section: Forced Loss Rate, Unit Capability Factor, and Chemistry Performance Indicator. The remainder of the WANO NPI components are analyzed in the safety section (Section 2.0).

Darlington quartile rankings for the Corrective and Deficient Maintenance Backlogs dropped to the third quartile while Unit Capability Factor dropped to the fourth quartile in 2015. Industry best quartile performance for NPI significantly improved in 2015. Darlington’s scores for the NPI metric fell overall and the station ranking fell from the median quartile in 2014 to the third quartile in 2015.

The Pickering station performed at the same quartile rankings when compared to 2014 except for the Chemistry Performance Indicator and Deficient Maintenance Backlogs, which fell to the fourth quartile in 2015. All other Pickering Reliability metrics are in the fourth quartile.
WANO Nuclear Performance Index

2015 WANO Nuclear Performance Index
CANDU Plant Level Benchmarking

Best Quartile: 93.54
Median: 89.36
Observations – WANO Nuclear Performance Index (NPI) (CANDU)

2015

- The 2015 best quartile of the CANDU plant comparison panel for WANO NPI is 93.5. This represents a 0.6 point increase above the 2014 best quartile.
- The median of the CANDU plant comparison panel rose 3.6 points, compared to last year, to 89.4 in 2015.
- At the plant level, both Darlington and Pickering scored below median NPI performance in 2015.
- In 2015, Darlington had three units in the second quartile, and one unit in the third quartile. Pickering had two units in the third quartile and four units in the bottom quartile.

Trend

- The best quartile of the CANDU plant comparison panel rose from 2010 to 2012, with the best quartile performance rising to its highest level in 2012. While this was not sustained in subsequent years, the best quartile results for the past 3 years remain in the low 90’s.
- The median value of the CANDU plant comparison panel continued to rise from 2010 to 2012, indicating that the performers in the lower quartiles are performing better. This performance was not sustained in 2013, but did recover in 2014 and 2015.
- Pickering has performed consistently below median over the review period.
- As the strongest OPG performer, Darlington achieved best quartile performance over the majority of the review period, ranking just below top quartile in 2014, but performance declined in 2015 due to the station vacuum building containment outage for planned regulatory maintenance and higher FLR.

Factors Contributing to Performance

- The WANO NPI is a composite index reflecting the weighted sum of the scores of 10 separate performance measures. A maximum score of 100 is possible. All of the sub-indicators in this index are reviewed separately in this benchmarking report.

Pickering

- Pickering’s NPI performance is negatively impacted by the need for long outages to accommodate fuel channel inspection programs.
- These long outages negatively impact both the unit capability factor and collective radiation exposure metrics.
- For 2015, Pickering achieved maximum scores for 3 out of 10 NPI sub-indicators.
- For the key safety system related metrics of high pressure injection and emergency alternating current (AC) power, the station received 10 of 10 points.
- Pickering also achieved a perfect score for industrial safety accident rate (5 of 5).
- Pickering earned 9.9 of 10 points for reactor trip rates.
- Pickering achieved 3.7 of 5 points for chemistry performance, 7.0 of 10 points for collective radiation exposure, 9.7 of 10 points for fuel reliability and 8.8 of 10 points for auxiliary feedwater.
- Pickering received 0.2 of 15 points for unit capability factor and 4.2 of 15 points for forced loss rate due to forced outages, longer planned outages related to life extension, and planned outage extensions.
Factors Contributing to Performance (CONT’D)

Darlington

- Darlington’s NPI performance has been impacted by higher forced loss rate and by a lower unit capability factor due to the 4 unit VBO shutdown in 2015.
- For 2015, Darlington achieved maximum scores for 7 out of 10 NPI sub-indicators.
- For each of the key safety system related metrics, high pressure injection, auxiliary feedwater, and emergency alternating current (AC) power, Darlington received 10 of 10 points.
- Darlington also achieved perfect scores for reactor trip rate (10 of 10), fuel reliability (10 of 10), chemistry performance (5 of 5), and industrial safety accident rate (5 of 5).
- Darlington earned 9.5 out of 10 points for collective radiation exposure.
- Darlington achieved 5.0 out of 15 points for unit capability factor and 9.3 out of 15 points for forced loss rate

Please refer to Table 13 of the Appendix for an NPI plant level performance summary of OPG nuclear stations against the North American panel.
Rolling Average Forced Loss Rate

2015 Rolling Average Forced Loss Rate
CANDU Plant Level Benchmarking

Best Quartile: 0.38
Median: 1.46

Max. NPI Threshold = 1.0
2015 Rolling Average Forced Loss Rate
CANDU Unit Level Benchmarking

Max. NPI Threshold = 1.0

Best Quartile: 1.11

Median: 2.63

Pickering 8
Pickering 6
Pickering 7
Pickering 5
Darlington 4
Darlington 2
Darlington 1
Darlington 3
Pickering 7
Pickering 4
Pickering 1
Pickering 6
Pickering 8

%
Rolling Average Forced Loss Rate
CANDU Plant Level Benchmarking

Rolling Average Forced Loss Rate
CANDU Unit Level Benchmarking
**Observations – Rolling Average Forced Loss Rate (CANDU)**

**2015 (Rolling 2 Year Average, Pickering %; Rolling 3 Year Average, Darlington %)**

- At the plant level, Pickering Forced Loss Rate (FLR) performance was 6.85, which was worse than industry median (1.46). At the unit level, one Pickering unit was above median (2.63) in the second quartile. All remaining 5 Pickering units were ranked in the third and fourth quartile.
- At the plant level, Darlington FLR performance was 3.65, which was also worse than median (1.46). At the unit level, all Darlington units were below median, positioned in the third quartile. This is declining performance, as Darlington previously had 2 units performing above median unit FLR threshold in 2014.

**Trend**

- Industry plant median FLR trend continues to improve over the same period, from 2.60 in 2010 to 1.29 in 2014, with minor up-tick to 1.46 in 2015. Industry best quartile has also improved during the period, from 1.18 in 2010 to 1.03 in 2014 and down to 0.38 in 2015.
- Pickering’s FLR performance over the 5 year review period, has been improving. The equipment reliability improvements at Pickering have been the main drivers for the favourable improvement in FLR performance. FLR performance appreciably improved in 2015 by a reduction in station FLR (6.85) from 2014 FLR (10.08).
- Darlington’s overall FLR performance decreased slightly from 2.85 in 2014 to 3.65 in 2015. Over the 5 year review period, there has been a general trend of minor decline in FLR performance, with increasing FLR (about 1.85%) from 1.80 in 2011 to 3.65 in 2015.

**Factors Contributing to Performance**

- Equipment reliability, work order backlog and human performance are the key contributors to the FLR performance gap at Pickering.
- Pickering’s 2015 FLR was impacted by 5 unplanned outages due to failures from the reactor and turbine side totaling 25.5 days of lost production. Equipment issues with the Boiler and Liquid Zone Control systems were the main contributors for the forced outages.
- Pickering continues to execute a list of high priority work orders (PRL-plant reliability list) to improve equipment reliability and reduce operator burden.
- Pickering continues reducing corrective and deficient work order backlogs through a reduction of incoming emergent work orders by proactive equipment replacements and minor modifications to improve/correct system and equipment performance.
- Pickering is also implementing equipment reliability projects to put new equipment in the plant to prevent forced loss events. Single point vulnerability (SPV) reviews have been completed and elimination and mitigation actions are being implemented or dispositioned for outstanding items.
### Observations – Rolling Average Forced Loss Rate (CANDU) (CONT’D)

- The main contributors to Darlington’s Forced Loss in 2015 were equipment mechanical issues relating to turbine oil leaks and the system main circulating pump motor electrical production trip. Only 5% of the FLR impact is from human performance. There were 7 forced outages in 2015.
- Darlington continues to drive plant reliability improvements via the system health improvement process and recovery actions. The Plant Reliability List of important work orders are implemented to improve system health. Incoming work reduction and Preventive Maintenance interval stretch have been leveraged for improvements.
- Improvements in equipment reliability, high Equipment Reliability Index performance and effective mitigation of SPVs in plant production systems are common practices of top operating plants.
- NFI-04 Equipment Reliability fleet initiative was launched in 2015 to improve OPG fleet performance over 2016-2018. Site equipment reliability Excellence Plans were developed as part of NFI-04 and locally focused ER improvement initiatives are being executed. An SPV mitigation program is being implemented at both sites.
Rolling Average Unit Capability Factor

2015 Rolling Average Unit Capability Factor
CANDU Plant Level Benchmarking

Max. NPI Threshold = 92

Median: 88.05
Best Quartile: 91.31

Pickering
Darlington
2015 Rolling Average Unit Capability Factor
CANDU Unit Level Benchmarking

Max. NPI Threshold = 92

Best Quartile: 89.95
Median: 85.77

Pickering 1
Pickering 8
Pickering 7
Pickering 6
Pickering 4
Pickering 5
Darlington 1
Darlington 2
Darlington 3
Darlington 4
Darlington 5
Pickering 8
Pickering 1

%
**Observations – Rolling Average Unit Capability Factor-UCF (CANDU)**

2015 (Rolling 2 Year Average, Pickering %; Rolling 3 Year Average, Darlington %)
- Pickering performed below median at both the plant and unit level UCF.
- Darlington UCF performance was 83.96, which was below plant median (88.05). At the unit level, only one Darlington unit was better than median (85.77) and the remaining 3 Darlington units were in the third quartile.
- Pickering’s gap to best quartile plant UCF was 13.99; and to median UCF was 10.73.
- Darlington’s gap to best quartile plant UCF was 7.35; and to median UCF was 4.09.

**Trend**
- Pickering’s UCF performance over the 5 year period, generally had been improving modestly, and in 2015 improved favourably to 77.32 vs 74.50 in 2014. The equipment reliability improvements at Pickering have been favourable for improvement in recent UCF performance.
- Darlington’s plant UCF has been declining for the past 4 years (92.01, 90.44, 89.41, 83.96). Coupled with UCF benchmark improving in the past year, Darlington’s gap to reach both the best quartile and median thresholds has widened.
- Industry plant median and best quartile UCF benchmarks both improved in 2015 and this is a reversal to the declining trend since 2012. This contributes to a slightly increased challenge in reaching top performance levels for both Pickering and Darlington.

**Factors Contributing to Performance**
- The primary factors impacting UCF are longer outages to accommodate reactor component inspections necessary for extended life at Pickering and the four unit Vacuum Building Outage at Darlington as well as forced outages at both stations and forced extensions to planned outages at Pickering.
- Darlington had 7 forced outages in 2015. Pickering had 5 forced outages in 2015.
- Pickering had 350.1 days of planned outage in 2015 and Darlington had 266.9 days (includes 4 unit VBO outage). Pickering had 40.6 days of forced extension to planned outage and Darlington had 7.7 days. Higher number of planned outage days and forced extension to planned outages contribute to lower UCF compared to CANDU peers.
- The issues and causes for degrading FLR performance also negatively impact UCF. Significant improvements in equipment reliability are expected to correlate into improved FLR and UCF performance.
Rolling Average Chemistry Performance Indicator

2015 Rolling Average Chemistry Performance Indicator
CANDU Plant Level Benchmarking

[Graph showing performance indicators for Darlington and Pickering]

- Best Quartile: 1.00
- Median: 1.00
- Max. NPI Threshold = 1.01
2015 Rolling Average Chemistry Performance Indicator
CANDU Unit Level Benchmarking

- Darlington 4
- Darlington 3
- Darlington 2
- Darlington 1
- Pickering 4
- Pickering 8
- Pickering 6
- Pickering 1
- Pickering 7
- Pickering 5

Median: 1.00
Best Quartile: 1.00
Max. NPI Threshold = 1.01
Rolling Average Chemistry Performance (CPI)
CANDU Plant Level Benchmarking

Rolling Average Chemistry Performance Indicator
CANDU Unit Level Benchmarking

[Graphs showing performance indicators for different units over years]
Observations – Rolling Average Chemistry Performance Indicator (CANDU)

2015 (Rolling 2 Year Average Pickering, Rolling 3 Year Average Darlington)

- The CANDU plant median and top quartile values are both 1.00.
- The CANDU unit median and top quartile values are both 1.00.
- CPI is calculated using data during normal operation (> 30% Full Power).
- The Pickering plant level of performance was worse than the CANDU plant median CPI (1.06 vs 1.00).
- The Pickering unit levels of performance were all worse than the CANDU unit level median CPI (1.01 to 1.10 vs 1.00).
- Pickering plant performance in 2015 declined to 1.06 from 1.04 in 2014.
- Pickering CPI in 2015 improved on Units 4 and 8 whereas performance on Unit 6 remained constant and declined for Units 1, 5, and 7. The CPI results were impacted primarily as a result of three outages with extended clean-up time for boiler impurities. Persistent elevated boiler sodium following restart from the planned outage on Unit 1 was a result of foreign material (high in sodium) introduced during turbine maintenance and elevated sulphate on Units 5 and 7 was attributed to sulphate transferred to boilers (from recent condenser tube leaks in 2012, 2013, and 2014) and, to a lesser extent, a larger latent inventory of sulphate-containing resin (from the 2006 Water Treatment Plant resin event).
- Darlington plant performance in 2015 was equivalent to the CANDU plant level median and best quartile performance (1.00).
- Darlington unit performance in 2015 was equivalent to the CANDU plant level best quartile performance (1.00) and equivalent to the median level performance (1.00).

Trend

- Pickering overall plant performance improved from 2011-2014 (1.10, 1.10, 1.10, and 1.04, respectively), but start up issues have adversely affected CPI in 2015 (1.06).
- Darlington overall plant performance has improved over the last 5 years (1.03, 1.03, 1.01, 1.00, and 1.00 for 2011-2015 respectively).

Factors Contributing to Performance

- Chemistry Performance at Pickering is hindered by numerous unit power transients (planned or forced outages), which tend to result in increased corrosion product transport throughout the heat transport system negatively impacting the chemistry performance.
- Pickering is one of the older sites and boiler ion specifications were much higher in the past. Consequently, there is a large inventory of sludge in the boilers, in addition to lakewater salts from prior chronic condenser water in-leakage, which contribute to boiler ions desorption/adsorption phenomenon and increases concentrations above the WANO limiting values for certain ions (most significantly, sulphate).
Observations – Rolling Average Chemistry Performance Indicator (CANDU)

Factors Contributing to Performance (continued)

- Pickering boilers have a different design from other plants (e.g. lower blowdown capacity than Darlington, 12 boilers per unit, mixed-alloy feedtrain for Units 1-4, Monel-400 boiler tubes compared to Alloy 800 at Darlington etc.), and WANO limiting values used in calculating CPI (6 parameters at Pickering) are three times less than Darlington.
- Best practices among top performing plants include use of dispersants to reduce corrosion product transport to boilers, condenser inspections and, cleaning to remove a source of iron and copper transport (CPT) to boilers during start-ups. These inspections and cleans are now being performed at both Pickering and Darlington to minimise CPT. Darlington has implemented morpholine addition to reduce iron transport (Pickering already employs morpholine addition). Darlington’s corrosion product reduction plan also includes startup condensate filtration, boilers lay-up practices and sampling improvements.
- Fleetwide and station initiatives which have or are expected to improve performance include:
  - Boiler blowdown piping improvements and enhanced tracking of blowdowns at Pickering per the procedure,
  - Condenser cleaning during planned outages (which has resulted in improvement in Darlington CPI performance),
  - Ongoing use of local portable feedwater dissolved oxygen analyzer carts (commissioned on Pickering Units 5-8) to ensure dissolved oxygen remains in specification,
  - Ongoing oversight of water treatment plant product water quality to meet boiler makeup water specifications, and
  - Investigation of Film Forming Amine (FFA) technology to control CPT to boilers.
1-Year On-line Deficient Maintenance Backlog

**2015 On-line Deficient Maintenance Backlog**

**All Participating Plants (AP-928 Working Group)**

- **Best Quartile = 116**
- **Median = 160**

**Darlington**

**Pickering**

Deficient Maintenance Backlog Work Orders per Unit
Observations – On-Line Deficient Maintenance Backlog (AP-928 Working Group)

2015 (Annual Value)
- The industry Best Quartile and Median Thresholds were 116 and 160 work orders per unit respectively for On-Line Deficient Maintenance (DM) backlog.
  - Darlington DM backlogs were at 174 Work Orders per unit for 2015 which is third quartile performance.
  - Pickering DM backlogs were at 251 Work Orders per unit which is fourth quartile performance.

Trend
- In comparison to the 2014 data:
  - Darlington performance in 2015 has improved from 176 to 174 work orders per unit
  - Pickering performance in 2015 improved from 276 to 251 work orders per unit
- Darlington has shown backlog improvement from 2011 through 2015.
- Pickering has shown backlog improvement from 2011-2013, a decline in 2014 and improvement again in 2015.

Factors Contributing to Performance
- For Darlington and Pickering the factors that impact the deficient maintenance backlogs include the following:
  - Forced outages and outage extensions which negatively impact the backlog reduction efforts by reducing the resources available to perform the planned work.
  - Gaps in the work package preparation, scheduling and parts availability
- To improve performance there is a fleet wide initiative to improve parts availability, which involves adherence to the work management process, reduction in the amount of work removed from the schedule and improvements to the process for in-house repair of components removed from systems. Implementation is ongoing and initiative completion is targeted for 2017.
- In addition to the fleet wide initiatives, both stations have made improvements to the Fix-It-Now teams to improve work execution efficiency and better address emergent work.
1-Year On-line Corrective Maintenance Backlog

2015 On-line Corrective Maintenance Backlog
All Participating Plants (AP-928 Working Group)

- Best Quartile = 7
- Median = 15

Corrective Maintenance Backlog Work Orders per Unit

Pickering
Darlington
Observations – 1 Year On-line Corrective Maintenance Backlog (AP-928 Working Group)

2015 (Annual Value)
- The industry Best Quartile and Median thresholds were 7 and 15 work orders per unit respectively for On-line Corrective Maintenance (CM) backlog.
  - Darlington CM backlogs were at 24 Work Orders per unit for 2015, which is in the third quartile.
  - Pickering CM backlogs were at 125 Work Orders per unit, which is in the worst quartile.

Trend
- In comparison to the 2014 data:
  - Darlington performance in 2015 declined from 20 to 24 work orders per unit
  - Pickering performance in 2015 improved from 160 to 125 work orders per unit
- Darlington has shown backlog improvement from 2011 through 2014.
- Pickering has shown backlog improvement from 2011-2012 and declined in 2013-2014.

Factors Contributing to Performance
- Refer to the factors contributing to performance discussed above in the 1 Year On-line Deficient Maintenance Backlog.
4.0 VALUE FOR MONEY

Methodology and Sources of Data

The Electric Utility Cost Group (EUCG) database is the source for cost benchmarking data. Data was collected for three-year rolling averages for all financial metrics covering the review period from 2010-2015. Zero values for cost indicators are excluded from all calculations. All data submitted to and subsequently extracted from EUCG by OPG is presented in Canadian dollars.

EUCG automatically applies a purchasing power parity (PPP) factor to adjust all values across national borders. The primary function of the PPP value is to adjust for currency exchange rate fluctuations but it also adjusts for additional cross-border factors which may impact purchasing power of companies in different jurisdictions. As a result, cost variations between plants are limited, as much as possible, to real differences and not due to advantages of utilizing one currency over another.

The benchmarking panel utilized for value for money metrics is made up of all North American plants reporting to EUCG. Bruce Power is the only other CANDU technology plant reporting within that panel. The remaining plants are Boiling Water Reactors or Pressurized Water Reactors. For that reason, some of the gaps in performance are associated with technology differences rather than comparable performance.

All metrics include cost information normalized by some factor (MWh or MW DER (Design Electrical Rating)) to allow for comparison across plants.

Discussion

Four value for money metrics are benchmarked in this report. They are the Total Generating Cost per MWh, Non-Fuel Operating Cost per MWh, Fuel Cost per MWh, and Capital Cost per MW DER. The relationship underlying the value for money metrics is shown in the illustration below. The Total Generating Cost per MWh is the sum of Non-Fuel Operating Cost, Fuel Cost and Capital Cost measured on a per MWh basis for benchmarking purposes. Given the differences between OPG’s nuclear generating stations and most North American plants with respect to both fuel costs and the different treatments of non-fuel and capital costs, the best overall financial comparison metric for OPG facilities is the Total Generating Cost per MWh.
3-Year Total Generating Cost per MWh

2015 3-Year Total Generating Costs per MWh
EUCG Benchmarking North American Plants (U.S. and Canada)

Median: 44.38
Best Quartile: 38.93

Canadian $/MWh
Total Generating Costs per MWh
EUCG Benchmarking North American Plants (U.S. and Canada)

Canadian $/MWh

2010 2011 2012 2013 2014 2015

0 10 20 30 40 50 60 70 80

Good

DN Median Best Quartile PN
Observations – 3-Year Total Generating Cost per MWh (All North American Plants)

2015 (3-Year Rolling Average)
- The best quartile level for Total Generating Cost per MWh (TGC/MWh) among North American EUCG participants was $38.93/MWh while the median level was $44.38/MWh.
- Darlington TGC/MWh was $44.38/MWh, equal to the median of $44.38/MWh.
- Pickering TGC/MWh was $67.36/MWh, worse than the median of $44.38/MWh.

Trend
- Over the 2010 to the 2015 period, the best quartile cost rose by $5.95/MWh while the median cost rose by $4.45/MWh.
- Darlington rose by $10.66/MWh and Pickering rose by $1.73/MWh.
- Both best quartile and median levels increased over the 2010-2015 period with a compound annual growth rate of 3.4% for best quartile and 2.1% for median.
- Darlington annual compound growth rate was 5.7%, higher than the median annual compound growth rate. Pickering was relatively flat with an annual compound growth rate of 0.5%.

Factors Contributing to Performance
- For technological reasons, Fuel Costs per MWh is an advantage for all CANDUs and the OPG plants performed within the best quartile.
- Non-Fuel Operating Cost per MWh, for all OPG plants, yielded results that are worse than the median for the most recent data point compared to the North American EUCG panel.
- OPG Capital Costs are below industry levels. Capital expenditures reported by the peer group include costs for life extension, reactor head replacement, steam generator replacement, upgrades, and spent fuel storage. These are costs not incurred by OPG to the extent as its peers.

Darlington
- The 3-Year Rolling Average for Darlington from 2014 to 2015 rose $6.65/MWh. The primary drivers at Darlington were lower generation (4,998 GWh) and higher total costs of approximately $319M. The higher total costs were primarily attributable to higher Operating, Maintenance & Administrative (OM&A) costs of $212M and Capital costs of $129M, partially slightly offset by lower Fuel Costs of $22M.
- Lower generation at Darlington was primarily due to higher planned outage days and increased forced outages. Outage days at Darlington increased by 234 days for 2015 period versus 2014 mainly due to the Darlington Vacuum Building Outage in 2015.
Observations – 3-Year Total Generating Cost per MWh (All North American Plants) (CON’T)

- OM&A costs increased mainly due to the Darlington Vacuum Building Outage in 2015 with increased outage costs (51%) along with smaller increases in project costs (20%), nuclear support (18%) and allocated corporate costs (10%), partially offset by smaller reductions in plant base costs. Labour, material and purchased services differential was mainly due to the increased planned outage days, and were accompanied by smaller increases in OM&A labour including payroll burden, overtime and other costs. The increased overtime, labour escalation and increased use of temporary staff were partially offset by reduced head count. The OM&A Project differential in 2015 over 2014 period includes project cancellation and asset removal costs.

- Capital costs have almost tripled at Darlington from 2012 – 2015 with Capital Portfolio and Minor Fixed Assets rising due to aging plant equipment, refurbishment support and regulatory requirements for extended life at Darlington. Labour capital has increased due to increased regular, overtime and temporary staff consistent with increased capital program at Darlington.

- Fuel spending is lower due to decreased energy production.

- Darlington performed within the best quartile for Fuel Cost per MWh and Capital Cost per MW DER while performing at the fourth quartile for the Non-Fuel Operating Cost per MWh.

- For Non-Fuel Operating Cost, CANDU technology is a large performance gap driver for Darlington during the review period. The larger equipment inventory in a CANDU unit compared to the pressurized water reactor’s and boiling water reactor’s units represents a net increase in maintenance and operations workload which requires additional staff.

Pickering

- The 3-Year Rolling Average for Pickering from 2014 to 2015 decreased by $0.57/MWh. The primary drivers at Pickering are higher generation (485 GWh) and lower total costs $2.1M. The lower total costs were primarily attributable to lower capital costs of $3.3M, partially offset by higher OM&A costs of $0.3M and Fuel Costs of $0.9M.

- Outage days for Pickering decreased by 48 days for 2015 versus 2014 leading to lower outage costs. Higher electricity production levels were also due to the successful implementation of equipment reliability program improvement initiatives and strategic investments to resolve degraded or obsolete equipment issues which helped reduce Pickering’s forced loss rate.

- OM&A Costs have decreased slightly mainly due to decreases in project costs, outage costs (purchased service and overtime) and allocated corporate costs, partially offset by increased nuclear support costs and base costs.
Observations – 3-Year Total Generating Cost per MWh (All North American Plants) (CON’T)

- Capital spending at Pickering has decreased slightly from the 2012-2014 period to the 2013-2015 period since OPG is reducing capital spending in advance of End of Life (EOL) at Pickering. Same comment as DN above.
- Fuel spending is higher due to increased energy production.
- Pickering performed within the best quartile for Fuel Cost per MWh and Capital Cost per MW DER while performing worse than the median for Non-Fuel Operating Cost per MWh.
3-Year Non-Fuel Operating Cost per MWh

2015 3-Year Non-Fuel Operating Costs per MWh
EUCG Benchmarking North American Plants (U.S. and Canada)

Median: 25.89
Best Quartile: 22.60
Non-Fuel Operating Costs per MWh
EUCG Benchmarking North American Plants (U.S. and Canada)
Observations – 3-Year Non-Fuel Operating Cost per MWh (All North American Plants)

2015 (3-Year Rolling Average)

- Best quartile plants had Non-Fuel Operating Costs per MWh (NFOC/MWh) at or below $22.60.
- The median plant level threshold was $25.89/MWh.
- Compared to North American EUCG plants, the Non-Fuel Operating Costs per MWh of all participating Canadian CANDU plants are worse than industry median performance.
- Darlington’s costs, at $33.19/MWh, were $10.59/MWh higher than best quartile and $7.30/MWh higher than the median.
- Pickering’s costs, at $56.49/MWh, were $33.89/MWh higher than best quartile and $30.60/MWh higher than median.

Trend

- Both best quartile and median levels increased over the 2010-2015 period with a compound annual growth rate of approximately 3.2% for the best quartile and approximately 2.0% for the median.
- Darlington annual compound growth rate was 4.1% and Pickering’s effectively did not change.
- Pickering 3-yr NFOC/MWh increased from 2010 ($56.79/MWh) to 2012 ($57.21/MWh) then decreased by 2015 ($56.49/MWh). Please see 2015 TGC per MWh discussion regarding total Pickering costs and production. Higher electricity production levels are largely due to the successful implementation of equipment reliability program improvement initiatives and strategic investments to resolve degraded or obsolete equipment issues which helped reduce Pickering’s forced loss rate.
- Pickering’s 3-yr NFOC/MWh had a slight reduction from 2010 to 2015 as compared to the annual compound growth rates of 3.2% for best quartile and 2.0% for median levels due to slightly lower costs and higher production.
- Pickering’s annual Non-Fuel Operating Cost, over the 2010-2015 review period, is being managed through the continuous pursuit of efficiency improvements enabled by initiatives such as the amalgamation of the Pickering A and Pickering B stations into one Pickering site. The company-wide business transformation project launched in 2011 is also helping streamline, eliminate and reduce work to leverage attrition profiles while sustaining safety and reliability performance excellence.
- Over the 2010-2015 review period, Darlington’s Non-Fuel Operating Cost increased from 2010 ($27.22/MWh) to 2015 ($33.19/MWh). Please see 2015 TGC per MWh discussion regarding total Darlington costs and production.
- Darlington’s 3-yr NFOC/MWh had an annual compound growth rate of 4.1% from 2010 to 2015 as compared to 3.2% for best quartile and 2.0% for median levels. The 2015 increase in Darlington’s 3-yr NFOC/MWh from 2014 is due to primarily to lower generation from the Darlington VBO and higher FLR, and higher OM&A spending.
Factors Contributing to Performance – 3-Year Non-Fuel Operating Cost per MWh (CONT’D)

Factors Contributing to Performance

- Performance in Non-Fuel Operating Cost per MWh drives the majority of OPG’s financial performance. The most significant performance gap drivers are CANDU technology, capability factor, station size, age of the plant, corporate cost allocations and capitalization policy. The biggest drivers are further expanded below:

  o The ‘capability factor’ driver is related specifically to generation performance of the station in relation to the overall potential for the station (results are discussed under the Reliability section within the Rolling Average Unit Capability Factor metric).

  o The ‘station size’ driver is the combined effect of number of units and size of units which can have a significant impact on plant cost performance.

  o The ‘CANDU technology’ driver relates specifically to the concept that CANDU technology results in some specific cost disadvantages related to the overall engineering, maintenance, and inspection costs. While OPG’s ten nuclear units are all CANDU reactors, they reflect three generations of design philosophy and technology which impacts the extent and nature of operations and maintenance activity. In addition, this factor is influenced by the fact that CANDU plants have less well-developed user groups to share and adopt competitive advantage information, than do longer-established user groups for Pressurized Water Reactors (PWR) and Boiling Water Reactors (BWR). Though quantification of CANDU technology impact to cost remains most difficult of all drivers, a staff benchmarking analysis recognized a significant reduction in the gap between OPG staff levels and the industry benchmark. OPG undertook a staffing study through a third-party consultant which concluded that technology, design and regulatory differences exist between CANDU and PWR reactor units and that such factors drive staffing differences. The study established that CANDU technology was a contributor to explaining higher staffing levels for CANDU versus PWR plants which also contributed to OPG’s performance in Non-Fuel Operating Cost.

  o The ‘corporate cost allocations’ driver relates directly to the allocated corporate support costs charged to the nuclear group.

  o Capitalization policy can be an indirect contributing factor when benchmarking Non-Fuel Operating Cost due to variations in “repair vs. replace strategies.”, i.e. a strategy to repair versus replace will increase non fuel operating cost versus option to replace. The impact of differing capitalization policies is removed when looking at Total Generating Cost per MWh (i.e., the sum of Non-Fuel Operating Cost, Fuel Cost, and Capital Cost).
3-Year Fuel Cost per MWh

2015 3-Year Fuel Costs per MWh
EUCG Benchmarking North American Plants (U.S. and Canada)

- Median: 8.73
- Best Quartile: 7.97

Canadian $/MWh

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Fuel Costs per MWh
EUCG Benchmarking North American Plants (U.S. and Canada)
Observations – 3-Year Fuel Cost per MWh (All North American Plants)

2015 (3-Year Rolling Average)
- Fuel Cost per MWh for all Canadian CANDU plants are better than the best quartile threshold ($7.97/MWh) for the panel of North American EUCG plants.
- The two OPG plants ranked as the top four lowest fuel cost plants in the North American panel with Darlington ($5.18/MWh) at second and Pickering ($5.71/MWh) at fourth.

Trend
- The best quartile 3-year Fuel Cost per MWh has remained flat over 2014 and 2015.
- From 2010 to 2012, Fuel Cost per MWh for all OPG plants had been rising and has since stabilized over the last three years, a trend similarly experienced by the nuclear industry. The rate of increase in the Fuel Cost per MWh has moderated since 2012, due primarily to lower input uranium costs offset by rising used fuel storage and disposal costs, which have increased well above the rate of inflation from 2014 to 2015.
- The Darlington Generating Station would rank the lowest among the CANDU plants in the peer panel ranked group if used fuel storage and disposal provision costs were excluded from the calculation with a 3-year rolling average fuel cost per MWh of $4.20/MWh. Similarly, Pickering would rank second with an average 3-year rolling average fuel cost per MWh of $4.25/MWh.

Factors Contributing to Performance
- Fuel costs, primarily driven by the technological differences in CANDU technology, are lower for OPG than all North American Pressurized Water Reactors or Boiling Water Reactors (PWR/BWR) reactors as CANDUs do not require enriched uranium like BWRs and PWRs. This provides a significant advantage for OPG and other CANDUs in this cost category.

Best quartile fuel cost performance noted above is due to the following factors:
- Uranium fuel costs: Raw uranium is processed directly into uranium dioxide to make fuel pellets, without the cost and process complexity of enriching the fuel as required in light water reactors. Fuel costs also include transportation, handling and shipping costs.
- Reactor core efficiency: CANDU is the most efficient of all reactors in using uranium, requiring about 15% less uranium than PWRs for each megawatt hour of electricity.
3-Year Capital Cost per MW DER (Design Electrical Rating)

2015 3-Year Capital Costs per MW DER
EUCG Benchmarking North American Plants (U.S. and Canada)

Median: 63.63
Best Quartile: 47.33

Canadian k$/MW DER
Observations – 3-Year Capital Cost per MW DER (All North American Plants)

2015 (3-Year Rolling Average)

- The best quartile threshold for Capital Cost per MW DER across the North American EUCG peer panel plants was $47.33/MW DER.
- Median cost for the panel was $63.63/MW DER.
- Both Pickering and Darlington had lower capital cost/MW DER than the best quartile threshold.

Trend

- The best quartile threshold declined to approximately the same as the 2010 rolling average. This is due to continuing reductions in life extension, uprates and steam generator replacement spending. These reductions are offset by increased Fukushima response and sustaining capital investment.
- Also driving the quartile thresholds down are reduced capital spending at plants slated for permanent shutdown in the coming years or are at risk of permanent shutdown due to economic factors. These units are reducing their Capital spending as they approach their planned or anticipated shutdown dates.
- Darlington’s Capital Cost per MW DER increased in 2015 due to increased spending on to support post-refurbishment operations, reliability improvements, non-power block infrastructure, sustaining and Fukushima response.
- Pickering’s Capital Cost per MW DER declined slightly in 2015 due to a reduction in reliability improvements and other regulatory costs. These were offset by increased sustaining and performance improvement spending as well as higher Fukushima response costs.

Factors Contributing to Performance

- Both Darlington and Pickering are performing in the best quartile overall for the period.
- This performance is due to best and median quartile spending performance on information technology, enhancements, regulatory and sustaining investments.
- Fukushima costs at Darlington and Pickering are significantly lower than their American peers, contributing to the second quartile ranking for regulatory spending. Only units slated for permanent shutdown in the US have incurred similar expenditures. The difference in approach to Fukushima response between the Canadian and American utilities has resulted in lower costs.
- The favourable ranking in enhancements spending is due primarily to costs incurred by the peer group (Reactor vessel head replacements, steam generator replacements and Uprates) that would not be incurred by OPG due to technological differences.
- Spending on sustaining investments at Darlington is in the second quartile despite having increased period over period to support operations following the refurbishment commencing 2016. Pickering sustaining investments declined as projects to support operations to 2020 approaches completion.
• The performance in these areas is offset by third and fourth quartile spending in non-power block infrastructure and capital spares.
• Non-power block infrastructure spending at Darlington to support post-refurbishment operations continues to be higher than the majority of its peers.
• Investment in capital spares at both Darlington and Pickering has increased to support overhauls of aging equipment and support safe and reliable operations.
5.0 HUMAN PERFORMANCE

Methodology and Sources of Data

The Human Performance Error Rate metric has been selected to benchmark the performance of OPG’s Nuclear fleet against other INPO utilities in the area of Human Performance. This will ensure a continued focus on improving Human Performance by comparing OPG Nuclear stations to industry quartiles through the use of consistent and comparable data.

18-Month Human Performance Error Rate

![Bar Chart for 2015 18-Month Human Performance Error Rate]

- Darlington: Best Quartile = 0.0010, Median = 0.0030
- Pickering: Median = 0.0030
18-Month Human Performance Error Rate
(Events per 10k ISAR and Contractor Hours)
INPO North American Plant Level Benchmarking

Events per 10k ISAR Hours

2010 2011 2012 2013 2014 2015

Median
Best Quartile
Observations – 18 Month Human Performance Error Rate (INPO North American Plants)

2015 (18 Month Rolling Average)

- The 2015 18-month Human Performance Error Rate (HPER) continues to indicate improved year over year performance. The 2015 INPO best quartile was 0.0010 and the median quartile 0.0030 both of which were improved from 2014 HPER when the INPO best quartile was 0.0020, and the median quartile was 0.0040.

- Compared to the INPO peer group, at the end of 2015 the Darlington station (HPER 0.0031) remained in the third quartile (from .0062 in 2014) and the Pickering station (HPER 0.0055) moved to the third quartile (from 0.0089 in 2014).

Trend

- Darlington and Pickering have shown improved performance with Pickering station HPER moving up to the next quartile performance, while Darlington just missing the median ranking.

- Industry performance continues to improve year-over-year with respect to both top quartile and median quartile results with the exception of 2014, where the top quartile benchmark remained unchanged from 2013 (HPER 0.002) while the median quartile improved in 2014 to 0.0040 from 0.0050 in 2013.

- While high level indicators show improved performance, evaluations and event investigations show that there are areas for improvement including: setting, communicating or reinforcing of standards and expectations through effective coaching in the field; providing sufficient positive reinforcement to ensure that good behaviours are reinforced and performance shortfalls addressed.

Factors Contributing to Performance

- Characteristic of organizations that achieve top quartile performance in this benchmark area:
  - Field workers who understand and are focused on the task and ingrain good human performance behaviours in their work habits.
  - Supervisor/managers who positively shape field worker behaviours by providing effective coaching; and identify and address challenges to proficiency or unexpected conditions.
  - Standardized Department Event Day Reset criteria aligned to the industry and used as a performance indicator to identify moderate consequential events and enable performance comparisons and benchmarking opportunities.
  - Leveraging lower tier reporting as an opportunity to rectify underlying causal factors that may contribute to a potential ‘high consequence’ loss-of-control event.
  - Leaders who provide candid and timely feedback, reinforce positive behaviors, correct shortfalls, nurture ownership and create a culture of healthy accountability to improve performance and expectations.
In 2015, human performance at OPG Nuclear continued to receive significant focus. The Human Performance peer team worked to align the stations around common initiatives to drive improved performance. A fleet strategic plan was approved. The focus of the strategy is to improve coaching culture, establish consistent reinforcement of procedures and standards, and introduce a culture in which front-line workers and others are not penalized for actions, omissions or decisions taken by them which are commensurate with their experience and training, but where gross negligence, willful violations and destructive acts are not tolerated.

As stated above, the stations have demonstrated improvement in 2015. Ongoing monitoring of performance will provide evidence that performance continues to improve and will serve as a feedback mechanism to allow for adjustment of initiatives as appropriate.
6.0 MAJOR OPERATOR SUMMARY

Purpose

This section supplements the Executive Summary, providing more detailed comparison of the major operators of nuclear plants for three key metrics: WANO Nuclear Performance Index (NPI), Unit Capability Factor (UCF), and Total Generating Cost (TGC) per MWh. Although the benchmarking study has been primarily focused on operational performance comparison to COG CANDUs, this section of the report contemplates the larger industry by capturing OPG Nuclear’s performance against North American PWR and PHWR operators in addition to the international CANDU panel. Operator level summary results are the average (mean) of the results across all plants managed by the given operator. These comparisons provide additional context, but the detailed data in the previous sections provide a more complete picture of plant by plant performance. The WANO NPI and UCF are calculated as the mean of all unit performance for a specific operator. The TGC per MWh is the mean of plant level data because costs are not allocated to specific units within the EUCG industry panel.

WANO Nuclear Performance Index Analysis

The WANO Nuclear Performance Index (NPI) results for the operators in 2015 are illustrated in the graph below. OPG Nuclear performance ranking fell from 2014 shown in Table 3.

*See Table 7 in the Appendix for listing of operators and plants.*
In 2015, OPG ranked 23rd, with an NPI of 74.6. OPG’s NPI performance slightly decreased by 0.85 and dropped by one compared to the 2014 ranking. Darlington performed better overall than Pickering. In 2015, Darlington’s NPI performance was unfavourably impacted by the 2015 Vacuum Building station containment outage and higher FLR. Refer to Section 3.0 for further information.

The NPI rankings of the major operators from 2010 to 2015 are listed in Table 3. The list and ranking of operators has been updated to reflect any industry developments if applicable.

**Table 3: Average WANO NPI Rankings**

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</tr>
</tbody>
</table>

*NA: Not applicable due to multi-year refurbishment of the generating Station.

**Note:** Four operators are no longer ranked in 2015 (reason for 28 ranked operators in 2010 vs. 24 in 2015). These operators were removed as a result of plant acquisitions or closures. All 2010-2014 rankings and numbers are carried over from previous Benchmarking reports.
Unit Capability Factor Analysis

Unit Capability Factor (UCF) is the ratio of available energy generation over a given time period to the reference energy generation of the same time period, expressed as a percentage. Reference energy generation is the energy that could be produced if the unit were operating continuously at full power under normal conditions. Since nuclear generation plants are large fixed assets, the extent to which these assets generate reliable power is the key to both their operating and financial performance.

A comparison of UCF values for major nuclear operators is presented in the graph below. UCF is expressed as a two-year average for all operators except for OPG Nuclear, which includes a three-year average for the Darlington station and a two-year average for Pickering to reflect each plant’s respective outage cycle. OPG Nuclear achieved a rolling average UCF of 80.0% and ranked 23 out of 24 operators in the WANO data set. The list and ranking of operators has been updated to reflect any industry developments if applicable.

* See Table 7 in the Appendix for listing of operators and plants.
** OPG unit values averaging to a rolling average UCF of 80.0% in 2015 are shown below:

<table>
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<tr>
<th>Unit</th>
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<td>72.8</td>
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<td>79.4</td>
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<td>74.7</td>
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<table>
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<td>82.5</td>
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<td>82.9</td>
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<td>Darlington 3</td>
<td>87.0</td>
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<td>Darlington 4</td>
<td>83.4</td>
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</table>
Rankings for the major operators for UCF over the past six years are provided in Table 4 below.

### Table 4: Rolling Average Unit Capability Factor Rankings

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**Note:** Four operators are no longer ranked in 2015 (reason for 28 ranked operators in 2010 vs. 24 in 2015). These operators were removed as a result of plant acquisitions or closures. All 2010-2014 rankings and numbers are carried over from previous Benchmarking reports.

### Total Generating Cost/MWh Analysis

The 3-year Total Generating Cost results for the major operators in 2015 are displayed in the graph below. Total Generating Costs are defined as total operating costs plus capital costs and fuel costs of all plants that the operator operates in 2013-2015. This value is divided by the total net generation of all plants that the operator operates for the same period and is provided as a three-year average. OPG Nuclear ranked 12th, with a 3-year Total Generation Cost of $54.58 per MWh.
*OPG plant values of 3-year rolling average TGC per MWh are shown below:

<table>
<thead>
<tr>
<th>Unit</th>
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<td>Darlington</td>
<td>$44.38/MWh</td>
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<td>Pickering</td>
<td>$67.36/MWh</td>
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**Table 5: Three-Year Total Generating Cost per MWh Rankings**

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</table>

**Note:** Two operators have been removed due to acquisitions by the other operators in the panel (reason for 14 ranked operators in 2010 vs. 13 in 2015).
Total Generating Cost is comprised of: (a) Non-Fuel Operating Costs, plus (b) Fuel Costs, plus (c) Capital Costs. Table 6 below shows the relative contribution of these cost components to Total Generating Cost and compares OPG’s costs to those of all EUCG operators.

**Table 6: EUCG Indicator Results Summary (Operator Level)**

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<th>EUCG Indicator Results Summary</th>
<th>OPG Average</th>
<th>EUCG Major Operators*</th>
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<td>EUCG Major Operators*</td>
<td>Units</td>
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<td>3-Yr. Fuel Costs per MWh</td>
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<td>3-Yr. Capital Costs per MWh</td>
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<td>$54.58</td>
<td>$41.70</td>
<td>$40.94</td>
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*See Table 8 in the appendix for list of operators included.

Notes: This summary contains the average of all plant results per operator. The calculation of the EUCG 3-Yr Total Generating Costs per MWh median and best quartiles has been modified. Previously, 3-Yr TGC/MWh was derived by summing the quartile rankings of the three sub-components of TGC/MWh. The revised approach derives the 3-Yr TGC/MWh by reference to actual quartile performance.
7.0 APPENDIX

Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>ALARA</td>
<td>As Low As Reasonably Achievable</td>
</tr>
<tr>
<td>BWR</td>
<td>Boiling Water Reactor</td>
</tr>
<tr>
<td>CANDU</td>
<td>CANada Deuterium Uranium (type of PHWR)</td>
</tr>
<tr>
<td>CEA</td>
<td>Canadian Electricity Association</td>
</tr>
<tr>
<td>COG</td>
<td>CANDU Owners Group</td>
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<tr>
<td>DER</td>
<td>Design Electrical Rating</td>
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<td>Electric Utility Cost Group</td>
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<td>INPO</td>
<td>Institute of Nuclear Power Operators</td>
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<td>OPG</td>
<td>Ontario Power Generation</td>
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<tr>
<td>PHWR</td>
<td>Pressurized Heavy Water Reactor</td>
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<tr>
<td>PWR</td>
<td>Pressurized Water Reactor</td>
</tr>
<tr>
<td>WANO</td>
<td>World Association of Nuclear Operators</td>
</tr>
</tbody>
</table>

Safety and Reliability Definitions

The following definitions are summaries extracted from industry peer group databases.

**All Injury Rate** is the average number of fatalities, total temporary disabilities, permanent total disabilities, permanent partial disabilities and medical attention injuries per 200,000 hours worked.

**Industrial Safety Accident Rate** is defined as the number of accidents for all utility personnel (permanently or temporarily) assigned to the station, that result in one or more days away from work (excluding the day of the accident) or one or more days of restricted work (excluding the day of the accident), or fatalities, per 200,000 man-hours worked. The selection of 200,000 man-hours worked or 1,000,000 man-hours worked for the indicator will be made by the country collecting the data, and international data will be displayed using both scales. Contractor personnel are not included for this indicator.

**Collective Radiation Exposure**, for purposes of this indicator, is the total external and internal whole body exposure determined by primary dosimeter (thermoluminescent dosimeter (TLD) or film badge), and internal exposure calculations. All measured exposure should be reported for station personnel, contractors, and those personnel visiting the site or station on official utility business.

Visitors, for purposes of this indicator, include only those monitored visitors who are visiting the site or station on official utility business.
Airborne Tritium Emissions per Unit: Tritium emissions to air are one of the sites’ leading components of dose to the public. By specific tracking of tritium emissions, the site can maintain or reduce dose. Reducing OPG Nuclear’s dose to the public demonstrates continuous improvement in operations.

Fuel Reliability Index is inferred from fission product activities present in the reactor coolant. Due to design differences, this indicator is calculated differently for different reactor types. For PHWR’s, the indicator is defined as the steady-state primary coolant iodine-131 activity (Becquerels/gram or Microcuries/gram), corrected for the tramp uranium contribution and power level, and normalized to a common purification rate.

Unplanned automatic reactor trips (SCRAMS) is defined as the number of unplanned automatic reactor trips (reactor protection system logic actuations) that occur per 7,000 hours of critical operation. The indicator is further defined as follows:

- Unplanned means that the trip was not an anticipated part of a planned test.
- Trip means the automatic shutdown of the reactor by a rapid insertion of negative reactivity (e.g., by control rods, liquid injection shutdown system, etc.) that is caused by actuation of the reactor protection system. The trip signal may have resulted from exceeding a set point or may have been spurious.
- Automatic means that the initial signal that caused actuation of the reactor protection system logic was provided from one of the sensors’ monitoring plant parameters and conditions, rather than the manual trip switches or, in certain cases described in the clarifying notes, manual turbine trip switches (or pushbuttons) provided in the main control room.
- Critical means that, during the steady-state condition of the reactor prior to the trip, the effective multiplication factor ($k_{eff}$) was essentially equal to one.
- The value of 7,000 hours is representative of the critical hours of operation during a year for most plants, and provides an indicator value that typically approximates the actual number of scrams occurring during the year.

The safety system performance indicator is defined for the many different types of nuclear reactors within the WANO membership. To facilitate better understanding of the indicator and applicable system scope for these different type reactors a separate section has been developed for each reactor type.

Also, because some members have chosen to report all data on a system train basis versus the "standard" overall system approach, special sections have also been developed for those reactor types where train reporting has been chosen. (The resulting indicator values resulting from these methods are essentially the same.)

Each section is written specifically for that reactor type and reporting method. If a member desires to understand how a different member is reporting or wishes to better understand that member’s indicator, it should consult the applicable section.

The safety systems monitored by this indicator are the following:
PHWRs

Although the PHWR safety philosophy considers other special safety systems to be paramount to public safety, the following PHWR safety and safety-related systems were chosen to be monitored in order to maintain a consistent international application of the safety system performance indicators:

- Auxiliary boiler feedwater system
- Emergency AC power
- High pressure emergency coolant injection system

These systems were selected for the safety system performance indicator based on their importance in preventing reactor core damage or extended plant outage. Not every risk important system is monitored. Rather, those that are generally important across the broad nuclear industry are included within the scope of this indicator. They include the principal systems needed for maintaining reactor coolant inventory following a loss of coolant, for decay heat removal following a reactor trip or loss of main feedwater, and for providing emergency AC power following a loss of plant off-site power. (Gas cooled reactors have an additional decay heat removal system instead of the coolant inventory maintenance system)

Except as specifically stated in the definition and reporting guidance, no attempt is made to monitor or give credit in the indicator results for the presence of other systems at a given plant that add diversity to the mitigation or prevention of accidents. For example, no credit is given for additional power sources that add to the reliability of the electrical grid supplying a plant because the purpose of the indicator is to monitor the effectiveness of the plant’s response once the grid is lost.

The Nuclear Performance Index Method 4 is an INPO sponsored performance measure, and is a weighted composite of ten WANO Performance Indicators related to safety and production performance reliability.

The NPI is used for trending nuclear station and unit performance, and comparing the results to the median or quartile values of a group of units, to give an indication of relative performance. The quarterly NPI has also been used to trend the performance and monitor the effectiveness of various improvement programs in achieving top quartile performance and allows nuclear facilities to benchmark their achievements against other nuclear plants worldwide.

The Forced Loss Rate (FLR) is defined as the ratio of all unplanned forced energy losses during a given period of time to the reference energy generation minus energy generation losses corresponding to planned outages and any unplanned outage extensions of planned outages, during the same period, expressed as a percentage.

Unplanned energy losses are either unplanned forced energy losses (unplanned energy generation losses not resulting from an outage extension) or unplanned outage extension of planned outage energy losses.

Unplanned forced energy loss is energy that was not produced because of unplanned shutdowns or unplanned load reductions due to causes under plant management control when the unit is
considered to be at the disposal of the grid dispatcher. Causes of forced energy losses are considered to be unplanned if they are not scheduled at least four weeks in advance. Causes considered to be under plant management control are further defined in the clarifying notes.

Unplanned outage extension energy loss is energy that was not produced because of an extension of a planned outage beyond the original planned end date due to originally scheduled work not being completed, or because newly scheduled work was added (planned and scheduled) to the outage less than four weeks before the scheduled end of the planned outage.

Planned energy losses are those corresponding to outages or power reductions which were planned and scheduled at least four weeks in advance (see clarifying notes for exceptions).

Reference energy generation is the energy that could be produced if the unit were operated continuously at full power under reference ambient conditions throughout the given period. Reference ambient conditions are environmental conditions representative of the annual mean (or typical) ambient conditions for the unit.

Unit Capability Factor is defined as the ratio of the available energy generation over a given time period to the reference energy generation over the same time period, expressed as a percentage. Both of these energy generation terms are determined relative to reference ambient conditions.

Available energy generation is the energy that could have been produced under reference ambient conditions considering only limitations within control of plant management, i.e., plant equipment and personnel performance, and work control.

Reference energy generation is the energy that could be produced if the unit were operated continuously at full power under reference ambient conditions.

Reference ambient conditions are environmental conditions representative of the annual mean (or typical) ambient conditions for the unit.

The Chemistry Performance Indicator compares the concentration of selected impurities and corrosion products to corresponding limiting values. Each parameter is divided by its limiting value, and the sum of these ratios is normalized to 1.0. For BWRs and most PWRs, these limiting values are the medians for each parameter, based on data collected in 1993, thereby reflecting recent actual performance levels. For other plants, they reflect challenging targets. If an impurity concentration is equal to or better than the limiting value, the limiting value is used as the concentration. This prevents increased concentrations of one parameter from being masked by better performance in another. As a result, if a plant is at or below the limiting value for all parameters, its indicator value would be 1.0, the lowest chemistry indicator value attainable under the indicator definition. The following is used to determine each unit’s chemistry indicator value:

- PWRs with recirculating steam generators and VVERs
  - Steam generator blowdown chloride
  - Steam generator blowdown cation conductivity
  - Steam generator blowdown sulphate
  - Steam generator blowdown sodium
- Final feedwater iron
- Final feedwater copper (not applicable to PWRs with I-800 steam generator tubes)
- Condensate dissolved oxygen (only applicable to PWRs with I-800 steam generator tubes)
- Steam generator molar ratio target range (by reporting the upper and lower range limits (as "from" and "to" values when using molar ratio control)
- Steam generator actual molar ratio (if reporting molar ratio control data)
- Feedwater oxygen
- Feedwater pH value at 270deg. C

- PWRs with once through steam generators
  - Final feedwater chloride
  - Final feedwater sulfate
  - Final feedwater sodium
  - Final feedwater iron
  - Final feedwater copper

- Pressurized heavy water reactors (PHWRs)
  - *Inconel-600 or Monel tubes
    - Steam generator blowdown chloride
    - Steam generator blowdown sulfate
    - Steam generator blowdown sodium
    - Final feedwater iron
    - Final feedwater copper
    - Final feedwater dissolved oxygen
  - Incoloy-800 tubes
    - Steam generator blowdown chloride
    - Steam generator blowdown sulfate
    - Steam generator blowdown sodium
    - Final feedwater iron
    - Final feedwater dissolved oxygen

- PHWRs on molar ratio control
  - Steam generator blowdown chloride
  - Steam generator blowdown sulfate
  - Final feedwater iron
  - Final feedwater copper
  - Feedwater dissolved oxygen
  - Steam generator molar ratio target range (by reporting the upper and lower range limits (as "from" and "to" values)
  - Steam generator actual molar ratio

**Online Deficient Maintenance Backlog** is the average number of active on-line maintenance work orders per operating unit classified as Deficient Critical (DC) or Deficient Non-Critical
(DN) that can be worked on without requiring the unit shutdown. This metric identifies deficiencies or degradation of plant equipment components that need to be remedied, but which do not represent a loss of functionality of the component or system.

**Online Corrective Maintenance Backlog** is the average number of active on-line maintenance work orders per operating unit classified as Corrective Critical (CC) or Corrective Non-Critical (CN) that can be worked on without requiring the unit shutdown. This metric identifies deficiencies or degradation of components that need to be remedied, and represents a loss of functionality of a major component or system.

On-line maintenance is maintenance that will be performed with the main generator connected to the grid.

**Value for Money Definitions**

The following definition summaries are taken from the *January 2013 EUCG Nuclear Committee Nuclear Database Instructions*.

**Capital Costs ($)**
All costs associated with improvements and modifications made during the reporting year. These costs should include design and installation costs in addition to equipment costs. Other miscellaneous capital additions such as facilities, computer equipment, moveable equipment, and vehicles should also be included. These costs should be fully burdened with indirect costs, but exclude AFUDC (interest and depreciation).

**Fuel ($)**
The total cost associated with a load of fuel in the reactor which is burned up in a given year.

**Net Generation (Gigawatt Hours)**
The gross electrical output of the unit measured at the output terminals of the turbine-generator minus the normal station service loads during the hours of the reporting period, expressed in Gigawatt hours (GWh). Negative quantities should not be used.

**Design Electrical Rating (DER)**
The nominal net electrical output of a unit, specified by the utility and used for plant design (DER net expressed in MWe). Design Electrical Rating should be the value that the unit was certified/designed to produce when constructed. The value would change if a power uprate was completed. After a power uprate, the value should be the certified or design value resulting from the uprate.

**Operating Costs ($)**
The operating cost is to identify all relevant costs to operate and maintain the nuclear operations in that company. It includes the cost of labour, materials, purchased services and other costs, including administration and general.

**Total Generating Costs ($)**
The sum of total operating costs and capital costs as above.
Total Operating Costs ($)
The sum of operating costs and fuel costs as above.

Note: Capital costs, fuel costs, operating costs and Total Generating Costs are divided by net generation as above to obtain per MWh results. Capital costs are also divided by MW DER to obtain MW results.

Human Performance Definitions

The following definition summary is taken from the Institute of Nuclear Power Operations (INPO) database.

Human Performance Error Rate (# per ISAR and Contractor Hours)

The Human Performance Error Rate metric represents the number of site level human performance events in an 18-month period per 10,000 ISAR hours worked (including on site supplemental personnel). The formula used is:

\[
\left\{ \frac{\text{(\# of S-EFDRs)}}{\text{(Total ISAR Hours + Total Contractor Hours)}} \right\} \times 10,000 \text{ Hours} \quad \text{(Calculated as an 18-month rolling average)}
\]

INPO guidelines define non utility personnel to include contractor, supplemental personnel assigned to perform work activities on site or at other buildings that directly support station operation. This includes personnel who deliver and receive equipment, deliver fuel oil, remove trash and radioactive waste, and provide building and grounds maintenance within the owner-controlled areas or facilities that support the station.

INPO defines an event to occur as a result of the following:

An initiating action (error) by an individual or group of individuals (event resulting from an active error) or an initiating action (not an error) by an individual or group of individuals during an activity conducted as planned (event resulting from a flawed defense or latent organizational weakness). They may be related to Nuclear Safety, Radiological Safety, Industrial Safety, Facility Operations or considered to be a Regulatory Event reportable to a regulator or governing agency. OPG Nuclear’s criteria for defining station event free day resets have been developed based on INPO guidelines. However, the definition may differ slightly due to adaptation resulting from technological differences.
### Table 7: WANO Panel

<table>
<thead>
<tr>
<th>Operator</th>
<th>Plant</th>
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</thead>
<tbody>
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<tr>
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<td>Bruce Power</td>
<td>Bruce A</td>
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<td></td>
<td>Bruce B</td>
</tr>
<tr>
<td>Dominion Generation</td>
<td>Millstone</td>
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<tr>
<td></td>
<td>North Anna</td>
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<tr>
<td></td>
<td>Surry</td>
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<tr>
<td>Duke Energy</td>
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<td>Mcguire</td>
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<td>Oconee</td>
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<td>Robinson</td>
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<tr>
<td>Entergy Nuclear</td>
<td>Arkansas Nuclear One</td>
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<td>Palisades</td>
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<td>Braidwood</td>
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<td>Byron</td>
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<td>Three Mile Island</td>
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<td>Calvert Cliffs</td>
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<td>Ginna</td>
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<td>FirstEnergy Nuclear Operating Co.</td>
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</tr>
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<td>Davis-Besse</td>
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<td>Embalse</td>
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<td>Qinshan 3</td>
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<td>Wolsong B</td>
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<td>Comanche Peak</td>
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<td>Point Lepreau</td>
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<tr>
<td>NextEra Energy Resources</td>
<td>Point Beach</td>
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<tr>
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<td>Seabrook</td>
</tr>
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<td>Fort Calhoun</td>
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<td>Vogtle</td>
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Table 8: EUCG Panel

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<td>St Lucie</td>
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<td>Bruce B</td>
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<td>Turkey Point</td>
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<tr>
<td><strong>Dominion Generation</strong></td>
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<td>NextEra Energy Resources</td>
<td>Point Beach</td>
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<td>North Anna</td>
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<td>Seabrook</td>
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<td>Surry</td>
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<td>Duke Energy</td>
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<td>Ontario Power Generation</td>
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<td>Fitzpatrick</td>
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Remaining EUCG Members

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<td>Cooper</td>
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<td>Fermi</td>
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<td>V.C. Summer</td>
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<td>Energy Northwest</td>
<td>Columbia</td>
<td>Company (SCE&amp;G)</td>
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<td>Comanche Peak</td>
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<td>South Texas</td>
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### Table 9: COG CANDUs

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<td>Bruce B</td>
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<tr>
<td>China (CNNP)</td>
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<tr>
<td>NASA</td>
<td>Embalse</td>
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<td>Korea (KHNP)</td>
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<td></td>
<td>Wolsong B</td>
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<tr>
<td>New Brunswick Power</td>
<td>Point Lepreau</td>
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<td>OPG</td>
<td>Darlington</td>
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<td>Pickering</td>
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### Table 10: CEA Members

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<td>Manitoba Hydro</td>
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<td>Maritime Electric Company</td>
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<td>Nalcor Energy</td>
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<td>Brookfield Renewable Energy Group</td>
<td>New Brunswick Power</td>
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<td>Capital Power Corporation</td>
<td>Newfoundland Power</td>
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<td>City of Medicine Hat, Electric Utility</td>
<td>Northwest Territories Power Corp.</td>
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<tr>
<td>Columbia Power Corporation</td>
<td>Nova Scotia Power</td>
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<td>Oakville Hydro Corp.</td>
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<td>EPCOR</td>
<td>Saint John Energy</td>
</tr>
<tr>
<td>FortisAlberta Inc.</td>
<td>Saskatoon Light &amp; Power</td>
</tr>
<tr>
<td>FortisBC Inc.</td>
<td>SaskPower</td>
</tr>
<tr>
<td>Horizon Utilities Corp</td>
<td>Toronto Hydro Corp.</td>
</tr>
<tr>
<td>Hydro One</td>
<td>TransCanada</td>
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<tr>
<td>Hydro Ottawa</td>
<td>Yukon Energy Corp.</td>
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</table>
Table 11: INPO Members for Human Performance Error Rate

<table>
<thead>
<tr>
<th>Plant</th>
<th>Plant</th>
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<tbody>
<tr>
<td>Arkansas Nuclear One (ANO)</td>
<td>Millstone</td>
</tr>
<tr>
<td>Beaver Valley</td>
<td>Monticello</td>
</tr>
<tr>
<td>Braidwood</td>
<td>Nine Mile Point</td>
</tr>
<tr>
<td>Browns Ferry</td>
<td>North Anna</td>
</tr>
<tr>
<td>Brunswick</td>
<td>Oconee</td>
</tr>
<tr>
<td>Byron</td>
<td>Oyster Creek</td>
</tr>
<tr>
<td>Callaway</td>
<td>Palisades</td>
</tr>
<tr>
<td>Calvert Cliffs</td>
<td>Palo Verde</td>
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<tr>
<td>Catawba</td>
<td>Peach Bottom</td>
</tr>
<tr>
<td>Clinton</td>
<td>Perry</td>
</tr>
<tr>
<td>Columbia Gen</td>
<td>Pilgrim</td>
</tr>
<tr>
<td>Comanche Peak</td>
<td>Point Beach</td>
</tr>
<tr>
<td>Cook</td>
<td>Prairie Island</td>
</tr>
<tr>
<td>Cooper</td>
<td>Quad Cities</td>
</tr>
<tr>
<td>Davis-Besse</td>
<td>River Bend</td>
</tr>
<tr>
<td>Diablo Canyon</td>
<td>Robinson</td>
</tr>
<tr>
<td>Dresden</td>
<td>Salem</td>
</tr>
<tr>
<td>Duane Arnold</td>
<td>Seabrook</td>
</tr>
<tr>
<td>Farley</td>
<td>Sequoyah</td>
</tr>
<tr>
<td>Fermi 2</td>
<td>South Texas</td>
</tr>
<tr>
<td>Fitzpatrick</td>
<td>St. Lucie</td>
</tr>
<tr>
<td>Fort Calhoun</td>
<td>Summer</td>
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<tr>
<td>Ginna</td>
<td>Surry</td>
</tr>
<tr>
<td>Grand Gulf</td>
<td>Susquehanna</td>
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<tr>
<td>Harris</td>
<td>Three Mile Island</td>
</tr>
<tr>
<td>Hatch</td>
<td>Turkey Point</td>
</tr>
<tr>
<td>Hope Creek</td>
<td>Vermont Yankee</td>
</tr>
<tr>
<td>Indian Point</td>
<td>Vogtle</td>
</tr>
<tr>
<td>LaSalle</td>
<td>Waterford</td>
</tr>
<tr>
<td>Limerick</td>
<td>Watts Bar</td>
</tr>
<tr>
<td>McGuire</td>
<td>Wolf Creek</td>
</tr>
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</table>
Table 12: INPO Members for On-Line Maintenance Backlogs

<table>
<thead>
<tr>
<th>Plant</th>
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</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>Beaver Valley</td>
<td>Nine Mile Point</td>
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<tr>
<td>Browns Ferry</td>
<td>Oconee</td>
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<tr>
<td>Brunswick</td>
<td>Oyster Creek</td>
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<tr>
<td>Byron</td>
<td>Palisades</td>
</tr>
<tr>
<td>Callaway</td>
<td>Palo Verde</td>
</tr>
<tr>
<td>Calvert Cliffs</td>
<td>Peach Bottom</td>
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<tr>
<td>Catawba</td>
<td>Perry</td>
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<tr>
<td>Clinton</td>
<td>Pilgrim</td>
</tr>
<tr>
<td>Columbia Gen</td>
<td>Point Beach</td>
</tr>
<tr>
<td>Comanche Peak</td>
<td>Prairie Island</td>
</tr>
<tr>
<td>Cook</td>
<td>Quad Cities</td>
</tr>
<tr>
<td>Cooper</td>
<td>River Bend</td>
</tr>
<tr>
<td>Davis-Besse</td>
<td>Robinson</td>
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<tr>
<td>Diablo Canyon</td>
<td>Salem</td>
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<tr>
<td>Dresden</td>
<td>Seabrook</td>
</tr>
<tr>
<td>Duane Arnold</td>
<td>Sequoyah</td>
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<tr>
<td>Farley</td>
<td>South Texas</td>
</tr>
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<td>Fermi 2</td>
<td>St. Lucie</td>
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<tr>
<td>Fitzpatrick</td>
<td>Summer</td>
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<tr>
<td>Ginna</td>
<td>Surry</td>
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<tr>
<td>Grand Gulf</td>
<td>Susquehanna</td>
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<td>Harris</td>
<td>Three Mile Island</td>
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<tr>
<td>Hatch</td>
<td>Turkey Point</td>
</tr>
<tr>
<td>Hope Creek</td>
<td>Vermont Yankee</td>
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<tr>
<td>Indian Point</td>
<td>Vogtle</td>
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<tr>
<td>LaSalle</td>
<td>Waterford</td>
</tr>
<tr>
<td>Limerick</td>
<td>Watts Bar</td>
</tr>
<tr>
<td>McGuire</td>
<td>Wolf Creek</td>
</tr>
<tr>
<td>Millstone</td>
<td></td>
</tr>
</tbody>
</table>
Table 13: NPI Plant Level Performance Summary (North American Panel)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>NPI Max</th>
<th>Best Quartile</th>
<th>Median</th>
<th>Pickering</th>
<th>Darlington</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolling Average Industrial Safety Accident Rate (#/200k hours worked)</td>
<td>0.20</td>
<td>0.00</td>
<td>0.00</td>
<td>0.05</td>
<td>0.08</td>
</tr>
<tr>
<td>Rolling Average Collective Radiation Exposure (person-rem per unit)</td>
<td>80.00</td>
<td>32.08</td>
<td>47.75</td>
<td>97.72</td>
<td>79.55</td>
</tr>
<tr>
<td>Fuel Reliability Index (microcuries per gram)</td>
<td>0.000500</td>
<td>0.000001</td>
<td>0.00008</td>
<td>0.000421</td>
<td>0.000122</td>
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<tr>
<td>2-Year Reactor Trip Rate (# per 7,000 hours)</td>
<td>0.50</td>
<td>0.00</td>
<td>0.21</td>
<td>0.17</td>
<td>0.13</td>
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<tr>
<td>3-Year Auxiliary Feedwater System Unavailability (#)</td>
<td>0.0200</td>
<td>0.0028</td>
<td>0.0041</td>
<td>0.0115</td>
<td>0.0000</td>
</tr>
<tr>
<td>3-Year Emergency AC Power Unavailability (#)</td>
<td>0.0250</td>
<td>0.0102</td>
<td>0.0133</td>
<td>0.0030</td>
<td>0.0000</td>
</tr>
<tr>
<td>3-Year High Pressure Safety Injection Unavailability (#)</td>
<td>0.0200</td>
<td>0.0019</td>
<td>0.0032</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Rolling Average Forced Loss Rate (%)</td>
<td>1.00</td>
<td>0.58</td>
<td>1.30</td>
<td>6.85</td>
<td>3.65</td>
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<tr>
<td>Rolling Average Unit Capability Factor (%)</td>
<td>92.00</td>
<td>92.61</td>
<td>90.00</td>
<td>77.32</td>
<td>83.96</td>
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<tr>
<td>Rolling Average Chemistry Performance Indicator (Index)</td>
<td>1.01</td>
<td>1.00</td>
<td>1.00</td>
<td>1.06</td>
<td>1.00</td>
</tr>
<tr>
<td>WANO NPI (Index)</td>
<td>Not Applicable</td>
<td>98.7</td>
<td>92.6</td>
<td>68.5</td>
<td>83.7</td>
</tr>
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</table>
SEC Interrogatory #64

Issue Number: 6.2

Issue: Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

Interrogatory

Reference:
[F2/1/1, Attach 2]

With respect to the Goodnight Consulting Benchmarking Report:

a. [p.14] Please explain why each of the ‘CANDU-Specific Exclusions’ functions are specific to CANDU reactors so that they could not be benchmarked.

b. [p.22] Please explain any changes to the raw adjustments from the report provided in EB-2013-0321.

c. [p.24] Please explain the basis for the 1.8 scaling factor.


e. [p.29] Please provide a copy of Appendix A.

f. OPG has said that in 2016 it will be at or close to benchmark. Please confirm that OPG means that its 2016 staffing will be at or close to the 2014 benchmarking as identified in the Goodnight Consulting Benchmarking Report. If not, please provide the basis for its statement.

g. [p.31] Based on the premise of part (f), please provide a similar table to page 31 that shows which functions OPG is above or below the benchmarking.

Response

a. As indicated at Ex. F2-1-1 Attachment 2, p. 14, the CANDU-specific exclusions are unique to CANDU design with no comparable PWR activity.

b. The raw adjustments in the 2014 study are equivalent to the sum of raw adjustments and ratio adjustments in the 2013 study, with the exception of the Management function. A separate methodology was used for developing the staffing benchmark for the 2014 study for the Management function.
c. Goodnight Consulting’s report, “Nuclear Staffing Benchmarking Analysis” for OPG dated February 3, 2012, Appendix D p. 61 at EB-2013-0321 Ex. F5-1-1 Part a describes factors in scaling from 2-units to 4-units, as follows:

- “As a consulting team, which included experienced nuclear plant engineers and operators, we developed the scaling factors based on our experience and best estimates – for most functions, we applied a scaling factor of 1.8 times the 2-unit level for a 4-unit plant, which was based on staffing levels we have observed at several international 4-unit sites relative to our benchmark 2-unit sites
- Several exceptions from the 1.8x scaling factor were applied…”

d. Refer to Attachment 1 to this response for the 2014 Goodnight Consulting US Nuclear Plant Staffing Newsletter.

e. Appendix A “OPG Data by Staffing Function” includes details by employee name and therefore cannot be released.

f. Confirmed; the statement refers to 2016 OPG overall staffing being at or close to Goodnight’s overall 2014 benchmark (see Ex. L-6.2-19 SEP-3).

g. Goodnight Consulting has not conducted a subsequent review. OPG conducted an internal analysis of functional staffing as of March 2016, which resulted in the following variances as compared to Goodnight’s 2014 functional benchmarks.
<table>
<thead>
<tr>
<th>Category</th>
<th>Variance</th>
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</thead>
<tbody>
<tr>
<td>Operations Support</td>
<td>189</td>
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<tr>
<td>Maintenance/Construction Support</td>
<td>181</td>
</tr>
<tr>
<td>Facilities</td>
<td>112</td>
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<tr>
<td>Contracts/Purchasing</td>
<td>52</td>
</tr>
<tr>
<td>Radwaste/Decon</td>
<td>37</td>
</tr>
<tr>
<td>Eng.--Computer</td>
<td>36</td>
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<tr>
<td>Chemistry</td>
<td>22</td>
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<tr>
<td>Outage Management</td>
<td>20</td>
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<tr>
<td>Eng.--Modification</td>
<td>20</td>
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<td>Project Management</td>
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<td>Eng.--Reactor</td>
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<td>Human Resources</td>
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<td>QA</td>
<td>8</td>
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<td>HP Support</td>
<td>7</td>
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<td>Training</td>
<td>4</td>
</tr>
<tr>
<td>Budget/Finance</td>
<td>3</td>
</tr>
<tr>
<td>Admin/Clerical</td>
<td>3</td>
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<tr>
<td>Safety/Health</td>
<td>2</td>
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<td>Nuclear Safety Review</td>
<td>-2</td>
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<tr>
<td>QC/NDE</td>
<td>-3</td>
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<tr>
<td>Materials Management</td>
<td>-3</td>
</tr>
<tr>
<td>Management</td>
<td>-4</td>
</tr>
<tr>
<td>Emergency Planning</td>
<td>-4</td>
</tr>
<tr>
<td>Communications</td>
<td>-4</td>
</tr>
<tr>
<td>Eng.--Procurement</td>
<td>-8</td>
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<tr>
<td>Nuclear Fuels</td>
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<tr>
<td>Management Assist</td>
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</tr>
<tr>
<td>Environmental</td>
<td>-14</td>
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<tr>
<td>Document Control</td>
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<td>ALARA</td>
<td>-24</td>
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<td>Licensing</td>
<td>-34</td>
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<tr>
<td>Scheduling</td>
<td>-37</td>
</tr>
<tr>
<td>Fire Protection</td>
<td>-42</td>
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<tr>
<td>Design/Drafting</td>
<td>-65</td>
</tr>
<tr>
<td>Warehouse</td>
<td>-72</td>
</tr>
<tr>
<td>Eng.--Plant</td>
<td>-72</td>
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<tr>
<td>HP Applied</td>
<td>-95</td>
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<tr>
<td>Eng.--Technical</td>
<td>-107</td>
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<tr>
<td>Maintenance/Construction</td>
<td>-119</td>
</tr>
<tr>
<td>Operations</td>
<td>-134</td>
</tr>
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</table>
2014 U.S. Nuclear Plant Staffing

Staffing Levels Resume Upward Trend

Goodnight Consulting has completed our annual survey of U.S. nuclear plant staffing. The data shows that staffing levels in the industry have increased significantly since last year. Average staffing has increased by 2.9%, reaching the industry’s highest levels since 2001. In the seven year period since the record low 2007, the index has increased from 78.6 to 85.7, a total increase of 7.1%.

1-Unit and 2-Unit Plants Increased Staffing

2-Unit plants have increased staffing since 2013, rising from 1065 to 1089, a 2.2% increase. 1-Units increased by 5.3% from 798 to 840. Average staffing at 3-Unit Plants staffing increased by 55 personnel. 2-Unit plants are up from 1072 in 2007, a 1.6% increase. 1-Unit plants have increased from 757 in 2007 to 840, an 11% increase.

Goodnight Consulting

Goodnight Consulting provides management consulting services to the power industry. Our staff of experienced consultants provides counsel focusing on strategic planning, work force planning, cultural analyses, staffing benchmarking, organizational analyses, HR services, and process analyses and redesign. We have provided services to most of the companies operating U.S. nuclear plants, as well as a number of clients in the international nuclear community.
Staffing has Increased for both PWRs and BWRs

2-Unit PWR plants have seen a increase in staffing since 2013, going up by 2.7% to 1084. 1-Unit PWRs have shown a 1.1% increase from 816 to 825. 2-Unit BWRs increased from 1088 to 1100 (1.1%) since last year, and 1-Unit BWRs have significantly increased staffing from 782 to 854, a 9% change.

Fleets and 1-Unit Non-Fleet Sites have Increased Staffing

Since 2013, fleets have increased their staffing at both 1-Unit and 2-Unit sites. 2-Unit fleet plants increased by 32 personnel, and 1-Units increased by 54 (3.0% and 6.6%, respectively). 1-Unit Stand-Alone Sites also increased by 27 (2.9%). 2-Unit stand-alone plants have shown the only decrease in personnel, by 16 (-1.3%).

Lowest Quartile Staffing Increased from 2013

For 2-Unit plants, the Lowest Quartile is at 921, up 3.9% from 885 in 2007; and up 0.1% from 2013. The 2-Unit Staffing lowest quartile is the highest it has been in 11 years, and still appears to be increasing. 1-Unit plants have increased significantly this year, with the 2013 Lowest Quartile of 721 up 3.3% from the recent dip to 697 in 2013, and up 7.9% from 664 during the industry low-staffing period in 2007.
Capital Baskets are Increasing Across the Industry due to Cumulative Impacts

The US Nuclear Industry has labeled this group of common drivers for change as Cumulative Impacts. Most of the Cumulative Impacts have created a significant increase in capital projects budgets, which are a large portion of overall staffing increases. While staffing is increasing across the industry, comparability between plants is decreasing. As Cumulative Impacts affect each site in a unique manner, the differences between individual sites are increasing. These differences are not only reflected in total staffing, but in plant configuration and other factors.

The Range for 1-Unit High and Low Quartiles has increased since 2007

1-Unit plants tend to be older than 2-Unit plants, and therefore will feel more effects from Cumulative Impacts. This is reflected in the increased range of plant staffing for 1-units since 2007. The difference between high and low quartile staffing increased by 32 (Low Quartile from 673 to 721, and the High Quartile from 845 to 925). The difference between the highest and lowest staffed 1-Unit plants increased by 160 since 2007.

Most Site Types have Increased Staffing Since 2007

Since the industry low-staffing point in 2007, 1- and 2-Unit BWR staffing has trended steadily upward, as has 1-Unit PWR staffing. 2-Unit PWR staffing has remained generally steady, climbing back up this year to near 2007 levels after a significant drop in 2013. The effects of Cumulative Impacts have driven BWR staffing levels higher than PWR, which is a new phenomenon in the industry.
Goodnight Consulting specializes in personnel planning support to the nuclear power industry. Additionally, we provide a broad range of other management consulting services. Key personnel have managed or supported a variety of analyses across the U.S., in Canada, Europe, Africa, and the Middle East. Examples of our engagements include:

- Strategic Staffing Plan Development
- Fleet Staffing Benchmarking
- Plant Staffing Benchmarking
- Process & Functional Staffing Benchmarking
- Process Analyses & Redesign
- Organizational Analysis & Redesign
- Performance Indicator Benchmarking
- Cost Planning
- Personnel Attrition Analyses
- HR Services
- Compensation & Benefits Benchmarking

**Experience & Client Base**

<table>
<thead>
<tr>
<th>AmerenUE</th>
<th>FFFA (Dominican Republic)</th>
<th>Omaha Public Power District</th>
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</thead>
<tbody>
<tr>
<td>Areva (France)</td>
<td>FirstEnergy Corporation</td>
<td>Ontario Power Generation (Canada)</td>
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<tr>
<td>Babcock &amp; Wilcox</td>
<td>Florida Power &amp; Light</td>
<td>Pacific Gas &amp; Electric</td>
</tr>
<tr>
<td>British Energy (U.K.)</td>
<td>GE Hitachi</td>
<td>Pennsylvania Power &amp; Light</td>
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<td>Carolina Power &amp; Light</td>
<td>International Atomic Energy Agency</td>
<td>PGE (Poland)</td>
</tr>
<tr>
<td>CCHEN (Chile)</td>
<td>JAEC (Jordan)</td>
<td>Philadelphia Electric Company</td>
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<tr>
<td>Constellation Energy</td>
<td>KA.CARE (Saudi Arabia)</td>
<td>PreussenElektra (Germany)</td>
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<td>DTE Energy</td>
<td>KHNP (Korea)</td>
<td>PSEG Nuclear</td>
</tr>
<tr>
<td>Duquesne Light</td>
<td>Luminant</td>
<td>SNN - Cernavoda (Romania)</td>
</tr>
<tr>
<td>EGAT (Thailand)</td>
<td>Ministry of Electricity &amp; Water (Kuwait)</td>
<td>Southern California Edison</td>
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<td>Emirates Nuclear Energy (UAE)</td>
<td>Nebraska Public Power District</td>
<td>STP Nuclear Operating Company</td>
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<td>ENERGOATOM (Ukraine)</td>
<td>New Brunswick OAG (Canada)</td>
<td>Tennessee Valley Authority</td>
</tr>
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<td>Entergy</td>
<td>New York Power Authority</td>
<td>TerraPower</td>
</tr>
<tr>
<td>ESKOM (South Africa)</td>
<td>North Atlantic Energy Service Corp</td>
<td>Virginia Power</td>
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<td>EVN (Vietnam)</td>
<td>NPPA (Egypt)</td>
<td>Westinghouse Electric Company</td>
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<tr>
<td>Exelon Nuclear</td>
<td>Nuclear Management Company</td>
<td>Worley-Parsons (Bulgaria)</td>
</tr>
</tbody>
</table>
**SEP Interrogatory #3**

**Issue Number: 6.2**

**Issue:** Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

**Interrogatory**

**Reference:**
Ref Exh F2-1-1, p 11 “OPG continues to examine staffing levels as part of its benchmarking studies and anticipates that it will eliminate the Goodnight staffing benchmark gap to industry peers in 2016.”

a) Using 2014 actuals as the starting point please provide a table which shows the staffing changes in 2015 and 2016 which result in the “benchmark gap” being eliminated in 2016. Use the staffing categories provided in F2-1-1, Attachment 2, p9 for this table [either the data organized by OPG Business Group or the data as organized by Goodnight].

b) Will the 2016 year end staffing profile by categories provided in answer to a) be substantially maintained through 2017 until 2021 or will there be material changes made? In either case, please explain why.

**Response**

a) Goodnight Consulting has not conducted a subsequent review. OPG conducted an internal analysis of functional staffing as of March 2016, which resulted in the following FTEs by process area, indicating that the overall benchmark gap has been more than eliminated as shown in Chart 1.
<table>
<thead>
<tr>
<th>Process Area</th>
<th>March 2014 Actual</th>
<th>March 2016 Actual</th>
<th>Change 2016 vs. 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration Control</td>
<td>345</td>
<td>364</td>
<td>19</td>
</tr>
<tr>
<td>Equipment Reliability</td>
<td>442</td>
<td>407</td>
<td>(35)</td>
</tr>
<tr>
<td>Loss Prevention</td>
<td>303</td>
<td>302</td>
<td>(1)</td>
</tr>
<tr>
<td>Materials &amp; Services</td>
<td>208</td>
<td>169</td>
<td>(39)</td>
</tr>
<tr>
<td>Operate The Plant</td>
<td>1,072</td>
<td>1,059</td>
<td>(13)</td>
</tr>
<tr>
<td>Support Services &amp; Training</td>
<td>1,149</td>
<td>1,073</td>
<td>(76)</td>
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<tr>
<td>Work Management</td>
<td>1,902</td>
<td>1,686</td>
<td>(216)</td>
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<tr>
<td><strong>OPG Benchmarked FTEs</strong></td>
<td><strong>5,421</strong></td>
<td><strong>5,060</strong></td>
<td><strong>(361)</strong></td>
</tr>
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<td>2014 Goodnight Benchmark</td>
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<td>5,208</td>
<td></td>
</tr>
<tr>
<td><strong>Benchmark Gap</strong></td>
<td><strong>213</strong></td>
<td><strong>(148)</strong></td>
<td></td>
</tr>
</tbody>
</table>

By year end 2016, OPG benchmarked FTEs are projected to increase based upon hiring of regular staff, partially offset by a corresponding reduction in non-regular and augmented staff. OPG anticipates that the resulting benchmarked FTEs at year end 2016 will continue to remain at or below the 2014 Goodnight benchmark.

b) The Goodnight benchmarks are based upon ten steady-state running units at Darlington and Pickering. As Darlington Refurbishment commences in October 2016 and preparations begin for Pickering End of Commercial Operations, staffing will change for reasons beyond the benchmarked scope, particularly in operations and maintenance. However, after taking the anticipated operating changes into consideration, the resulting benchmarked OPG FTEs during 2017-2021 are expected to continue to remain at or below the 2014 Goodnight benchmark.
SEP Interrogatory #4

Issue Number: 6.2

Issue: Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

Interrogatory

Reference:
Ref Exh F2-1-1, p19 Ins 4-17 Human Performance Initiative
F2-1-1, Attachment 1, p82 “18-Month Human Performance Error Rate” Chart
F2-1-1, p15 Chart 4 “Operational and Financial Targets”

a) Update the referenced chart provided in F2-1-1, Attachment 1, p82 with the 2015 actual and targets for Darlington and Pickering for 2016 to 2019.

b) Outline what the specific activities that will be focused upon in the Human Performance Initiative in 2016 to 2021.

c) Please provide the estimated annual cost for the Human Performance Initiative and estimated benefits for 2014 to 2021 as well as the reduced lost generation (in GWh) due to human error. Provide range estimates if more appropriate than point estimates.

Response

b) The Human Performance Initiative is focused on 3 key elements during the 2016-2018 business plan period: Leadership Accountability, Supervisor Effectiveness, and Procedure Use and Adherence. The specific activities related to each of these elements is summarized below:

Leadership Accountability:

i. Standardize the criteria for department level Human Performance Event resets in alignment with industry best practices.

ii. Review industry best practices with respect to Human Performance programs and update all Human Performance Program documents.

iii. Conduct regular Management Review Boards to review crew and section performance and field observations.

iv. Implement an accountability model for supervisors.

v. Develop and implement leadership workshops to improve performance of Managers and Section Managers.

vi. Benchmark industry best practices related to Human Performance Review Boards and implement recommendations for OPG.

Supervisor Effectiveness:

i. Using a cross-functional team, review the current process for field observation and coaching and implement improvements recommended by the team.

ii. Develop and implement training to improve supervisory coaching skills.

iii. Review industry best practices for supervisor rating/scorecarding and implement a standardized process across OPGN.

Procedure Use and Adherence:

i. Deliver training to all levels of leadership to drive alignment for the expected behaviours related to Procedural Use and Adherence.

ii. Implement a Rapid Revision Process for procedures to ensure updates are available for next required use.

iii. Develop and execute a communications campaign to drive an improved understanding of procedure adherence and place keeping requirements.

iv. Promote Peer-to-Peer coaching to encourage staff to give and accept coaching from peers in areas of safety and work practices.

v. Update the Nuclear General Employee Training to include key messages related to Human Performance Tools.

The results of the Human Performance Initiative will be monitored throughout 2017 and 2018 to measure the extent to which expected performance targets are being met, and to detect the factors that facilitate or hinder their realization; and allow for adjustment of initiatives as appropriate. Future plans will be developed based on any remaining gaps, industry best practices, and learning from human performance events.

c) There are no incremental costs associated with the Human Performance Initiative as the activities targeted are prioritized within the Fleet Operations & Maintenance work program.

The expected benefit of improving Human Performance will be to reduce lost generation due to human error. In 2013, approximately 2.4 TWh of lost generation could be attributed to Human Performance shortfalls that resulted in outage delays and extensions, and work management inefficiencies. The energy losses due to Human Performance fell in 2014 to 1.6 TWh and improved once again in 2015 to approximately 0.44 TWh of lost nuclear generation.

Improved human performance as measured by HPER will enable OPG to achieve its 2016-2018 Business Plan targeted forced loss rate and unit capability factor. The company’s nuclear generation forecast is at risk to the extent that OPG is not successful in reaching these HPER targets.
**SEP Interrogatory #5**

**Issue Number: 6.2**

**Issue:** Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

**Interrogatory**

**Reference:**
Ref Exh F2-1-1, p19 Ins 19-27 Equipment Reliability Initiative

a) Please provide the definition of the Equipment Reliability Index (“ERI”).

b) Please provide the Darlington and Pickering actual ERI’s for 2012 to 2015 and the targets for 2016 to 2021. Explain and discuss the ERI trends for Darlington and Pickering.

c) Please provide an overview of the initiatives in People, Equipment and Processes that OPG is undertaking which are driven by insights that the ERI has provided.

**Response**

a) The Equipment Reliability Index (ERI) is an overall index of equipment reliability based on a weighted composite of key indicators. The maximum ERI score is 100. This indicator reflects key areas of performance beyond those typically used for generation and system health alone and is focused upon measuring the longer term trend of improvements and adherence to the principle areas of AP-913, Equipment Reliability Process published by the Institute of Nuclear Power Operations (INPO). The ERI provides a process for identifying gaps or performance shortfalls in key processes for action by the station. The indicator is used across the nuclear industry and is developed by the Equipment Reliability Working Group sponsored by INPO and the Electric Power Research Institute.
b) ERI scores for Pickering and Darlington, including targets to 2019, are shown in Chart 1 below. Targets for 2020 and 2021 are not available at this time and will be established as part of the normal business planning process.

Both Pickering and Darlington have shown an increase in ERI scores since 2012. ERI scores are expected to continue to increase going forward.

<table>
<thead>
<tr>
<th>Year</th>
<th>Pickering</th>
<th>Darlington</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012 – Actual</td>
<td>55</td>
<td>71</td>
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<tr>
<td>2013 – Actual</td>
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<td>63</td>
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<tr>
<td>2016 – Target</td>
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<td>80</td>
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<tr>
<td>2017 – Target</td>
<td>72</td>
<td>85</td>
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<tr>
<td>2018 – Target</td>
<td>74</td>
<td>89</td>
</tr>
<tr>
<td>2019 – Target</td>
<td>78</td>
<td>90</td>
</tr>
</tbody>
</table>

c) OPG is currently undertaking several initiatives to improve and sustain overall equipment reliability across the fleet. These initiatives include actions associated with the preventive and predictive maintenance programs, improved life-cycle planning for key equipment, leadership behaviors associated with equipment reliability, maintenance efficiency, outage execution and scoping, parts improvement, and site-specific equipment replacements. These initiatives were established by analyzing trends in ERI and other site performance indicators.
SEP Interrogatory #6

Issue Number: 6.2
Issue: Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

Interrogatory

Reference:
Ref Exh F2-1-1, p19 Ins 29-32 & p20 Ins 1-10 Outage Performance Initiative

a) Briefly outline projects other than MDS as well as process changes which are part of the Outage Performance Initiative in the test period.

b) What are the annual targeted reductions in Forced Extension to a Planned Outage (“FEPO”) days in the test period for the Outage Performance Initiative?

Response

a) The Outage Performance Initiative includes the following (in addition to the Machine Delivered Scrape project):
   i. Major Equipment Life Cycle Management Plan (“LCMP”) strategies: During planned outages there are a number of activities related to inspection of major components. This initiative is to optimize the scope of the LCMPs, and to evaluate opportunities to increase efficiencies in execution of this scope.
   ii. Tooling Efficiency Improvements: Inspection of the pressure tubes and feeders during outages involves remotely operated tooling. This initiative is focused on increasing efficiency of such tooling and processes.
   iii. Improved Outage Planning & Execution: A number of initiatives are being evaluated related to outage cycle optimization, refueling opportunities, improvements to staffing and shift schedules, as well as improved issue response strategy and contingency planning.

b) OPG does not have a target for reductions in FEPO days as they are not budgeted. Since FEPO days constitute significant generation losses (e.g., 2015: 48 days), the Outage Performance Initiative is aimed at reducing all such losses to the greatest extent possible.
**SEP Interrogatory #7**

**Issue Number: 6.2**

**Issue:** Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG's nuclear benchmarking reasonable?

**Interrogatory**

**Reference:**
Ref Exh F2-1-1, p20 Ins 12-31 Parts Improvement Initiative

**a)** Please explain the 19 deliverables by cross-functional teams involving Supply Chain, Engineering, Fleet Operations & Maintenance, and Work Management that are targeted by this initiative for completion over a period of three years.

**b)** Please outline the targeted improvements in the “Work Order with Material Request Execution” and “Need to Use Cycle Time (Plan to Complete) for Work Orders with Material Request” factors through the test period.

**c)** Provide the improvement OPG expects to see in the test period in the trend in the overall duration it takes to complete a job that require parts.

**Response**

**a)** The 19 deliverables of the Parts Improvement Initiative are as follows:

1. **AM1: Enhance Parts Focus in Aging Management Program** – Improve the linkage of asset life-cycle management to long-range parts requirements, identification, and procurement.

2. **AM2: Implement Obsolescence Program** – Develop a long term obsolescence strategy to manage the proactive and reactive identification of obsolescence issues.

3. **AM3: Improve Scope Control and Execution** – Ensure that scope demand matches capability to execute work, and that the preventative maintenance program is actively reviewed and adjusted based on equipment condition and benefit versus cost analysis for risk levels.

4. **AM4: Improve Milestone Behaviour and Sequencing** – Utilize the Enterprise Prioritization Tool and interim monitoring points between milestones to track the progress of the most important and difficult work.

5. **AM5: Establish Work Recovery Team** – Establish a team to work on all dropped work related to planning issues in order to ensure that they are “ready” to execute before reinserting back into the work management process.

6. **AM6: Manage Break Plan and Emergent Work** – Narrow the definition of Break Plan work and ensure that non-Break Plan work is processed through the normal scoping
process. Additionally, this initiative will ensure the schedule and resources remain balanced when work is injected.

7. AM7: Manage Job Jar Work – Create a job jar to assign “ready” backlog work to maintenance crews when capacity is freed up during execution.

8. AM8: Reduce material holds on preventative maintenance work orders – Increase the percentage of preventative maintenance work orders generated in “ready” status by reducing the frequency of material holds.

9. AM9: Reclassify Component Criticality – Review current criticality coding with respect to industry norms and find opportunities to reduce the number of critical components.

10. AM10: Improve Work Order Health – Improve the ability to evaluate and filter work requests, and ensure existing work orders have a valid need, funding, and a targeted execution date.

11. PF1: Improve Cat ID Health – Create a single owner for the end-to-end Cat ID creation and maintenance process, as well as a process for identifying and cleaning up Cat IDs that will need to be procured before demand is placed on them.

12. PF2: Remove Unneeded Demand and Supply Signals – Remove unneeded demand associated with cancelled tasks from the system at the end of each day.

13. PF3: Streamline Holds Process – Reduce the overall time required to resolve issues discovered during the sourcing and procurement process.

14. PF4: Improve Cross-Functional Collaboration – Increase awareness among stakeholders of how their job functions impact others in the supply process.

15. PF5: Implement Purchasing Model – Clarify roles and responsibilities within Supply Chain to improve efficiencies.

16. PF6: Improve Inventory Management – Ensure that reorder points are applied based on a standardized approach, including clear responsibilities for all stakeholders.

17. PF7: Streamline Repairs Process – Streamline the internal and external repairs processes and create a new process for handling warranty claims.

18. INT1: Implement Enterprise Prioritization Tool – Refine the existing prioritization scores, and integrate into related software applications, metrics, and reporting packages.

19. INT2: Implement Remaining Metrics – Fully implement enhanced metrics to drive improvements in parts availability and work execution.

b) The targeted improvement for the two metrics are as follows:

“Work Order with Material Request Execution”: The targets for this measure are 40% at the end of 2016, 50% at the end of 2017 and 60% at the end of 2018. This represents a 34% improvement compared to the baseline average fleet score measured at the start of the initiative (2014 year end – 13 week average).

“Need to Use Cycle Time (Plan to Complete) for Work Orders with Material Request”: The target for this measure is 650 days by the end of 2018. This represents a 110 day improvement compared to the baseline average fleet score measured at the start of the initiative (2014 year end – 12 month average).
c) The overall duration it takes to complete a job that requires parts (i.e., Cycle Time) is expected to improve to 650 days by the end of 2018. This compares to an average fleet duration of 760 days at start of the initiative. The only exception to this is if the organization is completing a large volume of historical backlogs which will result in a temporary increase in Cycle Time.
**SEP Interrogatory #8**

**Issue Number: 6.2**

**Issue:** Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

**Interrogatory**

**Reference:**
Ref Exh F2-1-1, p21 Ins4-12 Inventory Reduction Initiative

a) Please estimate the annual reduction through the test period of the capital invested in the inventory as well as the reduction the potential for additional in the growth of the inventory obsolescence provision which will result from this initiative.

b) Please estimate the annual reduction through the test period of warehousing requirements and related expenses which will result from this initiative.

**Response**

a) The objective of the initiative is to reduce the historical inventory growth rate, which will mitigate $110M in growth from 2016 to 2021. The inventory level for the test period assumes this lower growth rate is achieved. The lower growth rate is accounted for in the calculation of the inventory obsolescence provision through the test period. Without achieving the reduced growth rate, the impact, holding all other variables constant (i.e., projected consumption during test period, project consumption nearing end of life, salvage value, etc.), would be an increase in the provision of $1.5M per year over the test period.

b) The changes in the warehousing requirements from this initiative have not been quantified.
SEP Interrogatory #9.5

Issue Number: 6.2

Issue: Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

Interrogatory

Reference:
Ref Exh F2-1-1, Attachment 1, p10 “All Injury Rate” Chart

a) Please update the chart with the 2015 actuals and the OPGN targets for 2009 to 2021.

b) Please summarize briefly what steps OPG is taking to meet an All Injury Rate target in 2016 to 2021 which is substantially lower than its actual rate in 5 of the 6 past years.

c) Are DRP contractors included in the OPGN All Injury Rate? If not, explain why not and what target will apply to these staff.

Response

a) Chart 1 below has been updated to include 2015 actual values and All Injury Rate (AIR) targets to 2018. Please see response to Ex. L-6.1-15 SEC-54 in reference to 2019-2021 targets.
b) OPG has recognized that to achieve aggressive targets for 2016 and beyond, an evolution of our safety culture is required. The following steps have been undertaken:

1. Introduction of the iCare Safety Culture. In 2016, OPG held a first ever corporate-wide safety stand down to introduce the company to the theme of “iCare”. In 2017, OPG will initiate a project to further define, engage the organization, and integrate the “iCare” safety culture across OPG.

2. Continue to trend safety incidents and reported conditions, and focus prevention efforts on safety incident performance trends. Our safety performance trending and analysis indicates that a majority of our safety events that are recordable against the AIR metric were associated with routine tasks and typically not associated with planned work tasks (e.g., persons walking between assigned work tasks, or climbing stairs, or slipping in parking lots). In 2016, a campaign was run across the company to focus on “distracted walking” and “routine activities” and the importance of applying our safety behaviours to these types of activities.
3. The business units have developed new programs that are suited to their operations to reinforce the right safety behaviours based on an analysis of underlying factors contributing to safety incidents. In the Nuclear business unit, a new Human Performance program was launched in 2016, “Core4”. This new program is focused on core behaviours that are contributing to safety events. The core behaviours targeted for improvement are 1. Pre-Job Briefing and Post-Job Briefing, 2. Procedural Use and Adherence, 3. Verification practices, and 4. Situational Awareness.

4. For the DRP, all vendor supervisors are provided training with a focus on recognition of safety hazards in a Nuclear environment and proactively ensure plans are in place to mitigate safety concerns. Additionally, OPG has flagged all High Energy events, i.e. electrical work, working at heights, major lifts, etc., on it’s integrated schedule and is applying additional OPG oversight to reduce/eliminate safety events.

c) DRP contractor workers who work for a vendor company are not included in the calculation of OPG’s AIR. Temporary workers who are hired directly and work for OPG are included in OPG’s AIR.

The reasons contractors are excluded from OPG’s AIR are:

1. OPG subscribes to the Canadian Electricity Association standard for reporting and recording of safety performance which does not include contractor performance. This is also consistent with how companies report their performance under the U.S. OSHA standards and World Association of Nuclear Operators.

2. It has not been OPG’s historical practice to include contractors’ performance in OPG’s safety performance and continuing this practice allows for comparability between years.

3. OPG’s safety performance, as measured by the AIR, reflects the safety performance of the workforce which operates directly under OPG’s safety programs, and OPG’s supervision, direction and control. Contracted vendor company workforces operate under the supervision and direction of the company and may in some circumstances operate under the vendor company safety programs.

4. The AIR metric is calculated using a formula which is normalized by worked hours. As a general statement, where a worker’s time is reported in OPG’s time system and they are paid directly by OPG the safety performance counts in the OPG AIR.

There is not a separate AIR target specific to Darlington Refurbishment contractors. However, within the DRP, management oversight reports include contracted workers.
who work for a vendor company in the tracked Darlington Refurbishment AIR to provide a composite AIR for the project and the project management teams. These reports track the composite AIR against the Darlington Refurbishment AIR target of 0.24.

Construction contractor safety performance is closely measured using an AIR metric separated from OPG. Keeping the performance isolated from the rest of OPG allows us to benchmark the construction contractor safety performance with the construction industry safety performance in Ontario. OPG’s construction contractor company safety performance is considerably better than the safety performance of the construction industry in Ontario, as shown in Figure 1.

Figure 1
SEP Interrogatory #9

Issue Number: 6.2

Issue: Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

Interrogatory

Reference:
Ref Exh F2-1-1, p21 Ins14-19 Workforce Planning and Resourcing Initiative

a) Please outline the fleet-wide resourcing strategy that is being implemented with this initiative.

Response

In recognition of the need to recruit staff into the organization, and concurrently manage the impact of Pickering End of Commercial Operations (PECO), integrated long term fleet staffing plans are required to ensure sufficient resources are available for safe and reliable operation, while minimizing cost post-PECO.

The resourcing strategy’s goal is to establish a long-term staffing overview for key functional areas (operations, maintenance and engineering) that manage the allocation of resources across the nuclear fleet. These staffing plans optimize the resources between sites within key functional areas, and provide the input for yearly external recruitment of staff.
SEP Interrogatory #10

Issue Number: 6.2

Issue: Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

Interrogatory

Reference:
Ref Exh F2-1-1, Attachment 1, p50 “Rolling Average Forced Loss Rate ” Chart (for Darlington and Pickering station not individual units thereof)

a) Please update the chart with the 2015 actuals and the OPGN targets for 2009 to 2021.

b) Please summarize briefly what steps OPG is taking to meet a Rolling Average Forced Loss Rate target in 2016 to 2021 which (with the exception of 2020 and 2021 Darlington) is substantially lower than its actual rate in the past six years.

Response

Please see Chart 1 below, which has been updated to include 2015 actual and targets for 2016-2021. Targets have not been shown for 2009-2015 since the targets have been set on an annual basis, not on a rolling average basis.
a) Please see Ex. L-5.1-1 Staff-81 part (c) and L-5.1-1 Staff-83 part (b).
**SEP Interrogatory #11**

**Issue Number: 6.2**

**Issue:** Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

**Interrogatory**

**Reference:**
Ref Exh F2-1-1, Attachment 4 p3

“The FHERI [Fuel Handling Equipment Reliability Index, where higher values are best] Benchmark is 85. As the FHERI was created in 2015, there is no historical data available prior to 2015. In 2015, Pickering achieved a FHERI of 53 against a target of 63, while Darlington achieved a FHERI of 83 relative to a target of 78.

a) Please explain why the 2015 Pickering index was lower than target.

b) What steps in particular are being taken to exceed the Pickering target in 2016 and beyond.

c) Is there anything in addition to or a particular focus on the 6 key processes identified on page 2 of the exhibit to ensure that Darlington meets or exceeds its targets in 2016 and beyond?

**Response**

a) FH ERI was developed as a pilot in 2015, and implemented for 2016. The December 2015 performance was 10 points off target due to higher than target unplanned unavailability, functional failures, incoming work orders, and preventative maintenance conditions.

b) For 2016, Pickering achieved its September target of 70 points. In September, unplanned unavailability was 5.43%, the best performance to date. Also, incoming functional failures have decreased by over 50% since the beginning of 2016, and incoming backlog work orders have reduced significantly. Pickering Fuel Handling has been steadily improving performance by executing the Fuel Handling Sustainability and Reliability Plans. Through continued execution of these plans, it is expected that Fuel Handling performance will continue to improve.

c) To date in 2016, Darlington has met its FH ERI targets. Sustainability of the Fuel Handling Reliability Plan, which includes a focus on preventative maintenance, careful management of equipment obsolescence and replacement, and an improved work
management process fully integrated with the station's work management process, will ensure performance meets or exceeds targets going forward.
SEP Interrogatory #12

Issue Number: 6.2

Issue: Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

Interrogatory

Reference:
Ref Exh F2-1-1, Attachment 4 p13
“The Days Based Maintenance initiative was successfully implemented at both Pickering and Darlington stations. Direct savings are approximately $4.5 million per year as a result of savings on shift premiums and compensation for VERT qualification. One time capital expenditures of $5.7M were incurred to install automated monitoring systems. Secondary benefits from implementing this initiative are expected to include reduced employee fatigue, lower human performance error rate, less rework, and higher work task completion rates. “

a) Please estimate the annual total monetary value of the secondary benefits outlined in the sentence above.

Response

OPG has no basis on which to estimate these secondary benefits. Some of them are qualitative (e.g., reduced employee fatigue) while others (e.g., less rework) would require detailed analysis over an extended period of time before a reasonable estimate could be made.
VECC Interrogatory #25

Issue Number: 6.2

Issue: Is the nuclear benchmarking methodology reasonable? Are the benchmarking results and targets flowing from OPG’s nuclear benchmarking reasonable?

Interrogatory

Reference:
Reference: F2/T1/S1/pg.15

a) Please explain how the Operational and Financial targets shown in Chart 4 and Chart 5 are related to compensation.

b) Why are none of the targets shown incorporated into the incentive rate making proposal?

Response

a) The Non-Fuel Operating Cost per MWh metric in Chart 4 and Total Generating Cost per MWh metric in Chart 4 and Chart 5 are the only metrics that are impacted by level of compensation.

The Non-Fuel Operating Cost per MWh metric includes all relevant costs to operate and maintain nuclear operations such as cost of labour (compensation), materials, purchased services as well as administration and general costs. Labour costs approximate 60% of the Non-Fuel Operating Costs. The Total Generating Costs per MWh includes all operating, fuel and capital costs.

b) The referenced performance improvement targets are the baseline for OPG’s nuclear incentive rate-setting proposal. The referenced targets are part of OPG’s gap-based nuclear business planning process. The proposed nuclear payment amounts are based on the assumption that OPG will achieve not only these performance targets, but also find additional efficiency improvements to compensate for the reduced revenue resulting from the stretch factor. The nuclear stretch factor creates an incremental incentive for the company to improve performance during the IR term, in addition to the natural incentive function of the company’s variable rate design.

As an example, Charts 4 and 5 include Forced Loss Rate (FLR) targets for both nuclear stations. If OPG fails to meet these FLR targets, nuclear production would decrease. Since the payment amounts are 100% variable, reduced production translates directly into reduced revenue. Conversely, OPG has a natural incentive to exceed the business plan FLR targets, since increased production results in greater revenues. By reducing OPG’s requested nuclear revenue requirement below the level of costs approved in the business plan, the proposed nuclear stretch factor provides an additional incentive to control costs and increase revenue.
Board Staff Interrogatory #111

Issue Number: 6.3

Issue: Is the forecast of nuclear fuel costs appropriate?

Interrogatory

Reference:
Ref: Exh F2-5-1

At page 3 of the evidence, it states that:

Offsetting lower generation is the one time impact of a requirement for a load of new fuel to be included in the reactor core of Unit 2 prior to start-up. One-half of the cost of the new fuel load will be capitalized in 2019 when the new fuel is loaded into the reactor and after the refurbished unit is declared in service in 2020, depreciated over the station’s remaining life. This is consistent with the concept that half of the fuel in the fuel channels will be unused at the end of the station life. The other half of the cost of the new fuel load for Unit 2 will be expensed in 2020 when Unit 2 is declared in-service.

a) What is the new fuel load cost that OPG proposes to capitalize and what is the new fuel load cost that OPG proposes to expense?

b) OPG proposes to depreciate a portion of the new fuel load over the station’s remaining life, stating that “half of the fuel in the fuel channels will be unused at the end of the station life.” Please explain this statement given the on-line refuelling capability of CANDU reactors.

c) Please explain OPG’s past practice with respect to new fuel loads along with accounting rationale behind why the cost of the new fuel load is eligible to be capitalized.

Response

a) The new fuel load cost OPG plans to capitalize is $15.3M in 2019, as shown at Ex. D2-1-2 Table 4, line 15. The new fuel load cost OPG plans to expense is $15.3M in 2020 (see Ex. F2-5-2, p. 2, lines 3-4).

b) In CANDU reactors, fuel bundles experience different rates of irradiation (burn up). In order to maintain the reactivity/criticality of the reactor and ensure fuel bundles remain within burn up limits, new fuel is routinely loaded and spent fuel is discharged at regularly scheduled intervals. Thus, at the end of the unit’s life, there will be a mixture of newer (less irradiated) fuel bundles alongside more irradiated bundles to maintain operation of the reactor, which, on average, is assumed to represent one half of a full load of new fuel.
c) OPG does not have a past practice with respect to new fuel loads because the return to service of refurbished Darlington Unit 2 will be the first instance of a full new fuel load being loaded into a defueled reactor of an OPG-operated nuclear station since OPG’s inception. OPG understands that the practice was used by the former Ontario Hydro.

The portion of the cost of the new fuel load corresponding to the unused fuel expected to be remaining in the reactor at the end of its life is eligible to be capitalized because it is considered to be a cost arising from operating the unit over its entire life (i.e., the unused fuel arises at the end of the unit’s life as a result of the ongoing refueling during the life). Capitalization of this amount at the outset of the unit coming online allows the value of the unused fuel bundles to be allocated systematically over the unit’s life. This treatment is consistent with US GAAP.
Board Staff Interrogatory #112

Issue Number: 6.3

Issue: Is the forecast of nuclear fuel costs appropriate?

Interrogatory

Reference:

Ref: Exh F2-5-1 page 6 Ref: Exh B1-1-1 page 6

On page 6 of Exh F2-5-1, it states that OPG will achieve the uranium concentrate inventory target of 288,000 KgU by 2019. The target was recommended by external consultants, Longenecker & Assoc., and noted in an April 2012 report filed in the previous proceeding, EB-2013-0321.

Does the inventory target reflect both Darlington refurbishment and Pickering Extended Operations?

Response

OPG adopted a minimum uranium concentrate inventory target of 288,000 KgU, which represents a four-month supply to feed the production of uranium dioxide. The inventory target was established to mitigate the effect of any supply disruption and was lowered from the previous target of 385,000 KgU following an external review. The lowered inventory target of 288,000 KgU took into consideration Darlington refurbishment, which was part of the long term generation plan, although it did not consider Pickering Extended Operations as this was not part of the long term plan at the time.

The existing inventory target has been reviewed since OPG decided to pursue Pickering Extended Operations and continues to represent a suitable working minimum level to continuously feed the production of uranium dioxide. The target is adequate to satisfy the forward requirements of both the Darlington Station during refurbishment, including full core fuel loads following each unit’s refurbishment and planned operation of the Pickering Station through 2024.
AMPCO Interrogatory #116

Issue Number: 6.3
Issue: Is the forecast of nuclear fuel costs appropriate?

Interrogatory

Reference:
Ref: F2-5-1

a) Please provide a table that shows the costs of processing uranium into fuel bundles for the years 2010 to 2015, 2016 budget and plan 2017 to 2021.

Response

The costs of processing uranium into nuclear fuel bundles are shown in Table #1 below (Table #1 content is confidential).

Table #1: Nuclear Fuel Processing Cost

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<td>Processing Cost (M$)</td>
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</thead>
<tbody>
<tr>
<td>Processing Cost (M$)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
AMPCO Interrogatory #117

Issue Number: 6.3

Issue: Is the forecast of nuclear fuel costs appropriate?

Interrogatory

Reference:

Ref: F2-5-2 Page 1

a) Please explain the increase in the Total Fuel Bundle cost per MWh from 2015 to 2016.

Response

Total Fuel Bundle cost per MWh is determined by dividing the Total Fuel Bundle cost by total generation. The 1.4% increase in Total Fuel Bundle cost from 2015 to 2016 is predominantly due to higher forecast energy production with the higher average unit price of fuel loaded and lower fuel utilization efficiency as lesser contributing factors, as discussed at Ex. F2-5-2, p. 2.
AMPCO Interrogatory #118

Issue Number: 6.3
Issue: Is the forecast of nuclear fuel costs appropriate?

Interrogatory

Reference:
Ref: F2-5-1 Table 1

a) Please provide a table that sets out Board Approved versus Actuals for the years 2013 to 2015.

b) Please explain the variance for the years 2014 and 2015.

Response

(a) See Ex. F2-5-2 Table 1.

(b) The variance explanations for Board Approved versus Actual are provided in Ex. F2-5-2 (page 2 for 2015 and page 3 for 2014).
**CCC Interrogatory #28**

**Issue Number: 6.3**

**Issue:** Is the forecast of nuclear fuel costs appropriate?

**Interrogatory**

**Reference:**
Reference: Ex. F2/T5/S1/p. 10

In its EB-2010-0008 Decision the OEB directed OPG to engage an external consultant to conduct a review of OPG’s uranium procurement program to determine whether the Company is optimizing its contracting in order to minimize costs to ratepayers. That report was filed in the EB-2013-0321 proceeding. What was the date of that study? Has OPG sought to update the study either through Longnecker or another consultant? If so, please provide the update. If not, why not? Are the previous recommendations still relevant to the current market?

**Response**

OPG engaged Longenecker & Associates, an external consultant, to conduct a review of its uranium procurement program in 2011 and a final report was issued by the consultant in April 2012. OPG has not sought to update the study, as OPG continues to follow recommendations from the Longenecker report, which remain relevant in the current market.
Witness Panel: Nuclear Operations and Projects

**Issue Number: 6.3**

**Issue:** Is the forecast of nuclear fuel costs appropriate?

---

**Interrogatory**

**Reference:**
Reference: Ex. F2/T5/S1/p. 3 and F2/T5/S2

Has OPG changed the way in which it prepares its forecasts for nuclear fuel costs since 2013? If so, please explain how the forecasting methodology has changed. Please provide further detail as to why in each year since 2013 OPG’s actual fuel costs were lower than the forecasts. Specifically, please explain why in each year the unit prices for new fuel loaded were lower than forecast. Are these differences subject to variance account treatment? What is the 2016 forecast and the most recent estimate of the actual costs to be incurred in 2016?

---

**Response**

OPG has not changed the way in which it prepares its forecasts for nuclear fuel costs since 2013.

The drivers of actual to budget variances in fuel costs are energy production, unit cost of new fuel loaded and fuel utilization efficiency. Exhibit F2-5-2 provides details of actual to forecast variances over the period 2013 to 2015 broken down by these drivers.

Actual overall fuel costs were lower than forecast in years 2013, 2014 and 2015 primarily due to lower energy production compared to OEB-approved production and lower unit cost of new fuel loaded. Uranium prices have been lower than forecast in 2013 and 2014, resulting in lower prices for new fuel loaded in those years and into 2015. OPG uses a uranium price forecast based on the annual composite average of the UX Consulting Company’s spot price forecast as input in modeling existing contracts during business planning. As the uranium market has been in a downturn, realized prices have been lower than those forecast by the industry. The differences between forecast fuel costs and actual fuels costs are not subject to any variance account treatment.

The 2016 budget fuel bundle cost is $198.6M; the most recent estimate of fuel costs for 2016 is $194.8M which is based upon actual amounts to the end of August 2016 and forecast amounts for September through December 2016. The projected year-end variance between actual and budget of -$3.8 million breaks down as follows: lower energy production (-$3.6M), higher fuel utilization efficiency (-$1.9M) and higher unit prices for new fuel loaded (+$1.7M).
SEC Interrogatory #66

Issue Number: 6.3

Issue: Is the forecast of nuclear fuel costs appropriate?

Interrogatory

Reference:

[F2/5/1]

On average, a reduction in production of 1 TWh in 2017 would represent how much of a reduction in fuel costs?

Response

On average, a reduction in production of 1 TWh in 2017 would represent approximately $5.7M in reduced fuel costs. Fuel costs include: Total Fuel Bundle costs (Ex. F2-5-1 Table 1 line 3) and Used Fuel Storage and Disposal costs (Ex. F2-5-1 Table 1 line 5).
VECC Interrogatory #26

Issue Number: 6.3

Issue: Is the forecast of nuclear fuel costs appropriate?

Interrogatory

Reference:
Reference: F2/T5/S1/pg.2

a) Please explain the reasons for the conversion price increase and the fuel bundle manufacturing price over the 2013 to 2021 period.

Response

Both the conversion price and fuel bundle manufacturing price are subject to price adjustments for inflation over the subject years. In addition, the fuel bundle contract price is also impacted by changes in zirconium costs, a key component in fuel bundles.
VECC Interrogatory #27

Issue Number: 6.3
Issue: Is the forecast of nuclear fuel costs appropriate?

Interrogatory

Reference:
Reference F2/T5/S1/pg.3

a) Please provide the forecast cost of the fuel load for Unit 2 in 2019 and the amount of this expected to be capitalized.

b) Please provide the forecast expected undepreciated cost of fuel in Unit 2 when it is refurbished.

Response

a) Please refer to Ex. L-6.3-1 Staff-111 part (a).

b) There will be no undepreciated cost for Unit 2 associated with the original fuel load when the unit is refurbished.
Board Staff Interrogatory #113

Issue Number: 6.4
Issue: Is the test period Operations, Maintenance and Administration budget for the Darlington Refurbishment Program appropriate?

Interrogatory

Reference:
Ref: Exh F2-7-1, pages 1 and 2

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>DRP</td>
<td>10</td>
<td>4.6</td>
<td>4.3</td>
<td>4.3</td>
<td>9</td>
<td>1.4</td>
<td>1</td>
<td>41.5</td>
<td>13.8</td>
<td>3.5</td>
<td>48.4</td>
<td>19.7</td>
</tr>
<tr>
<td>F&amp;IP</td>
<td>8.2</td>
<td>1.7</td>
<td>2.3</td>
<td>2</td>
<td>9.3</td>
<td>0.1</td>
<td>0.3</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Total</td>
<td>18.2</td>
<td>6.3</td>
<td>6.6</td>
<td>6.3</td>
<td>18.2</td>
<td>1.6</td>
<td>1.3</td>
<td>41.5</td>
<td>13.8</td>
<td>3.5</td>
<td>48.4</td>
<td>19.7</td>
</tr>
</tbody>
</table>

The above table shows the approved and actual OM&A for DRP for 2014 and 2015 and the forecasted OM&A for 2016 to 2021.

a) Given the capitalization criteria at Exh D4-1-1, please explain why these costs are not capitalized

b) OPG explains the variance between the 2015 approved and actual as primarily due to reclassification of expenses to Nuclear Operations. Was the DRP budget adjusted for these reclassifications?

c) OPG states that in 2017, $24.7M is related to Retube and Feeder Replacements for Unit 2 and in 2020, $30.3M is related to Retube and Feeder Replacements for Unit 3. Please explain why the OM&A costs for Unit 3 are greater than Unit 2.

Response

a) Approximately 90% of the 2017-2021 forecast OM&A costs referenced in the question relate to removal costs. Exhibit D4-1-1, p. 2, line 2, notes that OPG charges removal costs for existing assets to OM&A as incurred. This approach remains unchanged from previous proceedings (for example, see EB-2013-0321, Ex. D4-1-1, p. 2, line 3, and EB-2013-0321 Ex. L6.11-1 Staff-141, p. 2, lines 12-17).

OPG charges removal costs to OM&A in accordance with US GAAP.

b) The approved Release Quality Estimate baseline does not include costs that were reclassified.
1  c) Removal costs for Unit 3 are higher than for Unit 2 due to cost escalation and radiation protection costs.
AMPCO Interrogatory #119

Issue Number: 6.4

Issue: Is the test period Operations, Maintenance and Administration budget for the Darlington Refurbishment Program appropriate?

Interrogatory

Reference:
Ref: F2-7-1 Page 1

Preamble: For 2015, the OM&A cost variance is $16.7 million.

a) Please provide a breakdown of this amount due to: cost classification changes for the Operations trainee program from DRP to Nuclear Operations; transfer of facilities and infrastructure demolition projects and removal activities to Nuclear Operations portfolio; and unutilized contingency for potential Definition Phase costs that are not eligible for capitalization.

Response

a) The breakdown of the 2015 OM&A cost variance is as follows:

- cost classification changes for the Operations trainee program from DRP to Nuclear Operations (-$7.7M),
- transfer of facilities and infrastructure demolition projects and removal activities to Nuclear Operations portfolio (-$9.1M),
- unutilized contingency for potential Definition Phase costs that are not eligible for capitalization (-$0.3M), partly offset by
- newly identified removal costs related to the Third Emergency Power Generator (+$0.4M).
AMPCO Interrogatory #120

Issue Number: 6.4

Issue: Is the test period Operations, Maintenance and Administration budget for the Darlington Refurbishment Program appropriate?

Interrogatory

Reference:
Ref: F2-7-1 Page 1
Ref: F2-7-1 Table 1


a) Please provide further details on the nature of OPG’s OM&A costs related to Retube and Feeder Replacements and Other Refurbishment Projects, by year.

b) Please provide the number of regular and non-regular FTEs for the years 2013 to 2021.

c) Please provide the labour costs for the years 2013 to 2021 for regular and non-regular FTEs.

d) Please provide the overtime by year for the years 2013 to 2016 for regular and non-regular staff.

e) Please provide the removal costs by year.

f) Please provide the L&ILW costs by year.

g) Please explain if the removal costs are related to work undertaken by a contractor. If yes, please explain why these costs are not part of the Contractor’s contract.

Response

a) The Darlington Refurbishment Program (DRP) OM&A costs related to Retube and Feeder Replacements and other refurbishment projects are removal costs. These amounts exclude waste disposal costs. The details by year are provided below. Please note that numbers may not add due to rounding:

Witness Panel: Darlington Refurbishment Program
b) The FTEs for the years 2013 to 2015 are provided in the chart below. There are no FTEs related to OM&A in the DRP Release Quality Estimate for the years 2016 to 2021.

<table>
<thead>
<tr>
<th>FTE</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular</td>
<td>20.1</td>
<td>17.8</td>
<td>0</td>
</tr>
<tr>
<td>Non-Regular</td>
<td>0.2</td>
<td>1.2</td>
<td>0</td>
</tr>
</tbody>
</table>

c) The labour costs for regular and non-regular staff for the years 2013 to 2015 are provided in the table below. There are no labour costs related to OM&A in the DRP Release Quality Estimate for the years 2016 to 2021.

<table>
<thead>
<tr>
<th>Labour Costs (M$)</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular</td>
<td>4.2</td>
<td>3.9</td>
<td>0</td>
</tr>
<tr>
<td>Non-Regular</td>
<td>0.0</td>
<td>0.2</td>
<td>0</td>
</tr>
</tbody>
</table>

d) The overtime related to DRP OM&A for the years 2013 to 2016 is only $54k in total, as provided below:

<table>
<thead>
<tr>
<th>Overtime (k$)</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular</td>
<td>16</td>
<td>31</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Non-Regular</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
g) The removal costs are related to removal activities undertaken by contractors and the costs are part of the contract. For accounting purpose, these costs are treated as OM&A as per US GAAP.

<table>
<thead>
<tr>
<th>M$</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>L&amp;ILW costs</td>
<td>2.5</td>
<td>2.1</td>
<td>2.8</td>
<td>2.9</td>
<td>3.8</td>
</tr>
</tbody>
</table>
LOW Interrogatory #1

Issue Number: 6.4

Issue: Is the test period Operations, Maintenance and Administration budget for the Darlington Refurbishment Program appropriate?

Interrogatory

Reference:
Reference: Ex. D2-02-01 of the OPG application

In the last OPG Rates application in 2013-2014, Waterkeeper obtained the following expected costs for Darlington Nuclear Generating Station’s Environmental Assessment Follow-up programs during the last test period:

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>EA Item 1 Surface Water Study (Liquid Effluents) – this had been started during the test period and was expected to continue during Darlington’s refurbishment construction period and the facility’s continued operation</td>
<td>$60K</td>
<td>$30K</td>
</tr>
<tr>
<td>EA Item 2 Surface Water Study (Stormwater) – this was not scheduled to begin during the test period</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>EA Item 3 Aquatic Habitat/Biota Study (Cooling Water)</td>
<td>$60K</td>
<td>$10K</td>
</tr>
<tr>
<td>EA Item 4A Aquatic Habitat Study (Impingement and Entrainment), Part A: Entrainment monitoring with larger sample size and invertebrate component – scheduled prior to refurbishment outage</td>
<td>$150K</td>
<td>$150K</td>
</tr>
<tr>
<td>EA Item 4B Aquatic Habitat Study (Impingement and Entrainment) Part B: Benthic invertebrate community study – scheduled prior to refurbishment outage.</td>
<td>$100K</td>
<td>$100K</td>
</tr>
<tr>
<td>EA Item 4C Aquatic Habitat Study (Impingement and Entrainment) Part C: Impingement and entrainment – two years of monitoring following restart of all reactors.</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Actual Costs are provided for the EA Follow-up Studies in Exhibit 2, Tab2, Schedule 1, Attachment 5 of OPG’s current rates application. They are as follows:

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Effluent Characterization</td>
<td>0</td>
<td>$5K</td>
<td>$7K</td>
</tr>
</tbody>
</table>

This study corresponds to EA Item 1 in

Witness Panel: Darlington Refurbishment Program
<table>
<thead>
<tr>
<th>Study</th>
<th>2016-01-01</th>
<th>2016-01-31</th>
<th>2016-02-28</th>
<th>Correspondence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entrainment Study</td>
<td>0</td>
<td>$25K</td>
<td>$198K</td>
<td>This study corresponds to EA Item 4A in the chart above</td>
</tr>
<tr>
<td>Benthic Invertebrate Community Study</td>
<td>0</td>
<td>$25K</td>
<td>0</td>
<td>This study corresponds to EA Item 4A in the chart above</td>
</tr>
<tr>
<td>Thermal Monitoring</td>
<td>0</td>
<td>$20K</td>
<td>0</td>
<td>This study corresponds to EA Item 3 in the chart above</td>
</tr>
<tr>
<td>Stormwater Control Study</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>This study corresponds to EA Item 2 in the chart above</td>
</tr>
</tbody>
</table>

1 Please confirm that the following understanding is correct. Or if necessary, please correct any misunderstandings.

**Response**

2 OPG confirms the references in the table are correct.
LOW Interrogatory #2

Issue Number: 6.4
Issue: Is the test period Operations, Maintenance and Administration budget for the Darlington Refurbishment Program appropriate?

Interrogatory

Reference:
Reference: Ex. D2-02-01 of the OPG application

Can you explain or provide rationale (in broad terms) for the differences in budgeted and actual spending amounts on the EA follow-up studies?

It appears as though only $12K of a budgeted $90K was spent on the effluent characterization study, $223K of a budgeted $300K was spent on the entrainment study, $25K of a budgeted $200K was spent on the benthic invertebrate study, and $20K of a budgeted $70K was spent on thermal monitoring.

Response

The differences in budgeted and actual spending amounts so far on the EA follow-up studies can be attributed to delays in start up of the studies while awaiting approval of the study plans from regulators.

Once agreement by the CNSC was obtained on the sampling methodology and contract procurement in early 2015, the field sample collection for the entrainment study commenced in late 2015, and the benthic community sample collection started in mid-2016. All field sampling for these studies were completed prior to the first unit outage per the EA commitment. Sample analysis and report preparation is underway.

The thermal monitoring methodology recently (Q3 2016) received verbal agreement from both the CNSC and Environment and Climate Change Canada resulting in a plan to implement the thermal monitoring program to conduct thermal monitoring during refurbishment by the end of 2020, and after restart of all reactors by the end 2026.

Commencement of the effluent characterization study was delayed initially in 2014 and 2015 due to OPG seeking clarification on the scope of work and approval of the sampling plan from the CNSC. The plan was approved in 2015 and the sampling campaign has been completed.
LOW Interrogatory #3

Issue Number: 6.4
Issue: Is the test period Operations, Maintenance and Administration budget for the Darlington Refurbishment Program appropriate?

Interrogatory

Reference:
Reference: Ex. D2-02-01 of the OPG application

Are unused amounts that had been budgeted for these studies kept aside to be used in future years as the studies progress?

Response

Unused amounts that had been budgeted for these studies are assessed during planning processes to determine if variances should be carried forward.

Please refer to L-6.4-10 LOW-4 for the estimated costs for EA follow-up studies to be undertaken between 2016-2021.
**LOW Interrogatory #4**

**Issue Number: 6.4**

**Issue:** Is the test period Operations, Maintenance and Administration budget for the Darlington Refurbishment Program appropriate?

**Interrogatory**

**Reference:**

Reference: Ex. D2-02-01 of the OPG application

Are there any budgeted amounts for EA follow-up studies to be undertaken between 2016 and 2021? If so, please provide rough estimates.

**Response**

Estimated costs from 2016-2021 and actual spends from 2013-2015 for the EA follow-up studies are summarized in Chart 1 below.

Adaptive management projects will be developed if needed based on results of the initial monitoring studies and will be budgeted accordingly. At this time, no adaptive management projects have been identified, and therefore approximate potential costs are not available.

**Chart 1**

<table>
<thead>
<tr>
<th>Project Work Package Description</th>
<th>Estimate</th>
<th>Actual</th>
<th>Estimate</th>
<th>Actual</th>
<th>Estimate</th>
<th>Actual</th>
<th>Estimate</th>
<th>Actual</th>
<th>Estimate</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effluent Characterization</td>
<td>-</td>
<td>-</td>
<td>60</td>
<td>5</td>
<td>30</td>
<td>7</td>
<td>250</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fisheries Authorization</td>
<td>-</td>
<td>-</td>
<td>25</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>-</td>
<td>40</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Entrainment Study</td>
<td>-</td>
<td>-</td>
<td>150</td>
<td>25</td>
<td>150</td>
<td>198</td>
<td>209</td>
<td>20</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Benthic Invertebrate Community Study</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>25</td>
<td>100</td>
<td>382</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Thermal Monitoring</td>
<td>-</td>
<td>-</td>
<td>60</td>
<td>20</td>
<td>10</td>
<td>-</td>
<td>70</td>
<td>150</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Stormwater Control Study</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>60</td>
<td>30</td>
<td>90</td>
<td>-</td>
</tr>
<tr>
<td><strong>Budget - Total EA Follow-up Studies</strong></td>
<td>-</td>
<td>-</td>
<td>370</td>
<td>100</td>
<td>290</td>
<td>205</td>
<td>856</td>
<td>150</td>
<td>220</td>
<td>90</td>
</tr>
</tbody>
</table>
VECC Interrogatory #28

Issue Number: 6.4
Issue: Is the test period Operations, Maintenance and Administration budget for the Darlington Refurbishment Program appropriate?

Interrogatory

Reference:
Reference: F2/T7/S1

a) Please provide a breakdown/details of the 41.5m in unit refurbishment costs in 2017, the $13.8 million in 2018 and the 48.4m in 2020 and 19.7m in 2021

Response

The details of the Darlington Refurbishment Program (DRP) OM&A costs noted in Ex. F2-7-1, Table 1, are provided in the chart below:

<table>
<thead>
<tr>
<th>(M$)</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removal Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retube and Feeder Replacement</td>
<td>24.7</td>
<td>2.8</td>
<td>0.6</td>
<td>30.3</td>
<td>11.8</td>
</tr>
<tr>
<td>Turbine Generator</td>
<td>1.0</td>
<td>-</td>
<td>-</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Balance of Plant</td>
<td>2.8</td>
<td>-</td>
<td>-</td>
<td>3.0</td>
<td>3.1</td>
</tr>
<tr>
<td>Fuel Handling</td>
<td>10.4</td>
<td>8.7</td>
<td>-</td>
<td>11.1</td>
<td>-</td>
</tr>
<tr>
<td>Total Removal Costs</td>
<td>39.0</td>
<td>11.6</td>
<td>0.6</td>
<td>45.4</td>
<td>15.8</td>
</tr>
<tr>
<td>L&amp;ILW costs</td>
<td>2.5</td>
<td>2.1</td>
<td>2.8</td>
<td>2.9</td>
<td>3.8</td>
</tr>
<tr>
<td>Contingency</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Total DRP OM&amp;A Costs</td>
<td>41.5</td>
<td>13.8</td>
<td>3.5</td>
<td>48.4</td>
<td>19.7</td>
</tr>
</tbody>
</table>
Board Staff Interrogatory #118

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:

Ref: Exh F2-2-3 Attachment 2, Table E2

In Table E2, OPG provides the incremental costs of Pickering Extended Operations (PEO). According to this table, OPG has estimated costs of $240M for restoration of resources to normal levels to enable PEO.

a) Please update Table E2, such that it is consistent with OPG’s rate application, especially in regards to the test year expenditures in the table.

b) Please provide a breakdown of costs under the category “Normal Extension of Base & Outage OMA, Projects, Nuclear and Corporate Support Costs” and present it in a format similar to that provided in Chart 2 at Exh F2-2-3 page 6. Please also provide a brief description explaining the work that is planned to be undertaken.

c) Please confirm that the costs noted in Table E2 are incremental and arise only as a result of the PEO project and would not be incurred in the absence of the PEO proposal.

d) In addition to the incremental costs noted in Table E2, are there any other incremental costs related to PEO that are included in the test year budgets? If there are, please identify the costs.

e) The costs shown under the column titled “Post 2020” are OPG’s estimate of costs required to operate Pickering post 2020. Please describe in detail how this estimate was developed, identify the underlying assumptions used to develop the cost estimates, provide a breakdown of the costs by year and by major components, such as labour and comment on the major drivers for the costs. Please also comment on how OPG proposes to manage labour costs for the “Post 2020” period such that the operating costs are maintained at levels assumed in the IESO benefit analysis.

Witness Panel: Nuclear Operations and Projects
f) Please also comment on whether the Post 2020 operating costs noted in the referenced table are the same as that used by the IESO in its analysis.

g) Table E2 does not include any information on capital expenditures. Does the Business Case take into consideration the capital expenditures that are required in the test years and may be required in the 2021-2014 period?

**Response**

a) & b) Exhibit F2-2-3 Attachment 2 Table E2 sets out OPG’s estimate of operating costs (excluding fuel) to enable Extended Operations. In Table 1 below, the estimated costs in Table E2 have been updated to be consistent with forecasts underpinning OPG’s evidence in this application. Table 1 includes a breakdown of the forecast costs to restore normal operations at Pickering over the period 2016 to 2020 as a result of extending plant life to 2022/2024, consistent with Chart 2 at Ex. F2-2-3 page 6:

<table>
<thead>
<tr>
<th>Line No.</th>
<th>Cost Item</th>
<th>2016-2020 Total</th>
<th>2016-2024 Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Base OM&amp;A</td>
<td>11.0</td>
<td>12.0</td>
</tr>
<tr>
<td>2</td>
<td>Outage OM&amp;A</td>
<td>0.0</td>
<td>22.1</td>
</tr>
<tr>
<td>3</td>
<td>Project OM&amp;A</td>
<td>4.0</td>
<td>18.0</td>
</tr>
<tr>
<td>4</td>
<td>Total Enabling Costs</td>
<td>15.0</td>
<td>25.6</td>
</tr>
<tr>
<td>5</td>
<td>Base OM&amp;A</td>
<td>0.0</td>
<td>7.9</td>
</tr>
<tr>
<td>6</td>
<td>Outage OM&amp;A</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>7</td>
<td>Project OM&amp;A</td>
<td>0.0</td>
<td>4.5</td>
</tr>
<tr>
<td>8</td>
<td>Sub-total Nuclear Operations OM&amp;A</td>
<td>0.0</td>
<td>12.4</td>
</tr>
<tr>
<td>9</td>
<td>Project Capital (including Minor Fixed Assets)</td>
<td>0.0</td>
<td>15.5</td>
</tr>
<tr>
<td>10</td>
<td>Corporate Support</td>
<td>0.0</td>
<td>2.6</td>
</tr>
<tr>
<td>11</td>
<td>Total Restoration of Normal Operating Costs</td>
<td>0.0</td>
<td>15.0</td>
</tr>
<tr>
<td>12</td>
<td>Total Pickering Extended Operations Costs</td>
<td>15.0</td>
<td>40.6</td>
</tr>
</tbody>
</table>

Table 1

Pickering Extended Operations Costs per Application ($M)

As stated in Ex. F2-2-3, pp. 6 and 7, the restoration costs in this table are incremental as they are necessary to address the fact that with shutdown previously anticipated in 2020, ongoing operations and their costs were set to decline starting in 2017. With Extended Operations, OPG needs to restore on-
going operating and maintenance programs to normal levels for the 2017 to 2020 period. For example, outage requirements set to decline under the previous plan will now need to be reinstated. As well, both OM&A and capital projects need to be restored to the levels required to continue to operate safely for four additional years and to maintain or improve plant reliability during that time.

Normal operating are those required to maintain ongoing base operations, project and outage OM&A work as well as the capital projects necessary to continue the safe operation and maintenance of the plant.

The normal operating costs for Pickering are discussed extensively in the Base, Project and Outage OM&A exhibits (Ex. F2-2-1, Ex. F2-3-1 and Ex. F2-4-1) as well as in the project capital descriptions in (Ex. D2-1-3).

It should be noted that fuel costs do not appear in the referenced table but were included in the overall estimate and economic assessment for Pickering Extended Operations. Fuel cost forecasts underpinning OPG’s evidence in this application are presented in part (d) below.

c) The costs in Table E2 are incremental and fully allocated.

i. 2016-2020 Costs - Enabling and Restoration costs incurred during this period are fully incremental because the plant life is being extended beyond 2020. In the event that plant life was not extended and depending on when the decision was made, the Enabling and Restoration costs identified in Table E2 could be reduced or potentially eliminated.

ii. Post 2020 Costs – Costs beyond 2020 are considered normal operating costs and are provided on a fully allocated basis in part (a) and (b) of this response. In the event that plant life was not extended beyond 2020, these costs could also be reduced but not fully eliminated. As described in EB-2013-0321 Ex. F2-2-3 Attachment 1 p. 19, it is OPG’s assessment that as the nuclear fleet shrinks, losses of economies of scale will result in an effective increase in the cost of providing nuclear support services and corporate support services. As a result, these services and any fixed overheads would need to be reallocated across the remaining, smaller fleet.

d) In addition to the costs captured in Table 1 in part (a) and (b), the following costs and cost reductions during the IR term that are attributable to Pickering are shown in Table 2:
The basis for developing the cost estimates is explained in Ex. F2-2-3 Attachment 2 pp. 14 and 15 under the heading, “COSTS AND GENERATION ASSUMPTIONS” steps 1 through 8. The major categories of expenditures are provided in part (a) and (b) of this response. Processes to control costs and stay within approved plans are described in Ex. L-6.5-1-Staff-129.

The Normal Operating Costs shown in Table 1 above for the post 2020 period were prepared on a consistent basis with the information provided to the IESO, but are not the same. The post 2020 costs shown in Table 1 represent the costs underpinning OPG’s application and are expressed on a fully allocated basis in escalated dollars whereas the information provided to the IESO was based on Ex. F2-2-3, Attachment 2 and is expressed in constant 2015$ and on an incremental basis as is explained in Ex. L-6.5-1 Staff-126.

The Business Case did take into consideration capital expenditures required during the test period and beyond 2020 as is shown in Ex. L-6.5-1 Staff-126 and explained in part c) of that response.

Table 2
Other Incremental Costs ($M)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(a)</td>
<td>(b)</td>
<td>(c)</td>
<td>(d)</td>
<td>(e)</td>
</tr>
<tr>
<td>1</td>
<td>Fuel Expense</td>
<td>(5)</td>
<td>(7)</td>
<td>(9)</td>
<td>(21)</td>
<td>117</td>
</tr>
<tr>
<td>2</td>
<td>Inventory Obsolescence Charges</td>
<td>(10)</td>
<td>(10)</td>
<td>(10)</td>
<td>(10)</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>IESO Non-Energy Charges</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>35</td>
</tr>
<tr>
<td>4</td>
<td>Severance and Related Costs</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>(683)</td>
</tr>
<tr>
<td>6</td>
<td>Depreciation on Restoration Capital Expenditures</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>50</td>
</tr>
<tr>
<td>7</td>
<td>Cost of Capital for Working Capital Component of Rate Base</td>
<td>2</td>
<td>5</td>
<td>8</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td>8</td>
<td>Property Tax</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>9</td>
<td>Income Tax</td>
<td>(0)</td>
<td>(0)</td>
<td>(0)</td>
<td>(11)</td>
<td>(32)</td>
</tr>
<tr>
<td>10</td>
<td>Total</td>
<td>(12)</td>
<td>(12)</td>
<td>(11)</td>
<td>(19)</td>
<td>(475)</td>
</tr>
</tbody>
</table>
Board Staff Interrogatory #114

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Ref: Decision EB-2013-0321, page 51

In approving the expenditures for Pickering Continued Operations (PCO), the OEB in its Decision in EB-2013-0321, relied on three factors. These were: (i) The extension of the Pickering units was consistent with Government direction and consistent with the Long-Term Energy Plan; (ii) benefits from Pickering Continued Operations were confirmed by the OPA; and, (iii) Pickering Continued Operations proposal was reviewed by the CNSC resulting in the renewal of Pickering’s power reactor operators licence.

a) In OPG’s view does Ontario’s current (2013) Long-Term Energy Plan, endorse the continued operation of Pickering beyond 2020?

b) In OPG’s view is the proposal to operate Pickering beyond 2020 and up to 2022/2024 consistent with Government direction?

Response

a) While the Long-Term Energy Plan (LTEP) released in December 2013 expected the Pickering Generating Station to be in service until 2020, the Government of Ontario subsequently endorsed the continued operation of Pickering Generating Station beyond 2020 when it announced the approval of OPG’s plan to operate Pickering to 2024 on January 11, 2016 (see OPG’s response to L-6.5-1 Staff-115). Extending the operation of Pickering will continue to facilitate the refurbishment of Darlington and Bruce units “by providing replacement capacity and energy without greenhouse gas emissions while managing prices”, as documented on p.30 of the LTEP.

b) OPG’s proposal to operate Pickering to 2022/2024 is consistent with Government direction. The Ministry of Energy issued a news release on January 11, 2016, which states: “The Province has also approved OPG’s plan to pursue continued operation of the Pickering Generating Station beyond 2020 up to 2024” (see OPG’s response to L-6.5-1 Staff-115).
Board Staff Interrogatory #115

Issue Number: 6.5
Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Ref: Exh F2-2-3 page 2

Please provide a copy of the Government of Ontario announcement referred to at the above reference.

Response

Please see Attachment 1.
Ontario is moving forward with nuclear refurbishment at Darlington Generating Station, securing 3,500 megawatts of affordable, reliable, and emission free power.

Nuclear refurbishment at Darlington will contribute $15 billion to Ontario’s gross domestic product (GDP) throughout the project and create up to 11,800 jobs annually. The refurbishment of all four units is expected to involve about 30 million hours of work over 10 years and will support Ontario’s globally recognized CANDU nuclear supply chain, with more than 180 companies employing thousands of highly skilled workers.

Ontario Power Generation (OPG) is on track to begin refurbishment of the first unit at Darlington in October 2016. To best protect Ontario ratepayers and ensure OPG delivers refurbishment on-time and on-budget, the government has established off-ramps that require OPG to obtain government approval prior to proceeding with each of the remaining unit refurbishments. The budget for the project is $12.8 billion, about $1.2 billion less than originally projected by OPG, and all four units are scheduled for completion by 2026.

The Province has also approved OPG’s plan to pursue continued operation of the Pickering Generating Station beyond 2020 up to 2024, which would protect 4,500 jobs across the Durham region, avoid 8 million tonnes of greenhouse gas emissions, and save Ontario electricity consumers up to $600 million. OPG will engage with the Canadian Nuclear Safety Commission and the Ontario Energy Board to seek approvals required for the continued operation of Pickering Generating Station.

Securing clean, reliable power for decades to come is part of the government’s plan to build
Ontario up. The four-part plan includes investing in people's talents and skills, making the largest investment in public infrastructure in Ontario's history, creating a dynamic, innovative environment where business thrives and building a secure retirement savings plan.

QUOTES

"Proceeding with the refurbishment at Darlington will ensure that nuclear continues to be Ontario's single largest source of power. The Darlington refurbishment project will create up to 11,800 jobs annually and contribute $15 billion to Ontario's GDP. Continuing operations at Pickering will protect 4,500 jobs across the Durham region, provide emissions-free electricity, and save Ontario electricity consumers up to $600 million."

- Bob Chiarelli
Minister of Energy

"Refurbishing Darlington is an investment in Ontario. It's good for the customers, it's good for the economy and it's good for the environment. We're confident we have done the work and have the people in place to deliver this project safely, on schedule and on budget."

- Jeffrey Lyash
President and CEO, Ontario Power Generation

"With these investments, nuclear will continue its role in ensuring Ontarians have enough power when and where they need it. The plan to refurbish the Darlington nuclear units and to keep Pickering in operation longer during the refurbishment period is a cost effective way to meet our future power needs."

- Bruce Campbell
President and CEO, Independent Electricity System Operator

QUICK FACTS

- Nuclear energy plays a fundamental role in Ontario’s electricity system. Ontario’s nuclear fleet currently supplies enough power to meet about 60 per cent of Ontario’s daily electricity needs, and is our largest source of reliable, affordable power.
- OPG electricity rates are regulated by the Ontario Energy Board (OEB). All costs for the Darlington refurbishment will be subject to review and approval by the OEB through a public and transparent process to ensure they are prudently incurred. The average cost
of power from Darlington nuclear units post-refurbishment is estimated to range between $72/MWh and $81 MWh, or 7 and 8 cents per kilowatt hour.

- The average cost of power from Darlington after refurbishment is within the range assumed in the 2013 Long-Term Energy Plan for refurbished nuclear energy and lower than the average price of electricity generation in Ontario, which in 2015 was $92/MWh.
- The Pickering Generating Station employs about 4,500 people and is the largest employer in Durham Region.
- Continuing operations at Pickering Generating Station will avoid 8 million tonnes of greenhouse gas emissions, which is the equivalent to taking 490,000 cars off Ontario roads.

LEARN MORE

- [Learn about OPG’s Darlington Refurbishment Project](#)
- [Read the Conference Board of Canada’s report on the economic impact of the Darlington Refurbishment](#)
- [Read Ontario’s 2013 Long-Term Energy Plan](#)
Board Staff Interrogatory #116

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Ref: Exh F2-2-3 page 4 Chart 1

Please provide in table format the values for the variables noted in Chart 1 at the above reference.

Response

The values for the variables noted in Chart 1 at Ex. F2-2-3, p. 4 are provided below:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Operating Costs</td>
<td>1,349</td>
<td>1,311</td>
<td>1,264</td>
<td>1,229</td>
<td>1,086</td>
<td>1,395</td>
<td>7,634</td>
</tr>
<tr>
<td>Restoration of Normal Operating Costs</td>
<td>0</td>
<td>15</td>
<td>32</td>
<td>56</td>
<td>147</td>
<td>0</td>
<td>250</td>
</tr>
<tr>
<td>Enabling Costs</td>
<td>15</td>
<td>26</td>
<td>55</td>
<td>107</td>
<td>104</td>
<td>0</td>
<td>307</td>
</tr>
<tr>
<td>Total Costs</td>
<td>1,364</td>
<td>1,351</td>
<td>1,351</td>
<td>1,392</td>
<td>1,338</td>
<td>1,395</td>
<td>8,191</td>
</tr>
</tbody>
</table>

OPG notes that there was an error in the data used to construct Chart 1 in Ex. F2-2-3, p. 4. A new chart will be filed as an evidence correction.
## Board Staff Interrogatory #117

**Issue Number:** 6.5  
**Issue:** Are the test period expenditures related to extended operations for Pickering appropriate?

### Interrogatory

### Reference:  
Ref: Exh F2-2-3

CNSC approval is required for Pickering Extended Operations.

a) It appears OPG is confident it will receive CNSC approval. Please describe the elements of OPG’s proposal that is or will be before the CNSC that lead it to believe that it will likely receive CNSC approval for extended operations at Pickering.

b) What is OPG’s plan in the event it does not receive CNSC approval?

c) In the event CNSC approval is delayed, what is the final date by which point OPG must determine if it is going to pursue Pickering operations beyond 2020?

d) How much of the proposed $307M budget to enable PEO will have been spent by this point?

### Response

a) OPG will provide a complete and detailed licence application that meets all requirements for a licence to operate a nuclear power plant. This application will include, for example, the technical basis for operation to 2024. This technical basis is founded on numerous detailed inspections of the physical condition of the Pickering station, demonstrating it and will remain fit for service through the requested operating life.

OPG’s licence application will also be based on CNSC accepted methodology to predict the future aging of the station and on commitments to continually inspect, analyze, and report the physical condition of the plant. At all times, OPG expects to be able to demonstrate to the CNSC that sufficient safe operating margin is present.

The licence application will also provide updates on Pickering’s performance over the past few years, including the fact that OPG’s safety record remains exemplary.

The application will address our improvement plans for the extended operations period, which will be based on a detailed Periodic Safety Review (PSR). The PSR, which complies with CNSC regulatory requirements, assesses plant component condition and

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Witness Panel: Nuclear Operations and Projects
compares our programs to modern codes and standards. Any gaps must be addressed, and improvement plans developed and accepted by the CNSC as part of the licensing process.

OPG’s compliance with the CNSC’s regulatory framework requirements and licensing process, and our demonstrated excellent plant performance in recent years, provide confidence that the Commission will approve operation of the Pickering station past 2020.

b) OPG is confident that the CNSC will provide approval to continue to operate the Pickering station past 2020, but realizes that there could be regulatory conditions attached to that approval. OPG would plan to meet any regulatory requirements set by the Commission except in the unlikely event that such conditions are unreasonably onerous in terms of cost or practicality. If conditions imposed were to cause OPG to revise its plans to operate Pickering, it would consult with its Shareholder regarding any potential changes to the planned end of commercial operation date.

It is also possible that the Commission might choose to issue a shorter licence than 10 years. In that event, OPG would plan to apply for a new licence prior to the end of the next licence term.

c) The CNSC Commission will issue a licence by August 31, 2018 (i.e., it won’t be delayed). See answer to part b) above. There is no “final date” by which OPG must determine pursuit of operation beyond 2020.

d) See response to c) above. If a decision is ultimately made to not pursue extended operations, a re-evaluation of the future work program and going forward costs would have to be completed at that time based on the requirements in the CNSC decision that led OPG not to pursue operation to 2022/2024 as currently planned.
Board Staff Interrogatory #119

Issue Number: 6.5
Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Ref: Exh F2-2-3 Attachment 2 page 7
At the above reference OPG discusses the mitigation measures available to it to address pressure tube elongation. OPG states, “Some of the physical modifications which are available would be costly to implement and some of the technical solutions are complex and/or would require increasing the complexity of operational procedures. Therefore, the preliminary plans to enable the Preferred Alternative include only the less costly physical modifications and less complex technical evaluations”. [Emphasis Added].

a) It appears the plans to enable PEO rely on “less costly physical modifications and less complex technical evaluations”, specifically in relation to Fuel Channels. Please explain the rationale for this approach, how it impacts the benefits analysis conducted by the IESO and OPG respectively and comment on how OPG proposes to manage the risks and costs should it later be known that more expensive modifications are needed. Please also clarify if the above statement is in relation to OM&A costs or capital expenditures or both.

b) Table A1 provides a forecast of costs needed to fund modifications arising from the Periodic Safety Review. Please provide a breakdown of the costs, describe the types of modifications and explain why costs related to modifications to the physical plant are being treated as OM&A rather than capital.

Response

a) The “less costly physical modifications” to safely manage fuel channel elongation and available bearing life to enable Pickering Extended Operations are fuel channel shifting and/or reconfiguration, which is a process currently employed at OPG facilities.

The “less complex technical evaluations” include refinement of elongation assessments using refined measurements and probabilistic assessments.

In addition, the potential use of depleted fuel and/or operation with some channels defueled is being evaluated as part of the Fuel Channel Life Assurance project. These fuel strategies are only intended to be employed if shifting or reconfiguration is not successful on individual channels due to component interferences, or to minimize the amount of shift or reconfiguration that must be completed.

Witness Panel: Nuclear Operations and Projects
This suite of tools, assessments and strategies to manage and mitigate fuel channel elongation is expected to be successful. It is noteworthy that project work completed to date has increased OPG’s confidence in its ability to operate Pickering to 2022/2024 using these tools.

Using the more expensive physical modification alternative is considered very unlikely given the work completed to date. However if the existing plan was proven to be unsuccessful, then the more expensive alternatives would need to be re-evaluated.

The work programs described above are all considered OM&A and have been included in the extended operations costs and production forecasts assessed in the economic assessment prepared by the IESO.

b) The work program associated with the Periodic Safety Review is progressing but is not complete. Accordingly, a list of potential modifications has not been finalized. Until the scope of a specific modification is defined, determining if a project meets the capitalization criteria is not possible. As a result, project expenditures were classified as OM&A for planning purposes. To the extent some of the costs are determined to be capital at a later date, the revenue requirement impact of the different classification will be captured through the Capacity Refurbishment Variance Account.
Board Staff Interrogatory #120

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Ref: Exh D2-1-2 pages 5-6

With respect to capital expenditures in 2016, at the above reference it states: “It is expected that new, but not yet defined Pickering capital projects to ensure safe and reliable operations to 2022/2024 will be started in 2017 and use a portion of unallocated funding”. The Unallocated component of test year capital expenditures is provided in Table 2 at Exh D2-1-2 and reproduced below:

<table>
<thead>
<tr>
<th>Table 2: Capital Expenditure Summary - Nuclear Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source: D2/T1/S2/Table 2</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Budget</td>
</tr>
<tr>
<td>5.5</td>
</tr>
</tbody>
</table>

Row 1: Portfolio Projects - Unallocated ($M)

Row 2: Pickering Extended Operations Capital Projects ($M)

a) Please provide in the format noted in the table above, the capital expenditures related to projects that are intended solely for the purposes of operating Pickering beyond 2020 and that will be funded through the Unallocated capital expenditure budget.

b) Capital projects to enable operation of Pickering to 2022/2024 are scheduled to start in 2017. Is the reason for the 2017 start date dependent on CNSC approval that is expected by June 30, 2017?

Response

a) Capital expenditures related to projects required to restore ongoing operating programs to normal levels of spending based on extending operations beyond 2020 are provided in Chart 1 below in the format requested. The amounts provided in row 2 are consistent with those provided in Ex. L-6.5-1 Staff-126. The

Witness Panel: Nuclear Operations and Projects
values in row 2 are expressed in escalated dollars whereas the dollars in Ex. L-6.5-1 Staff-126 are expressed in constant 2015$. In addition, Row 2 does not include minor fixed assets in 2021.

Chart 1

<table>
<thead>
<tr>
<th>Capital Expenditure Summary - Nuclear Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source: D2/T1/S2/Table 2</td>
</tr>
<tr>
<td>2016 Budget</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>Row 1: Portfolio Projects - Unallocated ($M)</td>
</tr>
<tr>
<td>Row 2: Pickering Extended Operations Capital Projects ($M)</td>
</tr>
</tbody>
</table>

b) The question is incorrect in stating that CNSC approval is expected by June 30, 2017. CNSC will issue a licence no later than August 31, 2018. Project start dates in 2017 take into consideration the time required to progress the Periodic Safety Review, Component Condition Assessments and other technical reviews so that potential modifications can be properly identified, approved and planned.
Board Staff Interrogatory #121

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Ref: Exh D2-1-3 Table 5b
In Table 5b at Exh D2-1-3, OPG has provided a listing of 19 projects that are to be funded through the test year Unallocated Capital.

a) It is not clear to OEB staff which of these projects is specifically related to ensuring the operation of Pickering beyond 2020. Please expand Table 5b by adding additional columns to include the following information: Identify the project driver for each project in the table as “PEO” or “PCO” or “other”; identify the planned in-service date for each project; total estimated capital expenditure for each project and in-service date.

b) Please confirm that the projects listed in Table 5a, relate exclusively to the DRP and are not intended to enable Pickering Extended Operations. If that is not true, please identify the projects in Table 5a that are intended to enable Pickering Extended Operations.

Response

a) None of the projects listed in Ex. D2-1-3 Table 5b are required to ensure operation of the Pickering station beyond 2020. The projects listed in Ex. D2-1-3 Table 5b have been identified to maintain safe and reliable operations to 2020 and are proposed projects to be started in the years listed. At this time, there has not been sufficient engineering, planning or estimating completed to provide estimates and in-service dates as requested. Any potential projects that may be required to ensure operations beyond 2020 will be identified following the completion of the Periodic Safety Review and other technical assessments that are currently in progress.

b) OPG does not confirm that the projects listed in Ex. D2-1-3 Table 5a relate exclusively to the Darlington Refurbishment Program. Rather, the projects listed in Ex. D2-1-3 Table 5a are modifications planned for the Darlington station. None of the projects in Ex. D2-1-3 Table 5a are intended to enable Pickering Extended Operations.
Board Staff Interrogatory #122

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Ref: Exh F2-2-3 page 6 Chart 2

a) Please provide OPG’s reasons for the large increase in Outage OM&A Nuclear Support Costs which increase from $9.9M in 2017 to $62M in 2020?

b) Please clarify whether the outage work related to PEO will be conducted within the outage plan for Pickering (as set out in Chart 2 at Exh F2-4-1).

Response

(a) The increase in Outage OM&A from 2017 to 2020 is for additional inspections and maintenance on major components required to enable Pickering Extended Operations. Major components requiring the additional work include: steam generators, pressure tubes, feeders, fuel channel work, fueling machine, IMS tooling and balance of plant components.

(b) Yes. Outage work related to Pickering Extended Operations is within the outage plan as submitted Ex. E2-1-2 Table 1 for planned outage days and Ex. F2-4-1 Chart 2 for planned Pickering Extended Operations outage costs.
Board Staff Interrogatory #123

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Below are interrogatories on the IESO’s analysis (Exh F2-2-3 Attachment 1) of Pickering Extended Operations. In order to provide complete responses to all OEB staff interrogatories please consult the IESO as necessary.

Interrogatory

Reference:
Ref: Exh F2-2-3 Attachment 1, EB-2013-0321

a) In developing the business case to assess the feasibility of operating Pickering from 2016 to 2020, OPG relied on certain assumptions with respect to the Normal operating and capital costs for Pickering for the period 2016 to 2020 and concluded that there was $520M overall system benefit. In table format, please provide separately the assumptions for capital and operating cost relied on in assessing the feasibility of Pickering operations to 2020 and also referenced in the 2012 Business Case Update - Pickering Continued Operations (EB-2013-0321/ F2-2-3-Attachment 1), for each of the years 2016-2020. On a similar and comparable basis please provide the forecast of operating (including all compensation and corporate burdens) and capital costs related to Pickering operations in the current application for the years 2016-2020.

b) Please calculate the variance between the Business Case assumptions and the Test Year forecast for each of years 2016-2020. Please comment on the variance in the context of:

i. The observations in the 2012 Business Case Update which state: "The expected value is somewhat sensitive to the total cost of operating the Pickering Station. ....if OM&A costs were to worsen by 10%, then the incremental value would be reduced by approximately $220 M PV."

ii. The IESO’s analysis, which concludes that PEO “shows a disbenefit when Pickering capital/operating costs are 15-22% greater than the estimates provided by OPG”

Response

a) In order to derive the comparison requested in part a) OPG used the cost and generation assumptions developed in the business case for Continued Operations from EB-2013-0321, Ex. F2-2-3 Attachment 1 and compared them to the reference scenario used for the current Extended Operations that assumes all Pickering units cease commercial operations at the end of 2020. All costs were converted to 2015$ for comparison purposes.
The analysis indicates that current costs under the reference scenario are approximately $195M higher than previously projected. This figure is offset by fuel costs that are between $20M and $27M lower depending on the assumed production as shown in the comparison below. The majority of the variance occurs in 2020 where under the current reference scenario, all Pickering units are expected to operate to year end 2020. Whereas under the original Continued Operations plan, the following end of life dates were expected based on 247k EFPH of operation on the fuel channels:

- Unit P6 - April 2019,
- Unit P5 - February 2020 and
- Units P1, P2, P7, and P8 to the end of 2020.

The extended service life under the current scenario generates between 6.2 TWh and 6.8 TWh of production in 2020 and would effectively require a full staff compliment to support plant operations for an entire year resulting in higher operating costs beginning in 2019 and continuing through 2020.
## COMPARISON OF PICKERING OPERATING COSTS 2016-2020


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<tr>
<th></th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>Total</th>
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<tr>
<td><strong>PICKERING CONTINUED OPERATIONS - 247k EFPH</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>(Units 1, 4, 7 &amp; 8 Operate to Q4 2020, Unit 6 Operates to Q2 2019 and Unit 5 Operates to Q1 2020)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Total OM&amp;A &amp; Capital Costs (2015 $M)</td>
<td>1,001</td>
<td>953</td>
<td>965</td>
<td>891</td>
<td>624</td>
<td>4,433</td>
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<tr>
<td>Fuel &amp; Fuel Related Costs (2015 $M)</td>
<td>125</td>
<td>143</td>
<td>121</td>
<td>117</td>
<td>99</td>
<td>605</td>
</tr>
<tr>
<td>Energy Production (TWh)</td>
<td>21.0</td>
<td>22.6</td>
<td>21.9</td>
<td>20.3</td>
<td>17.2</td>
<td>103.1</td>
</tr>
</tbody>
</table>

| **PICKERING EXTENDED OPERATIONS Reference Case - 259k EFPH** |      |      |      |      |      |       |
| (All PNGS Units Operate to Year End 2020) |(50,506),(948,519) |      |      |      |      |       |
| **BCS Option 1 (Incr. 65 TWh Scenario)** |      |      |      |      |      |       |
| Total OM&A & Capital Costs (2015 $M) | 1,048 | 953 | 959 | 909 | 759 | 4,628 |
| Fuel & Fuel Related Costs (2015 $M) | 120 | 114 | 111 | 113 | 128 | 585 |
| Energy Production (TWh) | 20.8 | 20.0 | 20.4 | 21.2 | 24.1 | 106.5 |

| **BCS Option 2 (Incr. 62 TWh Scenario)** |      |      |      |      |      |       |
| Total OM&A & Capital Costs (2015 $M) | 1,048 | 953 | 959 | 909 | 759 | 4,628 |
| Fuel & Fuel Related Costs (2015 $M) | 120 | 114 | 111 | 109 | 124 | 578 |
| Energy Production (TWh) | 20.8 | 20.0 | 20.4 | 20.5 | 23.4 | 105.2 |

### Comparison - Continued Operations to 2020 vs. Extended Operations (Reference Scenario)

| **BCS Option 1 (Incr. 65 TWh Scenario)** |      |      |      |      |      |       |
| Total OM&A & Capital Costs (2015 $M) | 48 | 0 | -6 | 18 | 135 | 195 |
| Fuel & Fuel Related Costs (2015 $M) | -5 | -30 | -10 | -4 | 29 | -20 |
| Energy Production (TWh) | -0.2 | -2.6 | -1.5 | 0.9 | 6.8 | 3.5 |

| **BCS Option 2 (Incr. 62 TWh Scenario)** |      |      |      |      |      |       |
| Total OM&A & Capital Costs (2015 $M) | 48 | 0 | -6 | 18 | 135 | 195 |
| Fuel & Fuel Related Costs (2015 $M) | -5 | -30 | -10 | -8 | 26 | -27 |
| Energy Production (TWh) | -0.2 | -2.6 | -1.5 | 0.2 | 6.2 | 2.1 |
b) The 10% sensitivity analysis described in EB-2013-0321 Ex. F2-2-3 Attachment 1 is based on Pickering’s total incremental annual capital and operating cost. The total operating cost delta of $168M (using the 6.2 TWh production figure) represents a variance of less than 4% assuming all things equal. As described in part a) of this response, however, the majority of the variance occurs in 2020 when between 6.2 TWh and 6.8 TWh of incremental generation is also expected to be achieved.
Board Staff Interrogatory #124

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Below are interrogatories on the IESO’s analysis (Exh F2-2-3 Attachment 1) of Pickering Extended Operations. In order to provide complete responses to all OEB staff interrogatories please consult the IESO as necessary.

Interrogatory

Reference:
Ref: Exh F2-2-3 Attachment 1
At the above reference OPG has included slides from presentations prepared by the IESO that evaluate the economic case for Pickering Extended Operations.

Did the IESO prepare a report or reports in addition to the presentation provided? If such reports were prepared please submit the report(s).

Response

The following response has been prepared by the IESO:

The IESO analyses: “Assessment of Pickering Life Extension Options: October 2015 Update” and “Assessment of Pickering Life Extension Options” – March 9, 2015 included in Exhibit F2-2-3 Attachment 1 are the IESO’s reports on the assessment of Pickering Extended Operations. No additional reports were prepared.
Board Staff Interrogatory #125

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Below are interrogatories on the IESO’s analysis (Exh F2-2-3 Attachment 1) of Pickering Extended Operations. In order to provide complete responses to all OEB staff interrogatories please consult the IESO as necessary.

Interrogatory

Reference:
Ref: Exh F2-2-3 page 7

a) It is indicated that OPG conducted its own internal economic evaluation of PEO. Please provide the study.

b) Please compare the assumptions relied on in both studies, particularly with respect to assumptions related to load growth, price of gas-fired generation, Pickering production forecast, and Pickering operating and capital costs.

Response

a) The results of OPG’s internal economic evaluation are documented in the Pickering Extended Operations Technical and Economic Assessment at Ex. F2-2-3 Attachment 2.

b) A comparison of the major assumptions used in the development of the economic assessments conducted by OPG and the IESO are documented below. Chart 1 has been prepared by OPG and Chart 2 has been prepared by the IESO:
**Chart 1: OPG Assumptions**

### OPG Assumptions (Pickering Extended Operations - Economic Assessment)

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<td>System Demand (TWh)</td>
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<td>Gas Prices (Dawn, 2015C$/mmBtu)</td>
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<td>CO2 Credit (2015C$/Mg CO2e)</td>
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<tr>
<td>Pickering Production Forecast (TWh)</td>
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<td>Pickering Operating Costs ($M)</td>
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Refer to L-1-6.5 Staff 126 for Cost and Production Data

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<tbody>
<tr>
<td>7 Combined Cycle Gas Turbine (CCGT)</td>
<td>6,800</td>
<td>$1,100</td>
<td>$26</td>
<td>$3</td>
</tr>
<tr>
<td>8 Single Cycle Gas Turbine (SCGT)</td>
<td>9,500</td>
<td>$800</td>
<td>$21</td>
<td>$5</td>
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**Chart 2: IESO Assumptions**

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</tr>
</thead>
<tbody>
<tr>
<td>System Demand (TWh) (a range of demands were considered)</td>
<td>146</td>
<td>146</td>
<td>147</td>
<td>147</td>
<td>148</td>
<td>150</td>
<td>151</td>
<td>153</td>
<td>155</td>
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<tr>
<td>Gas Prices (Dawn, 2015C$/mmBtu)</td>
<td>4.7</td>
<td>5.2</td>
<td>5.2</td>
<td>5.2</td>
<td>5.2</td>
<td>5.2</td>
<td>5.2</td>
<td>5.2</td>
<td>5.2</td>
</tr>
<tr>
<td>CO2 Credit (2015C$/Mg CO2e)</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4 Pickering Production Forecast (TWh) (This corresponds to the Pickering extended operations, 45 TWh scenario)</td>
<td>21.3</td>
<td>19.2</td>
<td>19.3</td>
<td>19.6</td>
<td>20.9</td>
<td>19.7</td>
<td>21.3</td>
<td>14.8</td>
<td>16.7</td>
</tr>
<tr>
<td>Total O&amp;M &amp; Capital ($M)</td>
<td>1,055</td>
<td>987</td>
<td>1,038</td>
<td>1,054</td>
<td>977</td>
<td>987</td>
<td>902</td>
<td>631</td>
<td>494</td>
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<tr>
<td>6 Fuel &amp; Fuel Related Costs ($M)</td>
<td>126</td>
<td>121</td>
<td>118</td>
<td>125</td>
<td>115</td>
<td>119</td>
<td>122</td>
<td>85</td>
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</tr>
</thead>
<tbody>
<tr>
<td>7 Combined Cycle Gas Turbine (CCGT)</td>
<td>NA (No new CCGTs were assumed. Instead, capacity (MW) was addressed by peaking facilities at the net revenue requirement below, energy (TWh) was made up from the existing Ontario system)</td>
<td>NA</td>
<td>130 (Net Revenue Requirement for a capacity)</td>
<td>NA</td>
</tr>
<tr>
<td>8 Single Cycle Gas Turbine (SCGT)</td>
<td>~10,500</td>
<td>NA</td>
<td></td>
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</tbody>
</table>

Witness Panel: Nuclear Operations and Projects
Board Staff Interrogatory #126

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Below are interrogatories on the IESO’s analysis (Exh F2-2-3 Attachment 1) of Pickering Extended Operations. In order to provide complete responses to all OEB staff interrogatories please consult the IESO as necessary.

Interrogatory

Reference:
Ref: Exh F2-2-3 Attachment 1 page 3

At the above reference the IESO states in part: “Potential for cost savings although these depend on the outlook for Pickering production and operating costs (which have a lower degree of uncertainty and can be controlled to some degree)....”

a) Please provide the production and operating costs assumptions for Pickering for the period 2021-2024 that were used in the March 2015 study and the October 2015 update. Please provide this information in table format and by year. Please provide OPG’s views on the appropriateness of the two assumptions including the rate of growth.

b) For comparison purposes please provide the production and operating costs for Pickering, for the period 2016-2020. Please provide this information in the same format and on the same basis as in part (a).

c) Does the IESO study also take into account capital expenditures that will be required during the 2021-2024 period? What were the assumptions in the study?

Response

a) & b) The production and cost data provided to the IESO that was used in the March 2015 and October 2015 studies are provided below in Chart 1 and Chart 2:
### Chart 1

**PICKERING EXTENDED OPERATIONS Assessment Data (Scenario ~ 73 TWh)**

**(March 2015)**

<table>
<thead>
<tr>
<th>Year</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prod</td>
<td>0.0</td>
<td>0.0</td>
<td>-0.5</td>
<td>-0.2</td>
<td>-2.6</td>
<td>22.1</td>
<td>22.6</td>
<td>15.1</td>
<td>16.5</td>
<td>72.9</td>
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**Incremental Operating Costs ($2015M)**

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Total OM&amp;A</td>
<td>0</td>
<td>48</td>
<td>35</td>
<td>133</td>
<td>927</td>
<td>901</td>
<td>643</td>
<td>567</td>
<td>632</td>
<td>3,254</td>
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<tr>
<td>Total Capital</td>
<td>0</td>
<td>19</td>
<td>19</td>
<td>14</td>
<td>24</td>
<td>11</td>
<td>64</td>
<td>65</td>
<td>65</td>
<td>102</td>
</tr>
<tr>
<td>Total Operating Costs</td>
<td>0</td>
<td>67</td>
<td>55</td>
<td>147</td>
<td>951</td>
<td>911</td>
<td>650</td>
<td>574</td>
<td>557</td>
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<td>Fuel</td>
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<td>-1</td>
<td>-14</td>
<td>119</td>
<td>122</td>
<td>85</td>
<td>93</td>
<td>308</td>
<td>401</td>
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### Chart 2

**PICKERING EXTENDED OPERATIONS Assessment Data (BCS Option 1 ~ 65 TWh)**

**(October 2015)**

<table>
<thead>
<tr>
<th>Year</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prod</td>
<td>0.0</td>
<td>-0.9</td>
<td>-1.2</td>
<td>-1.8</td>
<td>-3.4</td>
<td>19.6</td>
<td>21.2</td>
<td>14.6</td>
<td>16.5</td>
<td>64.5</td>
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</table>

**Incremental Operating Costs ($2015M)**

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Total OM&amp;A</td>
<td>7</td>
<td>35</td>
<td>64</td>
<td>129</td>
<td>207</td>
<td>965</td>
<td>891</td>
<td>623</td>
<td>487</td>
<td>3,408</td>
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<tr>
<td>Total Capital</td>
<td>0</td>
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<td>16</td>
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<td>10</td>
<td>7</td>
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<td>89</td>
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<tr>
<td>Total Operating Costs</td>
<td>7</td>
<td>35</td>
<td>79</td>
<td>145</td>
<td>218</td>
<td>987</td>
<td>902</td>
<td>631</td>
<td>494</td>
<td>3,497</td>
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<tr>
<td>Fuel</td>
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<td>-5</td>
<td>-6</td>
<td>-9</td>
<td>-18</td>
<td>105</td>
<td>113</td>
<td>79</td>
<td>89</td>
<td>347</td>
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</table>

**PICKERING EXTENDED OPERATIONS Assessment Data (BCS Option 2 ~ 62 TWh)**

**(October 2015)**

<table>
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<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Prod</td>
<td>0.0</td>
<td>-0.9</td>
<td>-1.2</td>
<td>-1.6</td>
<td>-3.8</td>
<td>18.8</td>
<td>20.2</td>
<td>13.8</td>
<td>16.1</td>
<td>61.5</td>
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**Incremental Operating Costs ($2015M)**

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<tbody>
<tr>
<td>Total OM&amp;A</td>
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<td>965</td>
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<td>623</td>
<td>487</td>
<td>3,408</td>
</tr>
<tr>
<td>Total Capital</td>
<td>0</td>
<td>15</td>
<td>16</td>
<td>11</td>
<td>22</td>
<td>10</td>
<td>7</td>
<td>7</td>
<td>7</td>
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<td>Total Operating Costs</td>
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<td>35</td>
<td>79</td>
<td>145</td>
<td>218</td>
<td>987</td>
<td>902</td>
<td>631</td>
<td>494</td>
<td>3,497</td>
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<tr>
<td>Fuel</td>
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<td>-6</td>
<td>-8</td>
<td>-19</td>
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<td>108</td>
<td>74</td>
<td>87</td>
<td>331</td>
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Witness Panel: Nuclear Operations and Projects
The March 2015 data was provided to the IESO in December 2014 and was expressed in 2014$. The March table referenced above was converted to 2015$ consistent with the October data for comparison purposes.

Total OM&A includes base, outage, projects, the station’s portion of incremental allocated nuclear and corporate support costs and estimated costs to enable extended operations.

Total Capital costs include Minor Fixed Asset expenditures.

OPG believes the production data reflecting approximately 62 TWh of incremental production estimated in October 2015 is achievable and most accurately reflects the planned outage activities required to extend Pickering operations. The cost data also estimated in October 2015 accurately reflects the forecast incremental costs required to execute the work program to extend Pickering operations as described in Ex. F2-2-3 Attachment 2.

c) Yes, the study includes capital expenditures. These amounts are reflected in the Total Capital rows in the Charts in parts a) and b) above.
Board Staff Interrogatory #127

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Below are interrogatories on the IESO’s analysis (Exh F2-2-3 Attachment 1) of Pickering Extended Operations. In order to provide complete responses to all OEB staff interrogatories please consult the IESO as necessary.

Interrogatory

Reference:
Ref: Exh F2-2-3 Attachment 1 page 3
The IESO analysis establishes a reference gas price of $5/mmbtu.

How was this estimate/forecast developed? If the IESO has relied on published forecasts to set the reference price, please provide the source and an updated outlook for gas prices in the period 2021-2024.

Response

The following response has been prepared by the IESO:

The IESO does not produce its own natural gas price forecasts, but relies on industry outlooks to inform its planning assessments. As described in Exhibit F2-2-3 Attachment 1 page 93, the natural gas price outlook for the reference case is from Sproule which is a firm that produces publicly available long-term gas price forecasts. As described in Exhibit F2-2-3 Attachment 1, recognizing that there is uncertainty in the natural gas price outlook, the IESO examined a range of natural gas prices (informed by historical natural gas price distributions) to evaluate the impact of varying natural gas/carbon prices on the net benefit of Pickering extended operations.

The current Sproule natural gas price forecast can be found on Sproule’s website:
http://sproule.com/forecasts

Witness Panel: Nuclear Operations and Projects
Board Staff Interrogatory #128

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Below are interrogatories on the IESO’s analysis (Exh F2-2-3 Attachment 1) of Pickering Extended Operations. In order to provide complete responses to all OEB staff interrogatories please consult the IESO as necessary.

Interrogatory

Reference:
Ref: Exh F2-2-3 Attachment 1 page 15

a) What was the reason for reducing the production forecast from 73 TWh (in March 2015 study) to 62 TWh and 65 TWh (in October 2015 update)?

b) What is the level of production below the assumed 62 TWh where the net benefits of extended operations cease?

Response

a) The 73 TWh production forecast was developed in December 2014 based on a preliminary understanding of the scope of work required under various alternatives being developed for extended operations. During 2015, OPG focused on the preferred extended operations alternative and developed a more rigorous production forecast. In particular, planned outage durations were refined based on a detailed understanding of the scope of work in each outage under the preferred alternative. This is the primary reason why the production forecast was reduced for the October 2015 update.

b) The following response has been prepared by the IESO:

The IESO estimates that the net benefit of Pickering Life Extension ceases at a Pickering incremental production level (i.e. the difference in energy production with Pickering to 2022/2024 as compared to Pickering to 2020) of 56 TWh.
Board Staff Interrogatory #129

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Below are interrogatories on the IESO’s analysis (Exh F2-2-3 Attachment 1) of Pickering Extended Operations. In order to provide complete responses to all OEB staff interrogatories please consult the IESO as necessary.

Interrogatory

Reference:
Ref: Exh F2-2-3 Attachment 1 page 27

At the above reference, the IESO states, “In light of the impact that Pickering capital and operating costs have on the value proposition of extended Pickering operations, it may be worth exploring options for cost control”.

What are the cost control measures that OPG proposes to implement to ensure that Pickering operating and capital costs stay at the level assumed in the IESO study?

Response

OPG sets financial budgets based on the business planning process which are monitored and controlled by management through the execution period. In addition, robust project management techniques will be used to manage the scope and costs of the extended operations program (see description of the Centre of Excellence for Project Management at Ex. L-4.4-15 SEC-43). A scope control process will be used to monitor progress of work and approve changes as required. Cost reporting practices will be employed to monitor expenditures against approved budgets. Management oversight will be employed to ensure costs are effectively managed.
Board Staff Interrogatory #130

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Below are interrogatories on the IESO’s analysis (Exh F2-2-3 Attachment 1) of Pickering Extended Operations. In order to provide complete responses to all OEB staff interrogatories please consult the IESO as necessary.

Interrogatory

Reference:
Ref: Exh F2-2-3 Attachment 1 page 5 and 29

One of the differences between the October 2015 study versus the March 2015 Study is in the outlook for resource requirements from 2015-2032. Please explain the factors that caused the change.

Response

The following response has been prepared by the IESO:

The outlook for resource requirements is a function of (1) the electricity demand outlook and (2) the electricity supply outlook.

The demand outlook in the October 2015 study is approximately 534 MW higher than the March 2015 study. This increase is driven by a change in the demand forecast base year to reflect more recent experience with respect to embedded generation and natural conservation. The net change in the demand outlook is illustrated in Table 1 below.

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</thead>
<tbody>
<tr>
<td>October 2015</td>
<td>23,947</td>
<td>23,959</td>
<td>24,048</td>
<td>24,158</td>
<td>24,300</td>
<td>24,230</td>
<td>24,498</td>
<td>24,561</td>
<td>24,636</td>
</tr>
<tr>
<td>Net Change</td>
<td>476</td>
<td>521</td>
<td>528</td>
<td>527</td>
<td>551</td>
<td>553</td>
<td>555</td>
<td>533</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Peak Demand, MW</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>2027</th>
<th>2028</th>
<th>2029</th>
<th>2030</th>
<th>2031</th>
<th>2032</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 2015</td>
<td>24,148</td>
<td>24,376</td>
<td>24,537</td>
<td>24,775</td>
<td>24,885</td>
<td>25,137</td>
<td>25,346</td>
<td>25,414</td>
<td>25,477</td>
</tr>
<tr>
<td>October 2015</td>
<td>24,682</td>
<td>24,912</td>
<td>25,076</td>
<td>25,315</td>
<td>25,426</td>
<td>25,678</td>
<td>25,886</td>
<td>25,945</td>
<td>26,010</td>
</tr>
</tbody>
</table>
With respect to the supply outlook, the only change in the supply outlook between the March 2015 and October 2015 studies is with respect to the Bruce nuclear refurbishment schedule. The net change in installed nuclear capacity is illustrated in the Table 2.

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</thead>
<tbody>
<tr>
<td>Change in Nuclear Capacity</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+770</td>
<td>+770</td>
<td>-52</td>
<td>+718</td>
<td>-52</td>
<td>-822</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Installed MW</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>2027</th>
<th>2028</th>
<th>2029</th>
<th>2030</th>
<th>2031</th>
<th>2032</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in Nuclear Capacity</td>
<td>+52</td>
<td>-718</td>
<td>+52</td>
<td>-770</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Board Staff Interrogatory #131

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Below are interrogatories on the IESO’s analysis (Exh F2-2-3 Attachment 1) of Pickering Extended Operations. In order to provide complete responses to all OEB staff interrogatories please consult the IESO as necessary.

Interrogatory

Reference:
Ref: Exh F2-2-3 Attachment 1 page 32

Please explain and describe the methodology used to calculate the total cost of electricity at page 32.

Response

The following response has been prepared by the IESO:

The total cost of electricity service is comprised of the following major cost categories: electricity generation, conservation, transmission, distribution, wholesale market charges, and debt retirement charges, which are defined below:

1. Electricity generation - all payments to generators for the production of the electricity commodity. This includes payments pursuant to contracts, regulated rates or market clearing prices as established or negotiated by the generating facility.

2. Conservation cost includes the energy efficiency and demand response costs that are recovered by electricity ratepayers (i.e., excludes the equipment investments made by the customer implementing the conservation initiative).

3. Transmission cost is the regulated revenue requirement for the high-voltage transmission system that transport electricity from the generators to the low-voltage distribution delivery system.

4. Distribution delivery system is the regulated revenue requirement for the low-voltage distribution delivery system required to transport electricity to retail customers embedded in an LDC.

5. Wholesale Market Services include the cost for payments for constraints and losses, provisions for reserves, black starts, IESO administration fee, OPA administration fee,
rural and remote electricity rate protection. These costs reflect the operation and administration costs for the electricity system.

6. Debt Retirement Charge is the regulated rate established by the Electricity Act 1998, O. Reg. 493/01. This rate is a charge on electricity consumed in Ontario on behalf of the Ontario Electricity Financial Corporation. The funds collected are used to address the debt of the former Ontario Hydro.

The methodology of estimating these cost components is discussed in the 2013 LTEP cost module posted on the IESO website at the following address:

The basic methodology of developing the total cost estimates found at Exh. F2-2-3 Attachment 1 page 32 is consistent with the LTEP methodology.
Board Staff Interrogatory #132

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Below are interrogatories on the IESO’s analysis (Exh F2-2-3 Attachment 1) of Pickering Extended Operations. In order to provide complete responses to all OEB staff interrogatories please consult the IESO as necessary.

Interrogatory

Reference:
Ref: Exh F2-2-3 Attachment 1 page 36

At the above reference it is stated that early shutdown of Pickering would present practical challenges related to the securing of replacement supplies within a span of three years. OEB staff notes that the plan for the closure of Pickering in 2020 has been known for some time. In light of this, please explain why the IESO believes that there is inadequate time to source replacement supplies.

Response

The following response has been prepared by the IESO:

The above reference is addressing the scenario where Pickering would be shutdown early (i.e. by 2018) and notes that it would be more challenging to arrange approximately 3,000 MW of replacement supply within three years (i.e. by 2018) than it would be to arrange it within five years (i.e. by 2020). As a generalization, the point speaks to the need to account for resource development lead-times when planning. Relevant lead-times include the length of time required to develop and conduct acquisition processes (e.g. procurements, negotiations and/or market-based mechanisms such as capacity auctions) as well as the length of time of any applicable approvals, construction and commissioning activities related to replacement resources and enabling elements such as transmission.

Many of the electricity resources anticipated to enter service over the next few years are already at some stage of development or commissioning. Implementing additional resources at an accelerated pace would not be impossible, but would likely require the launching of new rounds of resource acquisition and development.
**Board Staff Interrogatory #133**

**Issue Number: 6.5**

**Issue:** Are the test period expenditures related to extended operations for Pickering appropriate?

Below are interrogatories on the IESO’s analysis (Exh F2-2-3 Attachment 1) of Pickering Extended Operations. In order to provide complete responses to all OEB staff interrogatories please consult the IESO as necessary.

**Interrogatory**

**Reference:**
Ref: Exh F2-2-3 Attachment 1 page 57  Ref: Exh F2-2-3 Attachment 2 Table 5

a) Please provide the revenue requirement that is attributed to Pickering NGS for each of the test years. Please also identify the impact (versus the status quo) on revenue requirement of the change in capital structure that is proposed in this application. With respect to year 2021, please explain your response in relation to the “Post 2020” costs provided in Table 5 in Attachment 2 of Exh F2-2-3.

b) What is the percent annual impact of the Pickering Extend Operations initiative on the test year revenue requirement?

c) If not already reflected, please update the NPV distributions shown on slide 19 of Assessment of Pickering Life Extension Options: October 2015 Update, as updated November 4 2015, at Exh F-2-3, so that the graph reflects the proposed capital structure contained in this application.

**Response**

a) Payment amounts are set on a nuclear-wide basis. Similarly, the nuclear revenue requirement has been developed on a nuclear-wide basis and cannot be readily attributed to a particular nuclear facility or initiative due to the presence of various common costs shared between facilities.

Consistent with the determination of post-2020 costs associated with extended operations at Ex. F2-2-3 Attachment 2, Table 5, the impact on the revenue requirement of the proposed change in capital structure that is associated with Pickering Extended Operations is negligible. As indicated at Ex. F4-1-1, p. 6, depreciation amounts have been determined for the Pickering units on the basis of an accounting end of life date of December 31, 2020, which is reflected in the negligible rate base amounts for Pickering in 2021 (see Ex. B3-1-1 Table 1).
b) The annual impact of the Pickering Extended Operations initiative on the nuclear revenue requirement is shown in Chart 1 below.

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<tbody>
<tr>
<td>1</td>
<td>Pickering Extended Operations Enabling Costs ($M)</td>
<td>Ex. F2-2-3, p. 6, Chart 2, line 7</td>
<td>25.6</td>
<td>55.3</td>
<td>107.1</td>
<td>104.3</td>
<td>0.0</td>
</tr>
<tr>
<td>2</td>
<td>Nuclear Revenue Requirement ($M)</td>
<td>Ex. I1-1-1, Table 1, line 26</td>
<td>3,189.9</td>
<td>3,250.0</td>
<td>3,285.0</td>
<td>3,774.8</td>
<td>3,489.4</td>
</tr>
<tr>
<td>3</td>
<td>PEO Enabling Costs as a % of Nuclear Revenue Requirement (%)</td>
<td>n/a</td>
<td>0.8%</td>
<td>1.7%</td>
<td>3.3%</td>
<td>2.8%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

c) The following response has been prepared by the IESO:

IESO analysis uses a social discount rate and changes to OPG’s cost of capital would not affect the discount rate.

While the social discount rate used by the IESO in its analysis is not meant to reflect any particular’s company’s capital structure, the IESO has considered the sensitivity of estimated Net Present Value of Change in Electricity System Cost to changes in the discount rate used (+/-1% real) (Figure 1 and Figure 2).

For context, the IESO assumed a 4% annual real discount rate in its evaluation of Pickering Life Extension; the sensitivity below considers a 5% and 3% discount rate.

Again, while not necessarily indicative of OPG’s or any other company’s capital structure, the IESO presents the information below for the Board’s information, notwithstanding.
Figure 1: Net Present Value of Change in Electricity System Cost Relative to Pickering to 2020 – Case with +65 TWh of Pickering Production

Figure 2: Net Present Value of Change in Electricity System Cost Relative to Pickering to 2020 – Case with +62 TWh of Pickering Production
Board Staff Interrogatory #134

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Below are interrogatories on the IESO’s analysis (Exh F2-2-3 Attachment 1) of Pickering Extended Operations. In order to provide complete responses to all OEB staff interrogatories please consult the IESO as necessary.

Interrogatory

Reference:
Ref: Exh F2-2-3 Attachment 1 page 73

In the 2013 Long-Term Energy Plan (LTEP) it is noted that early shutdown of Pickering units may be possible if the Clarington transformer station can be placed in service by 2018. Given that the Clarington transformer station is expected to be in-service by 2018 (page73) please describe what has changed, specifically with respect to capacity and demand needs in the East-GTA region, since the release of 2013 LTEP that makes the case for extended operations necessary.

Response

The following response has been prepared by the IESO:

As indicated at Exh F2-2-3 Attachment 1 page 73, the transmission plan for East GTA includes the construction of a new 500/230 kV transformer station in Clarington to maintain supply reliability to Durham Region following Pickering shutdown and to provide a secure electricity supply in this high growth area. Hydro One is currently constructing the new transformer station (“Clarington TS”) and remains on schedule for an in-service of 2018.

The IESO’s evaluation of Pickering options assumes a 2018 in-service date for Clarington TS (i.e. under all Pickering shut-down scenarios assessed). Contrary to the premise of the question, the IESO’s analysis does not posit that capacity and demand needs in the East-GTA make the case for extended operations necessary.

Rather, the IESO identifies a variety of potential benefits of extended Pickering operations, including reductions in replacement capacity costs and reductions in replacement energy costs from gas-fired resources and energy imports.
Board Staff Interrogatory #135

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Below are interrogatories on the IESO’s analysis (Exh F2-2-3 Attachment 1) of Pickering Extended Operations. In order to provide complete responses to all OEB staff interrogatories please consult the IESO as necessary.

Interrogatory

Reference:
Ref: Exh F2-2-3 Attachment 1 page 73

What is the impact on the net benefit of PEO if it is assumed that the Clarington TS and planned 500/230 kV autotransformer in Milton are placed in-service on schedule, i.e. by 2018 and 2020 respectively?

Response

The following response has been prepared by the IESO:

For clarity, most of the IESO’s analysis of PEO (i.e. pages 1 to 62 of Exh F2-2-3 Attachment 1) reflects the assumption that Clarington TS and planned 500/230 kV autotransformer in Milton are placed in service as scheduled, i.e. by 2018 and 2020 respectively. For example, the summary of cost/benefit estimates on page 59 reflects Clarington TS and Milton autotransformer in service dates by 2018 and 2020, respectively.

For additional context and by way of sensitivity, the IESO also considered implications of earlier and later implementation of the Milton station on pages 73 and 74. The sensitivity suggests that deferral of the Milton station could result in some time-value savings while advancement could result in some time-value costs. These potential savings are interpreted as relatively marginal compared to other potential savings related to reductions in replacement capacity costs and reductions in replacement energy costs from gas-fired resources and energy imports.

Sensitivity analysis was not conducted around different Clarington TS in-service dates; as indicated in the IESO’s response to Board Staff Interrogatory #134, the IESO assumed a 2018 in-service date for Clarington TS for all Pickering scenarios considered.
**CCC Interrogatory #30**

**Issue Number: 6.5**

**Issue:** Are the test period expenditures related to extended operations for Pickering appropriate?

**Interrogatory**

**Reference:**
Reference: Ex. F2/T2/S3/p. 1

The evidence refers to OPG’s plan, as approved by the Province of Ontario, that all six units at Pickering would operate until 2022, at which point two units would be shut down and the remaining four units would operate until 2024. Does OPG have the discretion to stop the Pickering Extended Operations at any time or change the timing? If so, under what conditions might the Extended Operations be stopped or the timing changed?

**Response**

The plan to operate Pickering to 2022/24 presented in OPG's evidence and endorsed by OPG’s shareholder remains the company’s plan. OPG does not envision changing this plan unless and until information emerges that the proposed operating lives are not technically feasible or OPG receives a regulatory decision from the CNSC that renders the planned operation infeasible. If that were to occur, OPG would consult with its shareholder.
CCC Interrogatory #31

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:

Reference: Ex. F2/T2/S3/p. 1

The Pickering Extended Operations Business Case Summary shows Units 1 and 4 operating until 2022 and the Units 5-8 operating until the end of 2024. In footnote 1 on p. 1 it states that confirmation of the planned shutdown date of each unit is subject to further testing and analysis. What further testing and analysis is required? When does OPG expect to determine the shutdown date of each unit? What are the implications of changing the shutdown dates on the payment amounts included in this application?

Response

As described in Ex. F2-2-3 Attachment 2, pages 10-12, the life limiting major component is the fuel channels. Technical assessment work on the fuel channels’ fitness for service will continue through the Fuel Channel Life Assurance project and ongoing inspections required to demonstrate fitness for service.

As part of OPG’s current licence, OPG is required to provide shutdown dates for each unit to the Canadian Nuclear Safety Commission (CNSC) by June 30, 2017. Refer to Ex. F2-2-3, page 3, lines 22-28.

OPG does not foresee any changes to payment amounts included in this application as a result of changes to shutdown dates as predicted. OPG remains confident that the predicted shutdown dates are achievable.
**CCC Interrogatory #32**

**Issue Number: 6.5**

**Issue:** Are the test period expenditures related to extended operations for Pickering appropriate?

**Reference:**
Reference: Ex. F2/T2/S3/p. 1

What specific approvals is OPG seeking from the OEB with respect to the Pickering Extended Operations through this Application?

**Response**

OPG seeks approval of the Nuclear Revenue Requirement (see Ex. A1-2-2, page 1, Line 8), which includes forecast OM&A expenditures, to enable Pickering Extended Operations and normal operating expenditures at Pickering during the test period, as shown in Ex. F2-2-3, page 4, Chart 1. OPG is also seeking approval of the Nuclear rate base (see Ex. A1-2-2, page 1, Line 13), which includes Pickering related in-service additions as shown in Ex. B3-3-1, Table 2. Finally, OPG is seeking approval of its Nuclear production forecast (see Ex. A1-2-2, page 2) which includes the impacts of outages as well as the 2021 production attributable to Pickering Extended Operations, as shown in Ex. E2-1-1, p. 4 and Table 1,
**CCC Interrogatory #33**

**Issue Number: 6.5**

**Issue:** Are the test period expenditures related to extended operations for Pickering appropriate?

**Interrogatory**

**Reference:**
Reference: Ex. F2/T2/S3/pp. 1, 6

The evidence states that achievement of the Pickering Extended Operations plan is subject to the results of certain ongoing investigations and requires Canadian Nuclear SafetyCommission (CNSC). Please explain what these “certain ongoing investigations” are and when they will be completed. When is the CNSC approval expected? What would be the impact on the Enabling Costs set out in Chart 2 if the CNSC approval is not granted?

**Response**

The required investigations are described at Ex.F2-2-3, Attachment 2, pages 10 to 14 with the timing of these activities indicated in Appendix 1: Details of Cost Forecasts (Ex.F2-2-3, Attachment 2, page 22).

CNSC action on OPG’s re-licensing application is expected no later than August 31, 2018.

Assuming that the CNSC decision issued on August 31, 2018 does not allow operations past 2020, a re-evaluation of the future work program and going forward costs not already committed would have to be completed at that time. Beyond that, any attempt to forecast the going forward enabling costs would be speculative as the costs required would depend on the specifics of the CNSC decision in terms of the required shutdown dates for the individual Pickering units, and the actions required to continue operating each unit until its required shutdown date.
**CCC Interrogatory #34**

**Issue Number: 6.5**

**Issue:** Are the test period expenditures related to extended operations for Pickering appropriate?

**Interrogatory**

**Reference:**
Reference: Ex. F2/T2/S3/p. 2

The IESO conducted an independent analysis of the system benefits of the Pickering Extended Operations in March 2015 and an update on October 2015. Has the IESO conducted any further analyses of the Pickering Extended Operations? If so, please provide them.

**Response**

The following response has been prepared by the IESO:

The October, 2015 study filed in Exhibit F2-2-3 Attachment 1 reflects the IESO's most recent assessment.
CC Interrogatory #35

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Reference: Ex. F2/T2/S3/p 6

The costs to enable Extended Operations are forecast to be $307 million from 2016-2020. Please provide a detailed explanation as to how these costs were determined. What are the costs for 2021?

Response

OPG has provided a detailed explanation of how the enabling costs of $307M were determined in Ex. F2-2-3, Attachment 2, pages 6-12 and 22. There are no enabling costs forecast for 2021.
EP Interrogatory #25

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Exhibit F2, Tab 2, Schedule 3, Chart 2

Does OPG have an updated forecast for the cost to keep Pickering running past 2020?

Response

No. Ex. F2-2-3, p. 6, Chart 2 remains the company’s forecast of the enabling costs to operate Pickering to 2022/2024.
ED Interrogatory #18

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Reference: Ex. F2, Tab 2, Schedule 3

a) Please find attached our calculations of OPG’s forecast of the Pickering Nuclear Station’s operating and fuel costs for 2017, 2018, 2019 and 2020 broken out by sixteen components. Please confirm and/or correct our calculations for each component and each year. Please also confirm that the table includes all components and that the total is correct.

b) Please provide the Pickering Nuclear Station’s actual operating and fuel costs for 2014 and 2015 broken out by the sixteen components listed in our attached file.

Response

a) and b):

OPG is unable to confirm the calculations or rationale for the derivation of Pickering Operating and Fuel Costs in the attached table to Ex. L-6.5-7 ED-18.

Consistent with OPG’s response to EB-2013-0321 Undertaking JT1.14, OPG’s payment amounts application for the 2017 - 2021 period was prepared on the basis of a single overall nuclear rate. OPG does not calculate separate rates for Pickering and Darlington and OPG does not have a station-level allocation methodology for rate making purposes.

OPG would note that Environmental Defence’s methodology for allocating costs is inconsistent with OPG’s approved allocation methodology (see Ex. F3-1-1) and that depreciation, property tax and income tax are not classified as “OM&A” which is why OPG excludes those cost elements from its calculation of total operating costs (see Ex. L-6.5-8 GEC-38).

OPG benchmarks its financial performance against other utilities. The EUCG Non-Fuel Operating Cost per MWh (“NFOC”) represents one such metric and includes Base OM&A, Outage OM&A, Project OM&A, Corporate Support & Administrative costs and some component of centrally held costs (excluding various OPEB and Pension costs). NFOC is derived by OPG for both Darlington and Pickering to allow OPG to benchmark financial performance and operating costs by station.
OPG also notes that the amounts included in the attached table to Ex. L-6.5-7 ED-18 for Pickering Extended Operations OM&A costs appear to have been “double counted” since these costs would also be reflected in amounts for Base OM&A, Outage OM&A and Project OM&A.

To assist Environmental Defence, OPG has prepared Chart 1 below which derives a “Pickering Cost” for the years 2014-2021. Amounts shown in Chart 1 are consistent with the elements included in the EUCG NFOC metric, except for the following adjustments to address the information requested:

- added fuel costs, consistent with Ex. L-6.5-8 GEC-38
- added certain costs that are excluded in deriving NFOC for purposes of EUCG benchmarking, consistent with Ex. L-6.5-8 GEC-38
- removed certain capital costs that are included in deriving NFOC for purposes of EUCG benchmarking, consistent with Ex. L-6.5-8 GEC-39
- added depreciation, income and property tax, which are not recognized as an operating cost. These costs were derived using an allocation based on Pickering’s share of total generation, which appears to be the basis for the allocated amounts included in the table that Environmental Defence sent with ED-18. However, OPG disagrees that share of total generation is an appropriate basis on which to allocate these costs.

**Chart 1**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Operating Costs - Initial</td>
<td>1,275.5</td>
<td>1,249.9</td>
<td>1,304.0</td>
<td>1,351.4</td>
<td>1,351.4</td>
<td>1,351.7</td>
<td>1,357.9</td>
<td>1,394.5</td>
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<td></td>
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<td></td>
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<tr>
<td>Inventory Obsolescence¹</td>
<td>0.0</td>
<td>0.0</td>
<td>12.4</td>
<td>12.4</td>
<td>12.4</td>
<td>12.4</td>
<td>12.4</td>
<td>12.4</td>
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<tr>
<td>Pickering portion of Tritium Removal Facility²</td>
<td>0.0</td>
<td>0.0</td>
<td>10.4</td>
<td>11.2</td>
<td>11.6</td>
<td>10.9</td>
<td>12.2</td>
<td>12.8</td>
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<tr>
<td>Fuel Costs</td>
<td>113.6</td>
<td>120.4</td>
<td>120.2</td>
<td>114.4</td>
<td>116.5</td>
<td>116.5</td>
<td>120.6</td>
<td>117.9</td>
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<tr>
<td>Subtotal</td>
<td>1,390.0</td>
<td>1,370.3</td>
<td>1,507.0</td>
<td>1,489.4</td>
<td>1,490.9</td>
<td>1,531.5</td>
<td>1,483.0</td>
<td>1,537.8</td>
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<td>Less</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Capital</td>
<td>119.6</td>
<td>99.9</td>
<td>124.3</td>
<td>85.2</td>
<td>29.8</td>
<td>28.0</td>
<td>23.2</td>
<td>23.1</td>
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<tr>
<td>Subtotal</td>
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<td>1,279.4</td>
<td>1,382.7</td>
<td>1,404.2</td>
<td>1,461.1</td>
<td>1,503.5</td>
<td>1,456.8</td>
<td>1,514.5</td>
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<td>Add</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>OPEB and Pension excluded from Centrally Held Costs</td>
<td>10.7</td>
<td>45.9</td>
<td>48.5</td>
<td>62.7</td>
<td>39.2</td>
<td>25.5</td>
<td>15.7</td>
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<td>IESO Non energy Charges²</td>
<td>32.2</td>
<td>51.5</td>
<td>27.6</td>
<td>36.6</td>
<td>28.2</td>
<td>25.7</td>
<td>28.7</td>
<td>22.3</td>
</tr>
<tr>
<td>Other²</td>
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<td>0.6</td>
<td>-3.7</td>
<td>-86.6</td>
<td>-37.3</td>
<td>-25.6</td>
<td>-30.6</td>
<td>-22.7</td>
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<tr>
<td>Subtotal</td>
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<td>1,378.7</td>
<td>1,455.1</td>
<td>1,428.8</td>
<td>1,491.2</td>
<td>1,529.0</td>
<td>1,473.3</td>
<td>1,546.8</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation and Amortization - Pickering³</td>
<td>140.9</td>
<td>147.3</td>
<td>165.7</td>
<td>199.9</td>
<td>223.2</td>
<td>226.7</td>
<td>233.3</td>
<td>53.1</td>
</tr>
<tr>
<td>Depreciation and Amortization - Pickering Generic²</td>
<td>44.2</td>
<td>53.5</td>
<td>34.2</td>
<td>38.6</td>
<td>37.1</td>
<td>34.9</td>
<td>36.7</td>
<td>26.4</td>
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<tr>
<td>Income Tax - Pickering³</td>
<td>-25.7</td>
<td>-15.2</td>
<td>-8.3</td>
<td>-9.2</td>
<td>-9.2</td>
<td>-9.1</td>
<td>26.9</td>
<td>27.5</td>
</tr>
<tr>
<td>Property Tax - Pickering</td>
<td>4.9</td>
<td>4.9</td>
<td>5.0</td>
<td>5.4</td>
<td>5.5</td>
<td>5.7</td>
<td>5.8</td>
<td>6.3</td>
</tr>
<tr>
<td>Total</td>
<td>1,477.6</td>
<td>1,567.2</td>
<td>1,651.7</td>
<td>1,663.6</td>
<td>1,747.9</td>
<td>1,787.2</td>
<td>1,776.2</td>
<td>1,654.0</td>
</tr>
<tr>
<td>Planned Operating Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pickering Generation - TWh</td>
<td>20.1</td>
<td>21.2</td>
<td>20.8</td>
<td>19.1</td>
<td>19.2</td>
<td>19.4</td>
<td>19.6</td>
<td>18.8</td>
</tr>
<tr>
<td>Planned Operating Costs - $/MWh</td>
<td>73.5</td>
<td>73.8</td>
<td>73.5</td>
<td>87.3</td>
<td>91.1</td>
<td>92.3</td>
<td>90.5</td>
<td>87.9</td>
</tr>
</tbody>
</table>

¹ Included in Total Operating Costs - Initial in 2014 actual and 2015 actual
² Allocation based on Pickering % of generation

Witness Panel: Nuclear Operations and Projects
## OPG’s Forecast of the Pickering Nuclear Station’s Operating and Fuel Costs ($/MWh)

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Base OMA</strong>&lt;sup&gt;i&lt;/sup&gt;</td>
<td>24.05</td>
<td>24.45</td>
<td>24.44</td>
<td>24.10</td>
</tr>
<tr>
<td><strong>Support OMA</strong>&lt;sup&gt;ii&lt;/sup&gt;</td>
<td>11.76</td>
<td>11.6</td>
<td>11.69</td>
<td>12.55</td>
</tr>
<tr>
<td><strong>Pickering Extended Operations OMA</strong>&lt;sup&gt;iii&lt;/sup&gt;</td>
<td>1.34</td>
<td>2.88</td>
<td>5.52</td>
<td>5.32</td>
</tr>
<tr>
<td><strong>Corporate Support &amp; Administration</strong>&lt;sup&gt;iv&lt;/sup&gt;</td>
<td>11.78</td>
<td>11.36</td>
<td>11.35</td>
<td>11.9</td>
</tr>
<tr>
<td><strong>Project OMA - Pickering</strong>&lt;sup&gt;v&lt;/sup&gt;</td>
<td>0.67</td>
<td>1.56</td>
<td>0.95</td>
<td>0.95</td>
</tr>
<tr>
<td><strong>Project OMA Nuclear</strong>&lt;sup&gt;vi&lt;/sup&gt;</td>
<td>1.96</td>
<td>1.41</td>
<td>1.9</td>
<td>2.16</td>
</tr>
<tr>
<td><strong>Pickering Outage OMA</strong>&lt;sup&gt;vii&lt;/sup&gt;</td>
<td>7.51</td>
<td>8.48</td>
<td>10.8</td>
<td>8.98</td>
</tr>
<tr>
<td><strong>Outage Support Division</strong>&lt;sup&gt;viii&lt;/sup&gt;</td>
<td>3.15</td>
<td>2.86</td>
<td>2.37</td>
<td>1.95</td>
</tr>
<tr>
<td><strong>Fuel Cost</strong>&lt;sup.ix&lt;/sup&gt;</td>
<td>4.18</td>
<td>4.16</td>
<td>4.1</td>
<td>4.17</td>
</tr>
<tr>
<td><strong>Other Fuel</strong>&lt;sup&gt;x&lt;/sup&gt;</td>
<td>1.5</td>
<td>1.55</td>
<td>1.83</td>
<td>1.63</td>
</tr>
<tr>
<td><strong>Asset Services Fee</strong>&lt;sup&gt;xi&lt;/sup&gt;</td>
<td>0.73</td>
<td>0.72</td>
<td>0.73</td>
<td>0.61</td>
</tr>
<tr>
<td><strong>Pickering depreciation &amp; amortization</strong>&lt;sup&gt;xii&lt;/sup&gt;</td>
<td>10.47</td>
<td>11.63</td>
<td>11.69</td>
<td>11.90</td>
</tr>
<tr>
<td><strong>Generic depreciation &amp; amortization</strong>&lt;sup&gt;xiii&lt;/sup&gt;</td>
<td>2.02</td>
<td>1.93</td>
<td>1.81</td>
<td>1.87</td>
</tr>
<tr>
<td><strong>Pickering taxes</strong>&lt;sup&gt;xiv&lt;/sup&gt;</td>
<td>0.48</td>
<td>0.49</td>
<td>0.49</td>
<td>0.51</td>
</tr>
<tr>
<td><strong>Generic taxes</strong>&lt;sup&gt;xv&lt;/sup&gt;</td>
<td>-0.48</td>
<td>-0.48</td>
<td>-0.47</td>
<td>1.37</td>
</tr>
<tr>
<td><strong>Centrally Held Costs - Nuclear</strong>&lt;sup&gt;xvi&lt;/sup&gt;</td>
<td>1.97</td>
<td>2.93</td>
<td>2.64</td>
<td>2.29</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>83.09</td>
<td>87.53</td>
<td>91.84</td>
<td>92.26</td>
</tr>
</tbody>
</table>

---

<sup>i</sup> E2-1-1, Table 1; and F2-2-1, Table 1  
<sup>ii</sup> Ibid.  
<sup>iii</sup> F2-2-3, page 6  
<sup>iv</sup> F3-1-1, Table 3  
<sup>v</sup> F2-3-1, Table 1  
<sup>vi</sup> F2-3-1, Table 1
ED Interrogatory #19

Issue Number: 6.5
Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Reference: Ex. F2, Tab 1, Schedule 1, Attachment 4, Page 10

Please provide the actual forced loss rates for the: a) Pickering; and b) Darlington Nuclear Stations for each of the last ten years.

Response

See Chart 1 below:

Chart 1: Actual Forced Loss Rate

<table>
<thead>
<tr>
<th>Year</th>
<th>Darlington</th>
<th>Pickering</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>3.24%</td>
<td>10.52%</td>
</tr>
<tr>
<td>2007</td>
<td>1.14%</td>
<td>24.65%</td>
</tr>
<tr>
<td>2008</td>
<td>0.71%</td>
<td>25.45%</td>
</tr>
<tr>
<td>2009</td>
<td>1.64%</td>
<td>11.90%</td>
</tr>
<tr>
<td>2010</td>
<td>3.23%</td>
<td>9.33%</td>
</tr>
<tr>
<td>2011</td>
<td>0.59%</td>
<td>11.59%</td>
</tr>
<tr>
<td>2012</td>
<td>2.31%</td>
<td>7.02%</td>
</tr>
<tr>
<td>2013</td>
<td>4.84%</td>
<td>9.73%</td>
</tr>
<tr>
<td>2014</td>
<td>1.50%</td>
<td>10.72%</td>
</tr>
<tr>
<td>2015</td>
<td>4.86%</td>
<td>2.89%</td>
</tr>
</tbody>
</table>
ED Interrogatory #20

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Reference: Ex. F2, Tab 1, Schedule 1, Table 3

(a) Please break-out the total nuclear FTEs in 2016 and 2017 according to the following categories: i) employees working at the Pickering Nuclear Station, ii) employees working at the Darlington Nuclear Station, iii) employees working at other locations (e.g. head office) in support roles relating Pickering Nuclear Station, and iv) employees working at other locations (e.g. head office) in support roles relating to Darlington Nuclear Station.

(b) If Pickering Nuclear Station were to be shut down, how many employees would OPG need to lay off?

Response

(a) FTEs are shown in Chart 1 below. Planned nuclear FTEs (Nuclear Operations and Darlington Refurbishment) are categorized according to their OPG organization structure rather than by their physical work locations. Pickering and Darlington nuclear station FTEs work at their respective stations (Chart 1 lines 2, 3, 8 and 9). Some employees in support roles (e.g. Engineering, Projects and Modifications) relating to a specific nuclear station (Chart 1 lines 4, 5, 10 and 11) may work at the nuclear station while others work at nearby locations within Durham Region. Other employees having support roles relating to both nuclear stations (Chart 1 lines 6 and 12) may work at either nuclear station or nearby locations.

Nuclear Operation function descriptions can be found at Ex. F2-2-1 Attachment 1.
Chart 1

<table>
<thead>
<tr>
<th>Line No.</th>
<th>Nuclear FTEs</th>
<th>2016 Budget</th>
<th>2017 Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regular Staff</td>
<td>6,216.2</td>
<td>6,298.0</td>
</tr>
<tr>
<td>2</td>
<td>Pickering Station</td>
<td>1,883.5</td>
<td>1,899.8</td>
</tr>
<tr>
<td>3</td>
<td>Darlington Station</td>
<td>1,206.1</td>
<td>1,118.7</td>
</tr>
<tr>
<td>4</td>
<td>Pickering Nuclear Support</td>
<td>913.5</td>
<td>883.0</td>
</tr>
<tr>
<td>5</td>
<td>Darlington Nuclear Support</td>
<td>1,135.9</td>
<td>1,284.4</td>
</tr>
<tr>
<td>6</td>
<td>Generic Nuclear Support</td>
<td>1,077.2</td>
<td>1,112.1</td>
</tr>
<tr>
<td>7</td>
<td><strong>Non Regular Staff</strong></td>
<td><strong>740.2</strong></td>
<td><strong>767.6</strong></td>
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<tr>
<td>8</td>
<td>Pickering Station</td>
<td>133.6</td>
<td>139.5</td>
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<tr>
<td>9</td>
<td>Darlington Station</td>
<td>228.2</td>
<td>199.7</td>
</tr>
<tr>
<td>10</td>
<td>Pickering Nuclear Support</td>
<td>151.0</td>
<td>120.7</td>
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<tr>
<td>11</td>
<td>Darlington Nuclear Support</td>
<td>122.8</td>
<td>212.1</td>
</tr>
<tr>
<td>12</td>
<td>Generic Nuclear Support</td>
<td>104.7</td>
<td>95.7</td>
</tr>
<tr>
<td>13</td>
<td><strong>Total Nuclear FTEs</strong></td>
<td><strong>6,956.4</strong></td>
<td><strong>7,065.6</strong></td>
</tr>
</tbody>
</table>

(b) OPG is unable to provide the requested information. Whether OPG would need to involuntarily sever employees and, if so, how many it would lay off would depend on the timing of any shutdown and how long in advance of the proposed shutdown date the decision to cease commercial operations was made.
ED Interrogatory #21

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference: “The estimated cost of this incremental work, above normal operating costs, is $307M over 2016-2020.” Ex. F2, Tab 2, Schedule 3, Page 2.

Please provide an annual break-out of these expenditures for each year from 2016 to 2020 inclusive.

Response

Please see Ex. F2-2-3, Attachment 2, p. 22.
ED Interrogatory #22

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference: “OPG expects to incur severance and related costs following the eventual shutdown of Pickering. Extended Operations will defer the costs associated with the closure of the station.” Ex F2, Tab 2, Schedule 3, Page 8.

Response

No.

Adopting an immediate dismantlement strategy for Pickering is not a viable means of deferring severance costs, as the staff that would otherwise be severed upon station closure could not be used to dismantle the plant. This is due to the fact that an immediate dismantlement strategy for a nuclear plant does not result in an immediate physical process. In accordance with Canadian Nuclear Safety Commission requirements, nuclear fuel consumed in the generation process must remain within the station’s wet fuel bay storage facilities for a minimum of 10 years prior to removal. Dismantlement cannot occur while irradiated nuclear fuel is being contained within the station. Therefore, under an immediate dismantlement strategy, the physical act of dismantlement would not begin until in the order of 12 years after station closure, in order to account for cooling of fuel in wet bays and the full emptying of those wet bays into dry storage containers. It is not a viable option to retain employees for that period of time to execute dismantlement instead of severing them upon station closure.
ED Interrogatory #23

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Reference: Ex. D2, Tab 1, Schedule 1, Page 2, Chart 1

If the CNSC does not approve an extension of the Pickering Nuclear Station’s operating licence beyond August 31, 2018, please quantify the magnitude of the nuclear operations project portfolio expenditures which would no longer be necessary in each year from 2018 to 2021 inclusive.

Response

As discussed in response to L-6.5-1 Staff-117 and L-6.5-5 CCC-33, the CNSC’s decision on Pickering Operating Licence will occur by August 31, 2018. Given this timing, 2018 project portfolio spending is unlikely to be significantly impacted. Beyond that, as indicated the previously cited interrogatory responses, there are a range of possible actions that the CNSC could require and operational periods it could approve. These actions and operational periods would all imply different project portfolio expenditures over the remainder of the rate period. Any attempt to forecast and quantify the range of potential expenditures would be speculative.
ED Interrogatory #25

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference: Ex. F2, Tab 2, Schedule 3, p. 1. “Under OPG’s plan, as approved by the Province of Ontario, all six units at Pickering would operate until 2022, at which point two units would be shut down and the remaining four units would operate until 2024.”

(a) Please provide the document that OPG provided to the Province of Ontario to seek this approval and the formal document(s) provided by the Province of Ontario to indicate approval.

(b) Please provide all correspondence from the Province of Ontario relating to OPG’s plan to operate Pickering until 2022/2024 (other than the January 11, 2016 news release).

(c) Please provide all documentation provided by OPG to the Province of Ontario prior to January 11, 2016, detailing OPG’s plan to operate Pickering until 2022/2024.

Response

OPG declines to provide the requested information on the basis of relevance. This interrogatory seeks information on communications with the Province of Ontario that is not relevant to deciding any issue on the approved Issues List in this application. An investigation into the Province’s decision to endorse Pickering Extended Operations is not within the scope of Issue 6.5. In rejecting attempts to broaden Issue 6.5, the OEB clearly stated that this issue is intended to address “consideration of the test period expenditures for Pickering Extended Operations.” (Decision on Issues List, September 23, 2016, page 7)
**ED Interrogatory #26**

**Issue Number: 6.5**

**Issue:** Are the test period expenditures related to extended operations for Pickering appropriate?

---

**Interrogatory**

**Reference:**
Reference: Ex. D2, Tab 2, Schedule 1, p. 2. OPG’s evidence refers to a Ministry of Energy January 13, 2016 news release stating that the continued operation of Pickering “would protect 4,500 jobs across the Durham region.”

(a) Please provide all correspondence between OPG and the Ministry of Energy which may have led the Ministry of Energy to believe that 4,500 jobs would be saved by the continued operation of Pickering GS. If OPG searches for said correspondence and it does not exist, please clearly state so. If that is the case, please provide OPG’s best estimate of how that figure was derived based on OPG’s knowledge of the underlying facts and the materials that would likely be available to the Ministry of Energy.

(b) Has OPG made a final and irreversible decision on whether it will undertake a deferred versus direct/immediate decommissioning when Pickering GS is shut down?

(c) The OECD Nuclear Waste Agency’s *Selection of Strategies for Decommissioning of Nuclear Facilities* states that “the present trend is in favour of immediate dismantling.” It discusses benefits of immediate dismantling such as the increased availability of qualified staff, a more smooth transition for the local economy, local public opinion, an increasing availability of new techniques to allow for immediate decommissioning, and decreased financial risks and uncertainties with immediate versus deferred decommissioning. Please discuss which, if any, of the benefits of immediate decommissioning discussed in this paper would not apply to Pickering GS? (for the OECD NEA paper see https://www.oecd-nea.org/rwm/docs/2006/rwm-wpdd2006-1-rev1.pdf, p. 7-9).

(d) The International Atomic Energy Agency’s (“IAEA”) safety standards regarding decommissioning state that “The preferred decommissioning strategy shall be immediate dismantling.” Is OPG aware of the reasons that the IAEA recommends immediate dismantling? If yes, please discuss and analyze those factors as they pertain to a decommissioning of Pickering GS. (see IAEA, Safety Standards, Decommissioning of Facilities, No. GSR Part 6, section 5.1 http://www-pub.iaea.org/MTCD/publications/PDF/Pub1652web-83896570.pdf).

(e) If Pickering were to be permanently shut down and immediately decommissioned at the end of its license on August 31, 2018: (i) What would the approximate cost of...
decommissioning be? (ii) Would the decommissioning costs be added to the rates paid by electricity consumers or paid out of OPG’s decommissioning fund (if it is a combination of both, please indicate how much for each)? (iii) How much money is currently available in OPG’s decommissioning fund? (iv) How many person-years of employment would be required for the direct decommissioning and over what period?

(f) What is the difference in cost between a deferred versus a direct decommissioning of Pickering?

For all of the above, an approximate, best-efforts answer is sufficient. Please make and state assumptions as necessary.

Response

(a) Please see Ex. L-6.5-7 ED-25.

Parts (b) through (f)

OPG declines to provide the requested information on the basis of relevance. This interrogatory seeks information on decommissioning plans and costs that is not relevant to deciding any issue on the approved Issues List in this application. OPG’s proposed expenditures on Pickering Extended Operations do not include any decommissioning costs.
ED Interrogatory #27

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Reference: Ex. F2, Tab 2, Schedule 3, Attachment 2, p. 16-18

(a) Please provide the detailed data and electronic spreadsheets underlying OPG’s economic assessment of Pickering Continued Operations, including its assessment of the system economic value. The economic assessment appears at pages 12 to 14 of OPG’s business case (using the numbering at the bottom right corner).

(b) As part of its assessment of the system economic value of continuing to operate Pickering until 2022/2014, did OPG consider the possibility of a contract for Quebec power as the primary source of replacement power for Pickering?

(c) Please redo OPG’s system economic value analysis based on the assumption that replacement power is sourced primarily from an electricity import agreement with Quebec.

Response

(a) OPG assumes that the requested information relates to Pickering Extended Operations per Ex. F2-3-3 and not to Pickering Continued Operations.

Refer to Ex. L-6.5-1 Staff-125 and Ex. L-6.5-1 Staff-126 for the production, cost data and major assumptions used in the economic assessment as well as Attachment 1 for the detailed data.

Attachment 2 (provided only as an electronic spreadsheet) contains a spreadsheet that allows parties to modify assumptions about the Pickering costs that underlie OPG’s economic assessment as presented in the Pickering Extended Operations Business Case.¹ This spreadsheet is provided pursuant to OPG’s proposal in its Reply to Motions to address ED’s request in part (a) of this interrogatory for electronic spreadsheets underlying OPG’s economic assessment.

¹ Ex. F2-2-3, Attachment 2, pp. 16-18.
As OPG explained in its Reply to Motions (para. 49), this spreadsheet incorporates output from OPG's proprietary production model, but the system benefit data is hardcoded such that it does not allow parties to run alternative resource scenarios. It will, however, allow parties to modify assumptions about the costs of the project.

The spreadsheet contains formulae and acronyms which are familiar to users trained in the spreadsheet, but which may not be properly understood by others. Because of the complexity of the spreadsheets, OPG cannot warrant the accuracy of the results obtained by any manipulation of the spreadsheets conducted by third parties.

(b) OPG’s economic assessment did not consider a contract with Quebec Power as a primary source of replacement power for Pickering.

(c) OPG declines to provide the requested information on the basis of relevance. This interrogatory seeks information on the costs of hypothetical alternatives to Pickering Extended Operations. Such information is not relevant to deciding any issue on the approved Issues List in this application. An investigation into alternatives to Pickering Extended Operations is not within scope of the Issue 6.5. In rejecting attempts to broaden Issue 6.5, the OEB clearly stated that this issue is intended to address “consideration of the test period expenditures for Pickering Extended Operations.” (Decision on Issues List, September 23, 2016, page 7). Moreover, OPG does not have the information necessary to perform the requested analysis and any attempt to develop this information would be speculative, depending entirely on assumptions about the cost and characteristics of a hypothetical future import agreement between the Provinces of Quebec and Ontario. See Ex. L-6.5-7 ED-40.
## PICKERING EXTENDED OPERATIONS Assessment Data

### Reference Case versus Ext. Operations Case

#### Section 1 - Operating Costs (2015 $M)

<table>
<thead>
<tr>
<th></th>
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<tbody>
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<td>953</td>
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<tr>
<td>Ext. Operations Case: P1 &amp; P4 Operate to Year End 2022 and P5-8 Operate to Year End 2024</td>
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#### Section 2 - Scenario A Fuel & Fuel Related Costs (2015 $M)

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<tbody>
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<tr>
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#### Section 3 - Scenario B Fuel & Fuel Related Costs (2015 $M)

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<td>101</td>
<td>108</td>
<td>74</td>
<td>87</td>
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</table>

### Notes

1. Total OM&A & Capital includes station OM&A (base, outage, projects), sustaining capital projects, the station’s share of incremental allocated nuclear and corporate support costs, estimated costs to enable extended continued operations. Does not include severance costs.

2. Costs are in constant 2015 dollars, deflated by 2% annually.
ED Interrogatory #28

Issue Number: 6.5
Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference: Reference: “Pickering extension to 2022/2024 yields a net benefit in the range of $0.3B-$0.6B…” Exhibit F2-2-3, Attachment 1, Page 6 of 116

With reference to the above captioned study, please provide its assumptions with respect to the following inputs for each year of its analysis:

(a) Pickering’s total installed capacity (MW);

(b) Pickering’s available capacity (MW) at the time of Ontario’s peak annual demand;

(c) Pickering’s generation (MWh);

(d) The avoided generation (MWh), by fuel type, as a result of Pickering’s extended operation;

(e) Pickering’s rolling average forced loss rate as defined by OPG’s 2015 Nuclear Benchmarking Report;

(f) The installed capacity (MW) of the replacement peaking generation capacity;

(g) The available capacity (MW) of the replacement peaking generation capacity at the time of Ontario’s peak annual demand;

(h) Pickering’s fuel and operating cost per kWh;

(i) Pickering’s incremental capital expenditures to permit its extension to 2022/24;

(j) The natural gas price at Henry Hub;

(k) Ontario’s carbon price;

(l) Ontario’s incremental peaking requirements (MW) to meet the NPCC resource adequacy criterion if Pickering is not extended to 2022/24; and

Witness Panel: Nuclear Operations and Projects
(m) Ontario’s cost per MW of incremental peaking requirements to meet the NPCC resource adequacy criterion if Pickering is not extended to 2022/24.

Response

The following response has been prepared by the IESO, except for part (e), which has been provided by OPG:

(a) The following table summarizes Pickering’s total installed capacity (MW) in different scenarios:

<table>
<thead>
<tr>
<th></th>
<th>Case with +65 TWh of Pickering Production, Pickering to 2020</th>
<th>Case with +65 TWh of Pickering Production, Pickering to 2022/2024</th>
<th>Case with +62 TWh of Pickering Production, Pickering to 2020</th>
<th>Case with +62 TWh of Pickering Production, Pickering to 2022/2024</th>
</tr>
</thead>
<tbody>
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<td>3094</td>
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<td>0</td>
<td>2064</td>
<td>0</td>
<td>2064</td>
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</tbody>
</table>

(b) The following table summarizes Pickering’s estimated available capacity (MW) at the time of Ontario’s peak annual demand. The available capacity is lower than the installed capacity shown in part (a) because of forced and planned outages among Pickering units:

<table>
<thead>
<tr>
<th></th>
<th>Case with +65 TWh of Pickering Production, Pickering to 2020</th>
<th>Case with +65 TWh of Pickering Production, Pickering to 2022/2024</th>
<th>Case with +62 TWh of Pickering Production, Pickering to 2020</th>
<th>Case with +62 TWh of Pickering Production, Pickering to 2022/2024</th>
</tr>
</thead>
<tbody>
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<tr>
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<td>2024</td>
<td>0</td>
<td>2064</td>
<td>0</td>
<td>2064</td>
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</tbody>
</table>

(c) The following table summarizes Pickering’s generation (MWh) in different scenarios:

Witness Panel: Nuclear Operations and Projects
(d) The following tables summarize the avoided generation (MWh) by fuel type as a result of Pickering’s extended operation in the plus 65 TWh of Pickering Production case. Blue and positive numbers represent increase in production and red and negative numbers represent decrease in production as a result of Pickering’s extended operation. Please note that besides Ontario resources, Pickering’s extended operation also has impact on the transactions of interconnections.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
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<td>21,269,076</td>
<td>21,269,076</td>
<td>21,269,076</td>
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<tr>
<td>2017</td>
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<td>20,130,936</td>
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<td>19,049,760</td>
<td>19,092,158</td>
<td>-4,730,629</td>
<td>-4,167,951</td>
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<td>19,092,158</td>
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<td>-6,473,855</td>
<td>-5,970,321</td>
<td>-11,202</td>
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<tr>
<td>2019</td>
<td>21,442,720</td>
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<td>20,651,680</td>
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<td>-6,473,855</td>
<td>-5,970,321</td>
<td>-11,202</td>
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<tr>
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<td>-5,970,321</td>
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<td>16,295,280</td>
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<td></td>
</tr>
</tbody>
</table>

The following tables summarize the avoided generation (MWh) by fuel type as a result of Pickering’s extended operation in the plus 62 TWh of Pickering Production case. Blue and positive numbers represent increase in production and red and negative numbers represent decrease in production as a result of Pickering’s extended operation. Please note that besides Ontario resources, Pickering’s extended operation also has impact on the transactions of interconnections.

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(e) Pickering’s rolling average forced loss rate in 2014 as defined by OPG’s 2015 Nuclear Benchmarking Report was 10.08% (see Ex. F2-1-1 Attachment 1, p. 51).

(f) The following table summarizes the installed capacity (MW) of the replacement generation capacity.
(g) The answer is the same as part (f). For simplicity, it is assumed that 100% of replacement peaking generation capacity is available at the time of Ontario’s peak annual demand.

(h) The following table summarizes Pickering’s fuel cost per KWh (2015 real cents per KWh). The OM&A expenditures is included in the answer of part (i). These values were provided to the IESO by OPG.

<table>
<thead>
<tr>
<th>Case with +65 TWh of Pickering Production, Pickering to 2020</th>
<th>Case with +65 TWh of Pickering Production, Pickering to 2022/2024</th>
<th>Case with +62 TWh of Pickering Production, Pickering to 2020</th>
<th>Case with +62 TWh of Pickering Production, Pickering to 2022/2024</th>
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</thead>
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<tr>
<td>2024</td>
<td>0.54</td>
<td>0.54</td>
<td>0.54</td>
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</tbody>
</table>

(i) The following table summarizes Pickering’s incremental capital and total OM&A expenditures (2015 real $M) to permit its extension to 2022/2024. These values were provided to the IESO by OPG.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Case with +65 TWh of Pickering Production</td>
<td>7</td>
<td>35</td>
<td>79</td>
<td>145</td>
<td>218</td>
<td>987</td>
<td>902</td>
<td>631</td>
<td>494</td>
</tr>
<tr>
<td>Production, Pickering to 2020</td>
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<tr>
<td>Case with +65 TWh of Pickering Production</td>
<td>7</td>
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<td>79</td>
<td>145</td>
<td>218</td>
<td>987</td>
<td>902</td>
<td>631</td>
<td>494</td>
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<td>Pickering to 2022/2024</td>
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<td>Case with +62 TWh of Pickering Production</td>
<td>7</td>
<td>35</td>
<td>79</td>
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<td>218</td>
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<td>902</td>
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<td>Pickering to 2020</td>
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<tr>
<td>Case with +62 TWh of Pickering Production</td>
<td>7</td>
<td>35</td>
<td>79</td>
<td>145</td>
<td>218</td>
<td>987</td>
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<td>494</td>
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<td>Pickering to 2022/2024</td>
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</tbody>
</table>

(j) The following table summarizes the projected natural gas price at Henry Hub (2015 real US$/MMBTU). Sensitivity cases were also considered.
(k) Ontario’s carbon price is zero in all scenarios.

(l) The assessment of replacement peaking generation capacity in part (f) accounts for the NPCC resource adequacy criterion.

(m) As shown in EB-2016-0152 Exhibit F2-2-3 Attachment 1 Page 93 of 116, additional peaking requirements are assumed to be met by new unspecified capacity based resources priced at SCGT (represents the least-cost supply resource), which is $130/KW-year from a ratepayer perspective based on York Region SCGT. DR, NUG contract renewals, coal conversions, or firm imports can also provide capacity if similarly prices.
ED Interrogatory #29

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:

Reference: “Pickering extension to 2022/2024 yields a net benefit in the range of $0.3B-$0.6B…” Exhibit F2-2-3, Attachment 1, Page 6 of 116

For each year of the Pickering extension to 2022/2024 analysis, please provide the IESO’s best current estimate of:

a) Pickering’s total installed capacity (MW);

b) Pickering’s available capacity (MW) at the time of Ontario’s peak annual demand;

c) Pickering’s generation (MWh);

d) The avoided generation (MWh), by fuel type, as a result of Pickering’s extended operation;

e) Pickering’s rolling average forced loss rate as defined by OPG’s 2015 Nuclear Benchmarking Report;

f) The available capacity at the time of Ontario’s peak annual demand of new gas-fired peaking capacity as a percent of its installed capacity;

g) Pickering’s fuel and operating cost per kWh;

h) Pickering’s incremental capital expenditures to permit its extension to 2022/24;

i) Natural gas prices at Henry Hub;

j) The NYMEX natural gas futures prices at Henry Hub;

k) Ontario’s carbon prices;

l) Ontario’s incremental peaking requirements (MW) to meet the NPCC resource adequacy criterion if Pickering is not extended to 2022/24;

Witness Panel: Nuclear Operations and Projects
m) Ontario’s cost, per MW, of meeting the NPCC resource adequacy criterion if
Pickering is not extended to 2022/24 by: a) domestic supply resources; b) demand
response resources; c) energy efficiency resources; and c) electricity imports from
neighbouring jurisdictions.

Please fully justify all your responses. In particular, please state your methodology and
assumptions for calculating Pickering’s available capacity (MW) at the time of Ontario’s peak
annual demand.

Response

The following response has been prepared by the IESO, except for part (e), which has been
provided by OPG:

(a) The following table summarizes Pickering’s total installed capacity (MW) as shown in
2016 Ontario Planning Outlook.

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>3094</td>
</tr>
<tr>
<td>2017</td>
<td>3094</td>
</tr>
<tr>
<td>2018</td>
<td>3094</td>
</tr>
<tr>
<td>2019</td>
<td>3094</td>
</tr>
<tr>
<td>2020</td>
<td>3094</td>
</tr>
<tr>
<td>2021</td>
<td>3094</td>
</tr>
<tr>
<td>2022</td>
<td>3094</td>
</tr>
<tr>
<td>2023</td>
<td>2064</td>
</tr>
<tr>
<td>2024</td>
<td>2064</td>
</tr>
</tbody>
</table>

(b) The following table summarizes Pickering’s available capacity (MW) at the time of
Ontario’s peak annual demand as shown in 2016 Ontario Planning Outlook.

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>2578</td>
</tr>
<tr>
<td>2017</td>
<td>2579</td>
</tr>
<tr>
<td>2018</td>
<td>2063</td>
</tr>
<tr>
<td>2019</td>
<td>2063</td>
</tr>
<tr>
<td>2020</td>
<td>3094</td>
</tr>
<tr>
<td>2021</td>
<td>2579</td>
</tr>
<tr>
<td>2022</td>
<td>3094</td>
</tr>
<tr>
<td>2023</td>
<td>2064</td>
</tr>
<tr>
<td>2024</td>
<td>2064</td>
</tr>
</tbody>
</table>
(c) The following table summarizes Pickering’s generation (MWh) as shown in 2016 Ontario Planning Outlook.

<table>
<thead>
<tr>
<th>Year</th>
<th>Generation (MWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>21,177,276</td>
</tr>
<tr>
<td>2017</td>
<td>19,351,248</td>
</tr>
<tr>
<td>2018</td>
<td>19,411,674</td>
</tr>
<tr>
<td>2019</td>
<td>19,602,972</td>
</tr>
<tr>
<td>2020</td>
<td>20,007,314</td>
</tr>
<tr>
<td>2021</td>
<td>18,972,174</td>
</tr>
<tr>
<td>2022</td>
<td>20,528,508</td>
</tr>
<tr>
<td>2023</td>
<td>13,913,424</td>
</tr>
<tr>
<td>2024</td>
<td>16,332,432</td>
</tr>
</tbody>
</table>

(d) Not applicable, as the simulation run of Pickering operates to 2020 is not available.

(e) Please see Ex. L-6.5-7 ED-28 part (e).

(f) Not applicable, as the simulation run of Pickering operates to 2020 is not available.

(g) The IESO has not analyzed any updates to Pickering’s fuel and operating cost per KWh since the analysis of November 2015, which is available at EB-2016-0152 Exhibit F2-2-3 Attachment 1 Page 1 to Page 10.

(h) The IESO has not analyzed any updates to Pickering’s incremental capital expenditures to permit its extension to 2022/24 since the analysis of November 2015, which is available at EB-2016-0152 Exhibit F2-2-3 Attachment 1 Page 1 to Page 10.

(i) The following table summarizes the natural gas price at Henry Hub (2016 real US$/MMBTU) as shown in 2016 Ontario Planning Outlook.

- 2016: 21,177,276
- 2017: 19,351,248
- 2018: 19,411,674
- 2019: 19,602,972
- 2020: 20,007,314
- 2021: 18,972,174
- 2022: 20,528,508
- 2023: 13,913,424
- 2024: 16,332,432
(j) The NYMEX natural gas future prices at Henry Hub can be found at this link:

(k) The following table summarizes Ontario’s carbon price (2016 real US$/kg CO2) as shown in 2016 Ontario Planning Outlook.

<table>
<thead>
<tr>
<th>Year</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>0</td>
</tr>
<tr>
<td>2017</td>
<td>0.013391</td>
</tr>
<tr>
<td>2018</td>
<td>0.014074</td>
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<tr>
<td>2019</td>
<td>0.014763</td>
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<tr>
<td>2020</td>
<td>0.015487</td>
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<tr>
<td>2021</td>
<td>0.016246</td>
</tr>
<tr>
<td>2022</td>
<td>0.017043</td>
</tr>
<tr>
<td>2023</td>
<td>0.017878</td>
</tr>
<tr>
<td>2024</td>
<td>0.018754</td>
</tr>
<tr>
<td>2025</td>
<td>0.019674</td>
</tr>
<tr>
<td>2026</td>
<td>0.020638</td>
</tr>
<tr>
<td>2027</td>
<td>0.02165</td>
</tr>
<tr>
<td>2028</td>
<td>0.022711</td>
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<tr>
<td>2029</td>
<td>0.023824</td>
</tr>
<tr>
<td>2030</td>
<td>0.024992</td>
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<tr>
<td>2031</td>
<td>0.026217</td>
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<tr>
<td>2032</td>
<td>0.027503</td>
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<tr>
<td>2033</td>
<td>0.028851</td>
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<tr>
<td>2034</td>
<td>0.030265</td>
</tr>
<tr>
<td>2035</td>
<td>0.031749</td>
</tr>
</tbody>
</table>

(l) Not applicable, as the simulation run of Pickering operates to 2020 is not available.

(m) Not applicable, as the simulation run of Pickering operates to 2020 is not available.
ED Interrogatory #30

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Reference: “Pickering extension to 2022/2024 yields a net benefit in the range of $0.3B-$0.6B…” Exhibit F2-2-3, Attachment 1, Page 6 of 116

Please re-calculate the net benefit of the Pickering extension to 2022/24 using the IESO’s best current estimates for each year of:

a) Pickering’s available capacity (MW) at the time of Ontario’s peak annual demand;
b) Pickering’s fuel and operating cost per kWh;
c) Pickering’s incremental capital expenditures to permit its extension to 2022/24;
d) The natural gas price at Henry Hub;
e) Ontario’s carbon price;
f) Ontario’s incremental peaking requirements (MW) to meet the NPCC resource adequacy criterion if Pickering is not extended to 2022/24;
g) Ontario’s least-cost combination of resources to meet the NPCC resource adequacy criterion if Pickering is not extended to 2022/24.

Please also re-calculate the net benefit of the Pickering extension to 2022/24 using all of the above-noted assumptions with the following exception, namely, substitute the NYMEX natural gas futures prices at Henry Hub for the IESO’s best estimate of the natural gas prices at Henry Hub.

Please fully describe your analysis and state and justify your assumptions.

Response

The following response has been prepared by the IESO:

The IESO’s most recent outlooks for for long-term electricity demand and supply are
described in the Ontario Planning Outlook at [http://www.ieso.ca/Pages/Ontario's-Power-System/Ontario-Planning-Outlook/default.aspx](http://www.ieso.ca/Pages/Ontario's-Power-System/Ontario-Planning-Outlook/default.aspx). The IESO has not updated its assessment of Pickering extended operations to reflect these updated electricity demand outlooks or other recent developments.
ED Interrogatory #31

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Reference: “Pickering extension to 2022/2024 yields a net benefit in the range of $0.3B-$0.6B…” Exhibit F2-2-3, Attachment 1, Page 6 of 116

With reference to the above captioned study, please provide its forecast, for each year of its analysis, of:

a) Ontario’s surplus base-load generation (MWh) due to the Pickering extension;
b) Ontario’s curtailed water power generation (MWh) due to the Pickering extension;
c) Ontario’s curtailed wind power generation (MWh) due to the Pickering extension; and
d) Ontario’s curtailed solar power generation (MWh) due to the Pickering extension.

Please provide a response on a best-efforts basis and make and state assumptions as necessary.

Response

The following response has been prepared by the IESO:
ED Interrogatory #031

a) Ontario’s Surplus base-load generation (MWh) based on 2022/2024 Pickering Case vs. 2020 Pickering Case

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Case with + 65 TWh of Pickering Production</td>
<td>0</td>
<td>0</td>
<td>(492,206)</td>
<td>986,576</td>
<td>(1,418,606)</td>
<td>(2,669,052)</td>
<td>6,123,001</td>
<td>6,641,024</td>
<td>3,798,101</td>
</tr>
<tr>
<td>Case with + 62 TWh of Pickering Production</td>
<td>0</td>
<td>0</td>
<td>(492,206)</td>
<td>(941,983)</td>
<td>(1,247,147)</td>
<td>(2,981,399)</td>
<td>5,746,215</td>
<td>6,132,962</td>
<td>3,478,657</td>
</tr>
</tbody>
</table>

b) Ontario’s curtailed water power generation based on 2022/2024 Pickering Case vs. 2020 Pickering Case

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Case with + 65 TWh of Pickering Production</td>
<td>0</td>
<td>0</td>
<td>(22,253)</td>
<td>(68,949)</td>
<td>(86,169)</td>
<td>(229,213)</td>
<td>325,673</td>
<td>162,386</td>
<td>98,712</td>
</tr>
<tr>
<td>Case with + 62 TWh of Pickering Production</td>
<td>0</td>
<td>0</td>
<td>(22,253)</td>
<td>(68,257)</td>
<td>(65,856)</td>
<td>(230,109)</td>
<td>313,048</td>
<td>143,403</td>
<td>94,449</td>
</tr>
</tbody>
</table>

c) Ontario’s curtailed wind power generation based on 2022/2024 Pickering Case vs. 2020 Pickering Case

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Case with + 65 TWh of Pickering Production</td>
<td>0</td>
<td>0</td>
<td>(1,461)</td>
<td>(4,390)</td>
<td>(10,217)</td>
<td>(53,209)</td>
<td>10,594</td>
<td>0</td>
<td>856</td>
</tr>
<tr>
<td>Case with + 62 TWh of Pickering Production</td>
<td>0</td>
<td>0</td>
<td>(1,461)</td>
<td>(4,390)</td>
<td>(8,113)</td>
<td>(44,444)</td>
<td>11,781</td>
<td>0</td>
<td>169</td>
</tr>
</tbody>
</table>

d) Ontario’s curtailed solar power generation based on 2022/2024 Pickering Case vs. 2020 Pickering Case

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Case with + 65 TWh of Pickering Production</td>
<td>0</td>
<td>0</td>
<td>(461)</td>
<td>(393)</td>
<td>(1,772)</td>
<td>(8,088)</td>
<td>548</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Case with + 62 TWh of Pickering Production</td>
<td>0</td>
<td>0</td>
<td>(461)</td>
<td>(393)</td>
<td>(865)</td>
<td>(6,721)</td>
<td>386</td>
<td>0</td>
<td>25</td>
</tr>
</tbody>
</table>
ED Interrogatory #32

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Reference: “Pickering extension to 2022/2024 yields a net benefit in the range of $0.3B-$0.6B…” Exhibit F2-2-3, Attachment 1, Page 6 of 116

(a) With reference to the above captioned study, please provide its forecast, for each year of its analysis, of:
   i. Ontario’s total revenue from its surplus base-load generation due to the extended operation of Pickering;
   ii. The cost to Ontario’s electricity consumers of Ontario’s curtailed water power generation due to the extended operation of Pickering;
   iii. The cost to Ontario’s electricity consumers of Ontario’s curtailed wind power generation due to the extended operation of Pickering;
   iv. The cost to Ontario’s electricity consumers of Ontario’s curtailed solar power generation due to the extended operation of Pickering;
   v. The total cost to Ontario’s electricity consumers of all power that must be curtailed due to the extended operation of Pickering.

(b) Are the costs of curtailed generation included in the IESO’s Pickering extension cost-benefit analysis?

Please provide a response on a best-efforts basis and make and state assumptions as necessary.

Response

The following response has been prepared by the IESO:
(a) i. Ontario’s total export revenues from its surplus base-load generation based on 2022/2024 Pickering Case vs. 2020 Pickering Case

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Case with + 65 TWh of Pickering Production</td>
<td>50</td>
<td>50</td>
<td>$19,834,720</td>
<td>$44,394,846</td>
<td>$225,693,746</td>
<td>$225,537,843</td>
<td>$139,593,703</td>
<td>$169,661,846</td>
<td>$98,083,513</td>
</tr>
<tr>
<td>Case with + 62 TWh of Pickering Production</td>
<td>50</td>
<td>50</td>
<td>$19,834,720</td>
<td>$115,805,013</td>
<td>$216,605,698</td>
<td>$136,688,308</td>
<td>$216,976,633</td>
<td>$150,658,620</td>
<td>$93,168,483</td>
</tr>
</tbody>
</table>

(b) The costs of curtailed generation are included in the IESO’s Pickering extension cost benefit analysis.
ED Interrogatory #33

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Reference: “Pickering extension to 2022/2024 yields a net benefit in the range of $0.3B-$0.6B…” Exhibit F2-2-3, Attachment 1, Page 6 of 116

Please compare the option of Pickering GS shutting down on August 31, 2018 versus OPG’s plan to operate it until 2022/2024 by providing a forecast for each relevant year of:

a) Ontario’s surplus base-load generation (MWh) due to Pickering’s continued operation after August 31, 2018;

b) Ontario’s curtailed water power generation (MWh) due to Pickering’s continued operation after August 31, 2018;

c) Ontario’s curtailed wind power generation (MWh) due to Pickering’s continued operation after August 31, 2018;

d) Ontario’s curtailed solar power generation (MWh) due to Pickering’s continued operation after August 31, 2018;

e) Ontario’s total revenue from its surplus base-load generation due to Pickering’s continued operation after August 31, 2018;

f) The cost to Ontario’s electricity consumers of Ontario’s curtailed water power generation due to Pickering’s continued operation after August 31, 2018;


g) The cost to Ontario’s electricity consumers of Ontario’s curtailed wind power generation due to Pickering’s continued operation after August 31, 2018;

h) The cost to Ontario’s electricity consumers of Ontario’s curtailed solar power generation due to Pickering’s continued operation after August 31, 2018; and

i) The total cost to Ontario’s electricity consumers of all power that must be curtailed due to Pickering’s continued operation after August 31, 2018.

Please provide a response on a best-efforts basis and make and state assumptions as necessary.

Witness Panel: Nuclear Operations and Projects
Response

The following response has been prepared by the IESO:

The scope of the IESO’s assessment of Pickering extended operations referred to in Exhibit F2-2-3, Attachment 1, Page 6 of 116 (the “October 2015 study”) was with respect to Pickering retirement at the end of 2020 versus extended operations to 2022/2024. The IESO did not evaluate extended operations relative to shutting Pickering down on August 31, 2018 in the October 2015 study. However, the March 2015 study included an assessment of surplus energy and net benefit relative to Pickering shutdown in 2018. This is illustrated in pages 42 through 116 of Exhibit F2-2-3 Attachment 1. Specifically, surplus energy is illustrated on page 53. Net benefit relative to shutting down in 2018 is summarized on page 61.
ED Interrogatory #34

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:

If the CNSC does not extend Pickering’ operating licence beyond August 31, 2018:

a) Please provide the IESO’s best estimate of Ontario’s incremental peaking requirements (MW), if any, to achieve compliance with the NPCC resource adequacy criterion in each year from 2018 to 2024 inclusive;

b) Please provide the IESO’s best estimate of Ontario’s potential to meet its incremental peaking requirements by electricity imports from neighbouring jurisdictions for each year from 2018 to 2024 inclusive; and

c) Please provide the IESO’s best estimate of Ontario’s potential to meet its incremental peaking requirements by demand response resources for each year from 2018 to 2024 inclusive.

Response

The following response has been prepared by the IESO:

a) Absent capacity otherwise provided by extended Pickering operations, Ontario could see temporary deficits of between approximately 500 MW and 3,000 MW in the period 2021 to 2024, depending on the demand outlook in question and level of reserve required.

The IESO considered a range of electricity demand futures in its recently published Ontario Planning Outlook, as illustrated at: http://www.ieso.ca/Documents/OPO/DATA-4-Supply-Outlook-20160901.xlsx. Net summer peak demands across the four futures considered are shown below in Table 1 for the period 2018 through 2024. Planning reserve requirements are identified in Table 2 - these are to meet the resource adequacy criterion and address identified planning risks such as the potential for implementation delays or failures among Ontario’s nuclear refurbishments and the potential effects of aging on generator performance. The resulting resource requirement is summarized in Table 3 across all demand futures considered.
As shown in Table 4, Ontario would have sufficient supply for the foreseeable future across the four demand futures, provided continued operation of existing resources and implementation of resources as described in the Ontario Planning Outlook. The values in Table 4 account for the contribution from extended Pickering operation to 2022/2024. Absent the supply otherwise provided by Pickering continued operation, the need for additional resources in the province would arise sooner and to a greater extent, as shown in Table 5.

The values in these tables should be interpreted as indicative: the future requirement for resources in the province will be a moving target and will be influenced by factors such as electricity demand, expiring generator contracts, nuclear refurbishment implementation, generator performance, policy choices, etc. While indicative, the values illustrate the notion described in the Ontario Planning Outlook that Ontario’s electricity system will undergo significant transformation in the years ahead and that extended Pickering operations could provide some coverage during the early 2020’s, a period of relatively intensive refurbishment and other activity and of accordingly heightened risk of a “many moving pieces” variety.

### T1. Summer Peak Demand, MW

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outlook B</td>
<td>24,041</td>
<td>23,993</td>
<td>23,916</td>
<td>23,889</td>
<td>23,881</td>
<td>23,890</td>
<td>23,868</td>
</tr>
<tr>
<td>Outlook C</td>
<td>24,108</td>
<td>24,124</td>
<td>24,112</td>
<td>24,152</td>
<td>24,216</td>
<td>24,298</td>
<td>24,353</td>
</tr>
<tr>
<td>Outlook D</td>
<td>24,166</td>
<td>24,242</td>
<td>24,291</td>
<td>24,393</td>
<td>24,520</td>
<td>24,667</td>
<td>24,788</td>
</tr>
</tbody>
</table>

### T2. Target Risk-Adjusted Planning Reserve at Summer Peak, MW

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outlook A</td>
<td>4,006</td>
<td>3,918</td>
<td>4,970</td>
<td>4,915</td>
<td>4,890</td>
<td>4,872</td>
<td>4,847</td>
</tr>
<tr>
<td>Outlook B</td>
<td>4,063</td>
<td>4,007</td>
<td>5,090</td>
<td>5,061</td>
<td>5,060</td>
<td>5,061</td>
<td>5,057</td>
</tr>
<tr>
<td>Outlook C</td>
<td>4,099</td>
<td>4,101</td>
<td>5,100</td>
<td>5,106</td>
<td>5,116</td>
<td>5,131</td>
<td>5,140</td>
</tr>
<tr>
<td>Outlook D</td>
<td>4,109</td>
<td>4,121</td>
<td>5,130</td>
<td>5,147</td>
<td>5,169</td>
<td>5,194</td>
<td>5,214</td>
</tr>
</tbody>
</table>
b) The total amount of incremental firm capacity (MWs) that can be imported into Ontario is a function of: import capacity (the physical wires), real-time system constraints (physical constraints based on real-time internal and external supply/demand balances and transmission limitations) and economics (cost). Currently, there are no approved projects underway to increase the import capacity (the physical wires), therefore they are projected to remain the same as today over the 2018 to 2024 time period. The current physical import capacity in Ontario is approximately 6,900 MW.

The total firm capacity that could be imported from each neighbouring jurisdictions is significantly less than simply the nameplate capacity of the interties. The first step to determine how much firm capacity can be imported into Ontario would be a detailed analysis of projected system constraints in Ontario and neighbouring jurisdictions. This would provide an indication of the amount of capacity that could physically flow over the interties into Ontario over the long-term. The next step would be to determine how much reliable capacity is available in the neighbouring jurisdictions to produce that power; for example Québec currently has a capacity shortfall during the winter periods, meaning...
that they would not be able to provide firm year-round capacity in the 2018-2024 timeframe (see Ex L-6 5-7 ED-39).

c) The IESO does not have an estimate of Ontario’s potential of demand response. In the Ontario Planning Outlook published in September 2016, the planned capacity of all demand response resources are as follows (Table 6).

<table>
<thead>
<tr>
<th>T6. Planned Demand Response, MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>1,885</td>
</tr>
</tbody>
</table>
ED Interrogatory #35

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:

a) Please fully describe the IESO’s contingency plan to meet Ontario’s peak day generation requirements for each year from 2018 to 2024 inclusive if the CNSC does not extend Pickering’s operating licence beyond August 31, 2018. Please provide a break-out of its incremental costs, incremental gas-fired generation and incremental greenhouse gas emissions for each year from 2018 to 2024 inclusive;

b) Please provide an analysis of the costs and benefits of meeting Ontario’s peak day generation requirements for each year from 2018 to 2024 inclusive, if the CNSC does not extend Pickering’s operating licence beyond August 31, 2018, by: a) curtailing natural gas-fired electricity exports; b) procuring more demand response resources; c) procuring more energy efficiency resources; d) importing renewable energy from neighbouring jurisdictions; and e) procuring more Made-in-Ontario green energy; and f) by the least-cost combination of options (a) to (e) inclusive.

Please fully describe your analysis and state and justify your assumptions.

Response

The following response has been prepared by the IESO:

a) The IESO is in the process of risk management planning for a variety of future risks as described in the Ontario Planning Outlook – costs and other attributes of options will be better defined as the planning further progresses.

b) The IESO’s consideration of options for addressing Ontario’s electricity requirements absent Pickering extended operation is still ongoing, the analysis would depend on the conditions laid out by the CNSC in its decision. The IESO would revisit its analysis at that time.
ED Interrogatory #36

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:

Table 3 of Ontario Reserve Margin Requirements 2016-2020 provides the IESO’s estimate of Ontario’s Available Capacity at Peak for each year from 2016 to 2020 inclusive.

a) Please state for each year from 2016 to 2020 inclusive the quantum of this capacity that is provided by: i) the Pickering Nuclear Station; and ii) the Darlington Nuclear Station.

b) Please state your methodology and assumptions, and show your calculations, for estimating Pickering’s and Darlington’s available capacity (MW) at the time of Ontario’s peak annual demand.

Response

The following response has been prepared by the IESO:

a) The capacity provided by Pickering and Darlington per the “IESO, Ontario Reserve Margin Requirements 2016-2020” is shown in Table 1 below.

<table>
<thead>
<tr>
<th>Year</th>
<th>Darlington</th>
<th>Pickering</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>3,512</td>
<td>3,094</td>
</tr>
<tr>
<td>2017</td>
<td>2,634</td>
<td>2,579</td>
</tr>
<tr>
<td>2018</td>
<td>2,634</td>
<td>2,578</td>
</tr>
<tr>
<td>2019</td>
<td>2,634</td>
<td>3,094</td>
</tr>
<tr>
<td>2020</td>
<td>2,634</td>
<td>3,094</td>
</tr>
</tbody>
</table>

b) For each year, the available capacity at peak represents the aggregate of the July maximum continuous rating of each unit as provided by OPG, decremented by any coincident retirements, refurbishment outages and planned outages that were assumed to occur in that year.

Witness Panel: Nuclear Operations and Projects
ED Interrogatory #37

Issue Number: 6.5
Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Reference: “Ongoing contingency planning in case Pickering extended operations does not proceed” Ex. F2-2-3, Attachment 1, Page 10 of 116;

Please provide your best estimate of:

a) The total amount of electricity (GWhs) that Ontario will be able to import from each of its neighbouring jurisdictions in each year from 2018 to 2024 inclusive; and

b) The total nameplate capacity (MW) of Ontario’s import connections with each of its neighbouring jurisdictions from each year from 2018 to 2024 inclusive (i.e. the sum of the nameplate import capacity of the interties with each jurisdiction).

Please state your assumptions regarding the transmission system reinforcements that the IESO anticipates will be made during that period that will impact Ontario’s import capacity.

Response

The following response has been prepared by the IESO:

a) The total amount of electricity (GWhs) that can be imported into Ontario is a function of: import capacity (the physical wires), real-time system constraints (physical constraints based on real-time internal and external supply/demand balances and transmission constraints) and economics (real-time costs). The import capacity (wires) has remained constant over the past several years, however, the total yearly imports in GWhs from each neighbouring jurisdiction has varied significantly. The real-time system constraints and the economics play a significant role in determining how much electricity can be imported into Ontario. There is very limited ability to predict real-time system constraints and economics in the 2018 to 2024 period, making any estimate of total amount of electricity that could be imported into Ontario highly speculative.

b) There are currently no fully approved projects underway to increase the total nameplate capacity of Ontario’s import connections with each neighbouring jurisdiction between now and 2024. The total nameplate capacity of Ontario’s import connections is approximately 6,900 MW. Details can be found in: “Ontario Transmission System”, June 22, 2015.
ED Interrogatory #38

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:

According to the above-referenced Memorandum, HQ Energy Marketing and the IESO will conclude a medium-term electricity trade agreement no later than 120 days following the finalization of the design of Ontario’s cap and trade system as it relates to or impacts Ontario’s electricity sector.

a) Has the medium-term electricity agreement been concluded? If yes, please provide it. If no, when does the IESO expect the agreement to be concluded?

Response

The following response has been prepared by the IESO:

b) The IESO and Ontario have finalized an agreement for trading electricity, energy capacity and energy storage. Under the agreement, the IESO will purchase a total of 14 terawatt hours (TWh) from Hydro-Quebec over a seven year period, from 2017 to 2023. See the government news release for more information.


Witness Panel: Nuclear Operations and Projects
ED Interrogatory #39

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Reference: Ex. F2-2-3, Attachment 1

The September 2016 Mandate Letter to the Minister of Energy asks that he "Continue to partner and collaborate with the Province of Québec on key energy issues, including … In co-operation with the IESO and Hydro-Québec, further the intention to explore an electricity trade agreement that would provide value to Ontario ratepayers."

(a) Please compare the net present value of the overall costs and benefits of following three scenarios:
   i. OPG’s proposal to continue operating Pickering until 2022/2024;
   ii. Pickering shutdown in August 31, 2018, with replacement power to come from an electricity trade agreement with Quebec (to the extent that it is technically feasible, with any additional power that cannot be imported to be provided by the next least-cost alternative); and
   iii. Pickering shutdown in December 31, 2020, with replacement power to come from an electricity trade agreement with Quebec (to the extent that it is technically feasible, with any additional power that cannot be imported to be provided by the next least-cost alternative).

Please make best efforts to estimate the cost of replacement power from an electricity trade agreement with Quebec. Please include provisos is necessary. Please consider including a number of agreement scenarios or ranges to address uncertainty regarding the terms of such an agreement. Please indicate and state assumptions and calculations.

Response

The following response has been prepared by the IESO:

(a) Please refer to “Assessment of Pickering Life Extensions Options: October 2015 Update” October 30, 2015. This presentation presents a net present value analysis of OPG’s proposal to continue operating Pickering A until 2022, and Pickering B until 2024. This analysis concludes that there is a net benefit to the proposed continued operation, relative to the least-cost alternative.
To replace the power from Pickering with a firm agreement with Québec, the agreement would need to include both capacity and energy. Québec has an abundance of energy, but currently has a capacity shortfall during their winter peak. Their need for winter capacity continues until the 2024 time period. Please refer to Tableau 4-2 of “État d’avancement 2015 du Plan d’approvisionnement 2014-2023” http://www.regie-energie.qc.ca/audiences/Suivis/SuiviD-2014-205_PlanAppro2014-2023/HQD_EtatAvancement2015_30oct2015.pdf

The capacity needs in Québec indicate that they would not be able to reliably provide firm, year-round capacity to Ontario during the 2018-2024 time-frames. Therefore all additional power would need to be supplied by the next least-cost alternative. The analysis presented in the aforementioned deck from October 30, 2015 assesses the net present value of operating Pickering until 2022/2024 against additional power being supplied by the next least-cost alternative.
ED Interrogatory #40

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference: Ex. F2-2-3, Attachment 1

The September 2016 Mandate Letter to the Minister of Energy asks that he “Continue to partner and collaborate with the Province of Québec on key energy issues, including … In co-operation with the IESO and Hydro-Québec, further the intention to explore an electricity trade agreement that would provide value to Ontario ratepayers.”

Please provide a breakdown of the transmission upgrade projects that would be necessary to replace the power from Pickering with imports from Quebec. Please indicate an approximate cost for each project and an estimate of the amount of time it would take for the project to be completed.

Response

The following response has been prepared by the IESO:

Pickering Nuclear has a nameplate capacity of approximately 3,300 MW. The transmission upgrades necessary to allow a firm capacity of 3,300 MW to flow from Québec are outlined in “Review of Ontario Interties” report written by IESO and OPA, and published on October 14, 2014. From the report, the necessary upgrades to the Ontario system are as follows:

1. Upgrading the 230 kV circuits between Merivale TS and Hawthorne TS. This is also needed to serve local load growth. The upgrades will cost approximately $325 million and estimated to take three to five years.

2. A new 230 kV double-circuit line between Cornwall and Ottawa to replace the existing single-circuit 115 kV line along the right of way

3. A new 230 kV circuit, approximately 8 km in length to connect existing circuits west of Ottawa (Kanata).

4. Additional voltage control equipment in the Ottawa area.

Cost of 2-4 is approximately $500 million and would take five to seven years.
5. A new double-circuit 230 kV interconnection with Québec with a new back-to-back DC facility at the Québec-Ontario border.

6. A Replacement of the existing phase-angle regulating transformers on the interties to New York at Cornwall, with units having a greater regulating range to control flows into and out of New York.

7. A new 46 km 500 kV double-circuit line between the Bowmanville and Cherrywood transformer stations

The cost of 5-7 could be as high as $1.4 billion. Including the time needed for regulatory and environmental approvals, the time needed to complete these enhancements is estimated to be seven to 10 years.

To complete all necessary upgrades the total cost is in excess of $2 billion with an estimated seven to ten years lead time.

An important consideration beyond just the cost of transmission upgrades in Ontario would be the system upgrades necessary in Québec and subsequently their cost of delivering the capacity to the border. Public documents indicate that Québec currently has limited quantities of capacity available to export in the winter and intends to add capacity in the coming years; please refer to: “ÉTAT D'AVANCEMENT 2015 DU PLAN D'APPROVISIONNEMENT 2014-2023.” Consequently, any deal to supply baseload energy year round, similar to Ontario’s nuclear plants, would require the construction of new generation in Quebec. This new generation would be more expensive than existing power because it would factor in the cost associated with new generation and transmission build, resulting in higher import prices for Ontario.
ED Interrogatory #41

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Reference: Ex. F2-2-3, Attachment 1

The IESO’s recent Ontario Planning Outlook states as follows: “To facilitate any potential large firm import capacity arrangement from Quebec/Newfoundland, major system reinforcements in eastern Ontario would be required – a new high-voltage direct current (HVDC) intertie to Lennox would be an example. The incorporation of new resources in Southwestern Ontario would require reinforcement of the transmission system, such as in the West of London area, as well as additional enabling facilities. Similarly, investments in new resources in the Greater Toronto Area might also trigger the need to reinforce the bulk transmission system.”

(a) In relation to the jurisdictions referred to in the above quote please provide the import capacity from the jurisdiction without making the system reinforcements referred to above; and

(b) In relation to the projects referred to in the above quote, please provide a list of each of the reinforcement projects indicating (i) the approximate cost, (ii) the location of the project, (iii) the import capacity that it would enable, and (iv) and the approximate time required to undertake the project.

Response

The following response has been prepared by the IESO:

(a) Any firm import from either Québec or Newfoundland would have to flow through Québec’s transmission system since there is currently no direct connection between Ontario and Newfoundland. In the joint IESO and OPA report ‘Review of Ontario Interties’ published October 14, 2014, the details of available import capacity from Québec without making system reinforcements are outlined. At present the firm import capability that could be relied on for all hours on the Québec-Ontario interties is restricted due to transmission issues in the Ottawa area, with the ability to accommodate only about 500 MW of firm capacity until 2020. As the Ottawa-area load increases, and if none of the system reinforcements mentioned in the above mentioned report are completed, in the early 2020’s it is expected that no firm import
capacity can be counted on to flow through from Quebec to meet Ontario peak load
requirements.

(b) The above quote is referring to several projects. The only one of which is related to
increasing the import capacity through the Ontario-Québec interface is the reference
to a new high-voltage direct current (HVDC) intertie to Lennox. The cost of a new
HVDC line, plus all necessary reinforcements to support large scale firm imports
could be in excess of $2 billion and take up to seven to ten years to complete. Please
refer to L-06 5-7 ED_040 and the ‘Review of Ontario Interties’ report for details of
these reinforcements. Many of the reinforcements would occur in the Ottawa area
and west of Cornwall, with the new HVDC intertie being connected at the Lennox TS.

An important consideration beyond just the cost of transmission upgrades in Ontario would
be the system upgrades necessary in Québec and subsequently their cost of delivering the
capacity to the border. Public documents indicate that Québec currently has limited
quantities of capacity available to export in the winter and intends to add capacity in the
coming years; please refer to: “ÉTAT D’AVANCEMENT 2015 DU PLAN
D’APPROVISIONNEMENT 2014-2023.” Consequently, any deal to supply baseload energy
year round, similar to Ontario’s nuclear plants, would require the construction of new
generation in Quebec. This new generation would be more expensive than existing power
because it would factor in the cost associated with new generation and transmission build,
resulting in higher import prices for Ontario.
ED Interrogatory #42

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Reference: Ex. F2, Tab 2, Schedule 3, p. 1. “Under OPG’s plan, as approved by the Province of Ontario, all six units at Pickering would operate until 2022, at which point two units would be shut down and the remaining four units would operate until 2024.”

Please provide all documentation provided by the IESO to the Province of Ontario prior to January 11, 2016 (the date the Province of Ontario news release relating to Pickering), detailing OPG’s plan to operate Pickering until 2022/2024.

Response

The following response has been prepared by the IESO.

Note: Attachment 1 is marked “confidential”, however, OPG has determined this attachment to be non-confidential in its entirety.

The presentations prepared by the IESO at F2/2/3 Attachment 1 comprise the bulk of the documentation provided by the IESO to the Province of Ontario prior to January 11, 2016 detailing OPG’s plan to operate Pickering until 2022/2024. Two additional pieces of documentation were provided and are included as attachments to this response. The first attachment is dated August 15, 2014 and contains some preliminary screening analysis of three Pickering scenarios, including one which would see Pickering units operate to 2022 and another in which Pickering units would operate to 2024. The second attachment is dated January 11, 2016 and contains some documentation prepared by the IESO in support of the government’s January 11, 2016 announcements related to Pickering (and Darlington).
Pickering Shutdown Timing:
Preliminary Economic Screening of Three Scenarios

Prepared for discussion with Ministry of Energy Staff

Power System Planning

August 15, 2014
Three scenarios of Pickering shutdown timing are compared against the reference plan, in which Pickering continues to operate to 2020: two scenarios see Pickering operate beyond 2020, one scenario sees Pickering shut down prior to 2020.

- The 2013 LTEP features Pickering operation to 2020

- At the request of Ministry of Energy staff, the OPA explored implications of earlier and later Pickering shutdown scenarios

- In the following slides, three scenarios are compared against the 2013 LTEP reference plan:
  - Early Shutdown: Pickering to operate until 2018
  - 2 year Extension: Pickering to operate until 2022
  - 4 year Extension: Pickering to operate until 2024

- Capacity and energy impacts and economic costs and benefits are estimated
Previous assessments identified a range of potential benefits from continued operations at Pickering

- The OPA expressed support for Pickering continued operations to 2020 at EB-2013-0321 (OPG rates case) and elsewhere

- Given findings to date with respect to Pickering operation to 2020:
  - Operation beyond 2020 holds intuitive appeal:
    - Longer deferral of otherwise required supply investments
    - Further dispatch cost savings from reduced natural gas-fired production and imports
    - Additional coverage during a period of significant transition in the Ontario electricity system
    - Reduced greenhouse gas emissions
  
  - Closure prior to 2020 holds intuitive disadvantage:
    - Advancement of otherwise required supply investments
    - Reduced dispatch cost savings
    - Less coverage during a period of significant transition
    - More greenhouse gas emissions
The current analysis illustrates that net cost implications of Pickering operation to 2018, 2022 or 2024 are highly sensitive to a few key variables: Pickering capital and O&M costs and decommissioning and severance deferral savings

- OPG previously provided cost information to the OPA on the question of Pickering continued operation to 2020 versus Pickering shutdown in 2016
  - Differences in Pickering capital and O&M costs and decommissioning and severance costs were explicitly identified by OPG

- OPA appropriated this information for purposes of the present assessment, but with modifications/assumptions as necessary in light of the particular alternative shutdown timing scenarios now being considered

- Of particular relevance: how do Pickering capital and O&M costs and decommissioning and severance costs change if Pickering operates for a fewer number or greater number of years compared to the reference plan?
  - Details on key assumptions made by the OPA in these regards are described in the Appendix

- Because of the importance of Pickering capital and O&M costs and decommissioning and severance deferral savings to the overall net cost/benefit of Pickering shutdown timing, OPA’s present analysis must be treated as highly preliminary, pending detailed input from OPG
Key finding: further assessment is warranted based on preliminary screening

- Net benefits increase with a longer continued operations period under some scenarios, but are highly sensitive to:
  - The extent to which Pickering costs can be avoided by a shorter operation period
  - The extent to which longer operation requires capital investment
  - Annual O&M costs and deferral savings

- Earlier shutdown would forego previously identified benefits of continued operation to 2020 and might require immediate action to secure replacement supply to meet a large and advanced need

- The scenarios merit further assessment, detailed OPG costs estimates will be required for a more determinative treatment
In the reference case (Pickering to 2020), Ontario will need additional capacity by approximately 2019 to maintain sufficient capacity margins. Earlier Pickering shutdown would advance the need for additional capacity, later shutdown would defer the need.
Output from Pickering offsets natural gas-fired production and imports. Scenarios with less production from Pickering see more production from natural gas and imports. Scenarios with more production from Pickering see less production from natural gas and imports.
Pickering’s contribution to potential surplus energy diminishes over time
Assumptions on Pickering OM&A and capital cost

- For the 2012 Pickering Continued Operations analysis, OPG provided an estimate of $6 B in 2012 dollars for the capital and OM&A cost of continued operations for the period of 2013 to 2020. This translates to $5.4 B in 2014 dollars for the period of 2014 to 2024.

- The annual cost information is used to extrapolate the OM&A and capital cost for the various scenarios as summarized below. Compared to the reference case, there are OM&A and capital savings from shorter operating period and increases with longer operating period.

<table>
<thead>
<tr>
<th>$2014 Real Dollars, Billions</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>Total ($B)</th>
<th>NPV ($B)</th>
<th>Delta from Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pickering to 2020</td>
<td>1.04</td>
<td>0.99</td>
<td>0.96</td>
<td>0.91</td>
<td>0.93</td>
<td>0.85</td>
<td>0.60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$6.3</td>
<td>$5.4</td>
<td></td>
</tr>
<tr>
<td>Pickering to 2018</td>
<td>1.04</td>
<td>0.99</td>
<td>0.95</td>
<td>0.85</td>
<td>0.60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$4.4</td>
<td>$4.0</td>
<td>-$1.5</td>
</tr>
<tr>
<td>Pickering to 2022</td>
<td>1.04</td>
<td>0.99</td>
<td>0.96</td>
<td>0.91</td>
<td>0.93</td>
<td>0.95</td>
<td>0.85</td>
<td>0.60</td>
<td></td>
<td></td>
<td></td>
<td>$8.2</td>
<td>$6.8</td>
<td>$1.4</td>
</tr>
<tr>
<td>Pickering to 2024</td>
<td>1.04</td>
<td>0.99</td>
<td>0.96</td>
<td>0.91</td>
<td>0.93</td>
<td>0.95</td>
<td>0.95</td>
<td>0.85</td>
<td>0.60</td>
<td></td>
<td></td>
<td>$10.1</td>
<td>$8.1</td>
<td>$2.7</td>
</tr>
</tbody>
</table>
Assumptions on decommissioning and severance liability

- For the 2012 Pickering Continued Operations analysis, OPG provided an estimate of $210 M in 2012 dollars of savings due to reduction in decommissioning and severance liability when shut down is deferred by four years.

- Appropriating the relationship observed above (a four year deferral providing $219 M (2014 dollars) in savings in the Pickering to 2020 case), this analysis assumes $55 M of cost/savings per each year of advancement/deferral (i.e. $219 M divided by 4).

<table>
<thead>
<tr>
<th>$2014 Millions</th>
<th>Pickering to 2018</th>
<th>Pickering to 2022</th>
<th>Pickering to 2024</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost (-)/Savings (+)</td>
<td>-110</td>
<td>+110</td>
<td>+220</td>
</tr>
</tbody>
</table>
Pickering to 2018: capital & fixed cost savings from shorter operation period can exceed the additional cost of more gas-fired production and imports

- Higher dispatch cost: decrease in nuclear dispatch cost is offset by higher gas production and import costs and lower export revenue
- Lower Pickering capital & fixed operating cost: cost of advancing otherwise needed replacement capacity is offset by savings in Pickering OM&A as operation period is shortened
**OM&A and Capital Cost Sensitivity - Pickering to 2018**

**Net Benefit or Cost (+) or Cost (-) ($2014 Millions)**

<table>
<thead>
<tr>
<th>Net Benefit or Cost</th>
<th>With Deferral of Decomm. &amp; Severance</th>
<th>Without Deferral of Decomm. &amp; Severance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base OM&amp;A</td>
<td>Base</td>
<td>Base + 5%</td>
</tr>
<tr>
<td>Base + 5%</td>
<td>Base + 5% (increase ~$40M/yr)</td>
<td>Base + 10% (increase ~$90M/yr)</td>
</tr>
<tr>
<td>Base + 10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Same as Pickering to 2020</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**OM&A & Capital Cost same as Pickering to 2020**

---

*annual OM&A cost post 2015*
Pickering to 2022: dispatch cost savings and savings from deferred decommissioning and severance costs exceed additional capital and fixed operating costs from longer operating period

- Lower dispatch cost: lower gas dispatch cost and import cost, increase in export revenue
- Higher capital & fixed operating cost: capacity savings from deferring gas replacement are offset by increase in Pickering OM&A and capital cost

<table>
<thead>
<tr>
<th>Benefit (+) / Cost (-) ($2014 Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dispatch Cost</td>
</tr>
<tr>
<td>$996</td>
</tr>
<tr>
<td>Capacity Savings</td>
</tr>
<tr>
<td>$426</td>
</tr>
<tr>
<td>Net Benefit (With Decom &amp; Severance)</td>
</tr>
<tr>
<td>$147</td>
</tr>
<tr>
<td>Net Benefit</td>
</tr>
<tr>
<td>$38</td>
</tr>
<tr>
<td>Decom &amp; Severance Cost</td>
</tr>
<tr>
<td>$109</td>
</tr>
<tr>
<td>Pickering OM&amp;A &amp; Capital</td>
</tr>
<tr>
<td>$1,384</td>
</tr>
<tr>
<td>$0</td>
</tr>
</tbody>
</table>

Filed: 2016-10-26, EB-2016-0152, Exhibit L, Tab 6.5, Schedule 7 ED-042, Attachment 1, Page 14 of 19
Pickering to 2022: a small increase in annual Pickering O&M can significantly impact the overall net benefit or net cost of later Pickering closure.
Pickering to 2024: like Pickering to 2022, but with more net benefit

- Lower dispatch cost: lower gas dispatch cost and import cost, increase in export revenue
- Higher capital & fixed operating cost: capacity savings from deferring gas replacement are offset by increase in Pickering OM&A and capital cost
Pickering to 2024: a small increase in annual Pickering O&M can significantly impact the overall net benefit or net cost of later Pickering closure.

OM&A and Capital Cost Sensitivity - Pickering to 2024

Net Benefit (±) or Cost (-) ($2014 Millions)

NPV of Pickering OM&A and Capital Cost ($2014, Billions)

With Deferral of Decomm. & Severance

Without Deferral of Decomm. & Severance

Base OM&A
Base + 5%
Base + 10%

Base + 5 %
(increase ~$45 M/yr)

Base + 10 %
(increase ~$70 M/yr)
Scenarios at a glance

<table>
<thead>
<tr>
<th>Compared to Pickering to 2020 (2013 LTP)</th>
<th>NPV for 2014 -2032</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2018</td>
</tr>
<tr>
<td>Change in Dispatch Cost</td>
<td>-$899</td>
</tr>
<tr>
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<td>Net Benefit with Deferral</td>
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Sensitivities at a glance – increases in Pickering OM&A cost
Nuclear in the Context of Power System Planning

Technical Briefing for Media

Bruce Campbell, President and CEO
Mike Lyle, Vice President, Planning, Law and Aboriginal Relations

January 11, 2016
System Benefits from Refurbishment and Continued Operation

✓ The Darlington and Pickering nuclear units provide long-term, lower cost, emissions-free and reliable baseload electricity generation
✓ The respective refurbishment and continued operation defers the need to procure new resources for a number of years
✓ Both facilities utilize existing assets and access to transmission

Pickering Continued Operations
  – Six Pickering units will continue operation to 2022; four of those units will continue operation to 2024
  – Defers capacity needs and new investment of up to about 2,000 MW and projected decommissioning costs
  – Offsets greenhouse gas emissions, and reduces electricity bills during continued operation
  – Provides stability during a period of significant resource turnover/transition

Darlington Refurbishment
  – Secures 3,500 MW of supply capability over the longer-term (about 30 TWh per year) into the 2050 period
  – Both Darlington and Bruce refurbishment schedules have been developed in a coordinated manner to minimize impacts to the electricity system.
Overview of Nuclear Refurbishment and Decommissioning Outages

- Bruce 1
- Bruce 2
- Bruce 3
- Bruce 4
- Bruce 5
- Bruce 6
- Bruce 7
- Bruce 8
- Darlington 1
- Darlington 2
- Darlington 3
- Darlington 4
- Pickering 1
- Pickering 4
- Pickering 5
- Pickering 6
- Pickering 7
- Pickering 8

- Refurbishment Outage
- Projected End of Service
Electricity Supply in 2015

Installed Capacity
- Nuclear: 33%
- Natural Gas: 26%
- Water: 23%
- Solar/Wind/Bioenergy: 16%
- Demand Response: 2%

Total: 39 GW

Energy Production
- Nuclear: 61%
- Natural Gas: 24%
- Water: 9%
- Solar/Wind/Bioenergy: 6%

Total: 159 TWh

Nuclear represents one third of Ontario’s installed generation capacity.
Nuclear produces about 60% of the electricity generated in Ontario.

Installed capacity as of Q2 2015. Energy production is estimated. Reflects grid connected and embedded supply resources.
OPG Share of Ontario’s Nuclear Electricity Supply

Together, Pickering and Darlington represent about half of Ontario’s installed nuclear generation capacity.

Together, Pickering and Darlington represent about half of Ontario’s nuclear energy production.
Electricity Supply in 2025

- **Installed Capacity**: 41 GW
  - Nuclear: 20%
  - Solar/Wind/Bioenergy: 26%
  - Natural Gas: 23%
  - Water: 26%

- **Energy Production**: 143 TWh
  - Nuclear: 41%
  - Solar/Wind/Bioenergy: 29%
  - Water: 13%
  - Natural Gas: 5%

Nuclear’s share of Ontario’s installed generation capacity declines by 2025.

Nuclear’s share of electricity generated in Ontario declines by 2025.
Electricity Bills

Average Monthly Residential Electricity Bill (assumes 800 kWh/month consumption, nominal $)

- LTEP 2013
- Updated with Pickering Continued Operations and New Negotiated Bruce Pricing
ED Interrogatory #43

Issue Number: 6.5
Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Reference: Ex. F2, Tab 2, Schedule 3, p. 1. “Under OPG’s plan, as approved by the Province of Ontario, all six units at Pickering would operate until 2022, at which point two units would be shut down and the remaining four units would operate until 2024.”

A January 11, 2016, news release from the Ministry of Energy referred to in OPG’s evidence states as follows: “The Province has also approved OPG’s plan to pursue continued operation of the Pickering Generating Station beyond 2020 up to 2024, which would protect 4,500 jobs across the Durham region, avoid 8 million tonnes of greenhouse gas emissions, and save Ontario electricity consumers up to $600 million. OPG will engage with the Canadian Nuclear Safety Commission and the Ontario Energy Board to seek approvals required for the continued operation of Pickering Generating Station.”

(a) Based on the IESO’s discussions with the Province of Ontario and OPG, does the IESO believe that approval from the Ontario Energy Board is needed for OPG to implement its plan to continue operating Pickering until 2022/2024?

(b) Has an irreversible and fully final decision been made with respect to OPG’s plan to continue to operate Pickering until 2022/2024, or is it still possible for another alternative option to be chosen (e.g. if it becomes clear that another option is preferable and more cost-effective)?

Response

The following response has been prepared by the IESO:

a) The IESO considers OEB review of OPG’s proposed payment amounts to be an important element of the Pickering extended operations assessment and implementation process. The IESO understands that extended Pickering operations would involve enabling costs which are described throughout the EB-2016-0152 application and that approval of such costs would allow for their recovery through OEB-regulated payment amounts.

Witness Panel: Nuclear Operations and Projects
b) Beyond the above-cited Ministry of Energy announcement dated January 11, 2016, the IESO is not aware of the status of any government policy deliberation with respect to OPG's plan to continue to operate Pickering until 2022/2024.
**GEC Interrogatory #17**

**Issue Number: 6.5**

**Issue:** Are the test period expenditures related to extended operations for Pickering appropriate?

**Interrogatory**

**Reference:**
Exhibit F2, Tab 2, Schedule 3, attachment 1, pages 17 and 18:

These pages of the IESO’s updated Pickering life extension analysis appear to indicate that Pickering life extension is not cost effective given the gas price projections offered and are only cost effective if a probabilistic assessment of the past distribution of gas costs is utilized. Please confirm, or provide OPG’s alternative understanding of the IESO’s report.

**Response**

The IESO’s assessment at Ex. F2-2-3 Attachment 1, p. 6 indicates that Pickering extension to 2022/2024 yields a net benefit in the range of $0.3B to $0.5B. As a result, OPG does not confirm that the IESO’s assessment indicates that Pickering life extension is not cost effective.

The IESO provides a more detailed interpretation of the sensitivity analysis outlined on pages 17 and 18 of Ex. F2-2-3 Attachment 1 in Ex. L-6.5-20 VECC-29.

As described by the IESO, gas prices are one input used in the modeling of system costs and benefits. The economic merit of Pickering Extended Operations isn’t limited to one variable in isolation. All factors need to be considered in the analysis.
GEC Interrogatory #18

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Exhibit F2, Tab 2, Schedule 3, attachment 1

Please confirm that IESO's analyses indicate that early shutdown of Pickering (i.e. 2018) offers the highest likelihood of reducing electricity costs. Please indicate whether OPG agrees with this analysis.

Response

OPG does not confirm that the IESO's analyses indicate that early shutdown of Pickering (i.e. 2018) offers the highest likelihood of reducing electricity costs. On page 30, of Ex.F2-2-3, Attachment 1, the IESO summarizes the net present value of the scenarios that were analyzed. Among the five scenarios shown, including Pickering shutdown in 2018, operating Pickering through 2022/24, as proposed, shows the greatest net benefit.
GEC Interrogatory #19

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Exhibit F2, Tab 2, Schedule 3, attachment 1, pages 76 and 77

Please identify which Darlington lapping scenario reflects OPG’s current DRP proposal.

Response

None of the identified scenarios exactly reflects OPG’s current DRP proposal.

Refer to Ex. L-4.3-8 GEC-10 for the current DRP proposal.
**GEC Interrogatory #20**

**Issue Number: 6.5**

**Issue:** Are the test period expenditures related to extended operations for Pickering appropriate?

**Interrogatory**

**Reference:**
Exhibit F2-2-3, Attachment 2

What gas price forecast underlies OPG’s cost-effectiveness analysis? Please compare the gas price forecast used to the corresponding current Henry Hub futures prices.

**Response**

The gas price forecast used in OPG’s analysis and current Henry Hub future prices are provided in the Chart 1 below.

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<tr>
<td>Henry Hub Gas Forecast - 2015 System</td>
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All values are in U.S. dollars

Witness Panel: Nuclear Operations and Projects
GEC Interrogatory #21

Issue Number: 6.5
Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
In a March 23, 2016 article in Queens Park Briefing (See: Pickering nuclear plant extension still a work in progress, copy attached) OPG is reported to have issued the following comment on the Pickering life extension: “OPG says the component condition assessments are scheduled to be completed by this September, and the fuel channel life management work is slated to finish in the third quarter of 2017. This work could ultimately confirm the Pickering nuclear plant can live long and power. It's just not done yet.” The article also notes: “There are regulatory hurdles remaining as well. OPG's current operating licence for Pickering expires at the end of August, 2018. … Chiarelli said the life-extension plan would be contingent on the relicensing efforts. The government says OPG will ask it for a "final" approval to keep Pickering running after the company checks off all the regulatory boxes.”

Response

(a) OPG declines to provide the requested information on the basis of relevance. This interrogatory seeks OPG’s comments on selected statements from an article. Despite the use of quotation marks in the question above, the referenced article does not present the two statements above as quotes from OPG. Rather, this material appears to be expressing the views of the article’s author. Neither this article nor its author’s views are relevant to the determination of the test period expenditures for Pickering Extended Operations. OPG’s evidence on the work necessary to confirm that Pickering can operate until 2022/24 and the timing of that work is presented in Ex. F2-2-3, pages 3-6 and Ex. F2-2-3, Attachment 2, pages 10-13.

(b) Since Pickering can only operate pursuant to a licence from the CNSC, no decision on the plant’s service life can be final until the CNSC issues its relicensing decision.
March 23, 2016

Pickering nuclear plant extension still a work in progress

By Geoff Zochodne

OPG says assessments won't be completed until September to confirm if components are in good enough condition to allow the plant to continue operating to 2024.

Ontario may have put the cart before the uranium-fed workhorse in backing a longer lifespan for a nuclear power plant.

The Liberal government announced in January it had approved a proposal that would keep the decades-old Pickering Nuclear Generation Station in service past 2020 to a new expiry date of 2024.

Recent filings, however, show the plant's operator still isn't certain it can stay in operation for that long.

In a Feb. 17 filing to the Ontario Energy Board, Ontario Power Generation referred to the life-extension plan announcement as a "project that is yet to yield a high confidence result."

OPG, the owner and operator of the Pickering nuclear plant, said in year-end financial results that "early technical work to date" shows the Pickering plant can be safely kept in service past 2020. But the Crown corporation said it is "conducting component condition assessments to identify the work required to support the continued operation of the station to 2024."

The company is also continuing work on fuel channels, which hold uranium, "to confirm that the Pickering pressure tubes will achieve the additional life predicted by the technical work carried out to date."

OPG says the component condition assessments are scheduled to be completed by this September, and the fuel channel life management work is slated to finish in the third quarter of 2017. This work could ultimately confirm the Pickering nuclear plant can live long and power. It's just not done yet.

The government's 2013 long-term energy plan had predicted Pickering would stay in service until 2020, and even allowed for an earlier shut down of the plant, located minutes east of Toronto. The plan to keep the plant running longer was first announced on Jan. 11, when Energy Minister Bob Chiarelli and Ontario Power Generation president Jeffrey Lyash unveiled the proposal in tandem with confirmation that the province would go ahead with the $12.8-billion rebuild of the Darlington nuclear facility - preparations for which date to 2009.
The Darlington refurbishment will start later this year, and another overhaul will begin at the Bruce nuclear plant in 2020. The Pickering stay of execution is intended to bridge the gap in electricity generation during that time. The station has six operating Candu nuclear reactors that pumped out 14 per cent of the province's power in 2015.

For accounting purposes, OPG's end-of-life date for the operating nuclear units at Pickering is the end of 2020. That will be updated "when OPG's further technical work confirms that the longer fuel channel life necessary to extend Pickering operations will be achieved," states the company's financial results.

The cost of preparing the Pickering plant to stay humming past 2020 will be $310 million, according to numbers provided to *QP Briefing* by OPG. This includes the price of equipment inspections, technical assessments, work with the safety regulator and managing the state of nuclear fuel channels. It does not include the cost of operating the plant after 2020.

Both Chiarelli and OPG say they're confident the Pickering nuclear plant has more life in it. They are touting $600 million in savings for electricity customers and eight million tonnes of greenhouse gas emissions that will be avoided as a result of the project (because Ontario would be less reliant on gas-fired power plants), not to mention 4,500 jobs in Durham region that would be preserved.

"We would not be doing it if we didn't think that it's safe to do it," said OPG spokesman Bill McKinlay. "The technical work shows the plant can be operated to 2024."

There are regulatory hurdles remaining as well. OPG's current operating licence for Pickering expires at the end of August, 2018. The company also plans to file a five-year rate-setting application to the OEB this year for its hydroelectric and nuclear facilities.

Chiarelli said the life-extension plan would be contingent on the relicensing efforts. The government says OPG will ask it for a "final" approval to keep Pickering running after the company checks off all the regulatory boxes.

"There's a fairly high confidence level, but we don't certainly take it for granted," Chiarelli told *QP Briefing*.

OPG says it is working on a "comprehensive" safety check of the facility. The Crown corporation is spearheading the life-extension plan, which involves running six nuclear reactors at Pickering until 2022, shutting down two units, and then keeping four online until 2024. Which reactors will shut down at what point is still to be determined, OPG says.

Chiarelli said the initial 2020 date for the plant's lifespan had been a "guesstimate" that always needed to be confirmed with the Canadian Nuclear Safety Commission.

Prior to the Jan. 11 announcement, OPG says it relied on existing equipment assessments and planning ahead in judging how reliable Pickering will be during its expanded lifespan. The total cost of the preliminary assessments was $200,000.

"They didn't find any issues that would stop us from safely operating the plant through 2024," said McKinlay.

OPG says it has spent more than $200 million on the Pickering nuclear plant since 2010, and that the station "achieved the best ever reliability performance in the station's history" last year. OPG also recently shut down the facility's Unit 8 for approximately $75 million in planned inspections and maintenance.
To contact the reporter on this story:
gzochodne@qpbriefing.com
416-212-5913
Twitter: @geoffzochodne

References

1. www.qpbriefing.com/2016/01/11/province-approves-12-8-billion-darlington-rebuild-pursuit-of-four-more-years-for-pickering-nuclear-plant
2. www.twitter.com/geoffzochodne
GEC Interrogatory #22

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:

Please describe what planning OPG has undertaken in the event it does not receive approval from either the OEB or the CNSC to fund or operate Pickering until 2024. Please provide details of the impact on OM&A and on total revenue requirement in each year from 2017 to 2024 of such decisions if in 2017 or 2018 as applicable.

Response

OPG’s planning is based on operating Pickering to 2022/2024 as proposed in the application. Should a regulatory decision call the proposed operating life into question, OPG would analyze the applicable regulatory decision and then determine an appropriate course of action. For additional information, please see OPG’s response to Ex. L-6.5 Staff-117.
GEC Interrogatory #26

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Reference:

Please provide copies of the condition assessments completed in 2016 for the Pickering nuclear station.

Response

OPG declines to provide the requested information on the basis of relevance. This information relates to matters that will be considered as part of the CNSC relicencing process and that are not relevant to deciding any issue on the approved Issues List in OPG’s application to set payment amounts. OPG notes that it is currently developing the information requested. Once the relevant information is completed and approved, it will serve as an input into the Periodic Safety Review that OPG will submit to the CNSC by June 30, 2017 as part of the Pickering relicencing application.
GEC Interrogatory #27

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:

Please provide any documents showing the CNSC’s acknowledgement that OPG wishes to continue operating Pickering until 2024. Please provide all documents detailing the CNSC’s expectations for submissions, including the period safety review, before the 2018 licence renewal hearings.

Response

OPG declines to provide the requested information on the basis of relevance. This interrogatory seeks information on matters that are within the CNSC’s regulatory jurisdiction and that are not relevant to deciding any issue on the approved Issues List in OPG’s application to set payment amounts.
GEC Interrogatory #28

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:

In 2013 and 2014, the CNSC instructed OPG to develop probabilistic risks assessments that considered the risk of all the reactors and waste facilities at the Pickering nuclear station.

a. Has OPG embarked on this analysis?

b. Is a similar analysis required for Darlington?

c. Have or will these analyses change the core damage and large release frequency estimates for the Pickering and Darlington sites? Please provide any available results.

d. What are the potential cost implications of increased risk estimates? Please explain.

Response

a) This activity is in progress. A Whole-Site PSA project with the Candu Owners Group ("COG") was initiated to address this request. The scope includes developing a methodology to carry out a proper aggregation of risk. Once the methodology is developed, it will be applied to Pickering NGS with an expected completion date of December 2017.

b) A similar analysis is not required for Darlington, but is under consideration by OPG.

c) The risk aggregation that is part of the Pickering NGS pilot, as discussed in part a), will include the risk estimate but any changes are not expected to be significant. Results will not be available until December 2017.

d) As per OPG governance, whenever PSA results are above the Administrative Safety Goal, an action plan is prepared to consider improvement options as practicable.
**GEC Interrogatory #33**

**Issue Number:** 6.5  
**Issue:** Are the test period expenditures related to extended operations for Pickering appropriate?

**Interrogatory**

**Reference:**  
In Table 4 of Attachment 2 to Exhibit F2-2-2 OPG lists “level of concern” for fuel channel risks as high, medium and low.

Please provide a likelihood range for the levels of concern marked low, medium and high.

**Response**

The correct reference should be Ex. F2-2-3 Attachment 2, Table 4.

The likelihood ranges for the levels of concern are provided below. The ranges depict the likelihood that mitigation will be effective in satisfying fitness for service requirements for a specific degradation mechanism.

- **Low concern:** >70% likelihood that mitigation will be effective
- **Med concern:** 30-70% likelihood that mitigation will be effective
- **High concern:** <30% likelihood that mitigation will be effective

Based on technical work completed to date, Engineering has reduced the level of concern associated with Units 1 and 6 (Pressure Tube Elongation) from High, as shown in Ex. F2-2-3 Attachment 2, Table 4, to Medium. All other risk mechanisms remain the same.
GEC Interrogatory #34

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
In Table 3 of Attachment 2 to Exhibit F2-2-2, OPG lists “level of concern” for confidence in operation to 2022 to 2024.

Please provide a likelihood range for the levels of concern marked low, medium and high.

Response

The correct reference is Ex. F2-2-3 Attachment 2, Table 3.

The likelihood ranges for the confidence levels in Ex. F2-2-3 Attachment 2, Table 3 are provided below.

Low: <30% likelihood
Med: 30-70% likelihood
High: >70% likelihood

Based on technical work completed to date, Engineering has improved the confidence level associated with Units 1 and 6 from Low, as shown in Ex. F2-2-3 Attachment 2, Table 3, to Medium. All other confidence levels remain the same.
**GEC Interrogatory #35**

**Issue Number: 6.5**  
**Issue:** Are the test period expenditures related to extended operations for Pickering appropriate?

**Interrogatory**

**Reference:**  
Exhibit F2-2-3, Attachment 2, pg. 9.

OPG states that “steam generators and feeders do not present a significant hurdle for proving fitness-for-service of the units.” However, media reports indicate that recent inspections of Unit 4 “showed significant steam generator tube thinning in a number of tubes since the last outage inspections in Steam Generators 11 and 12, winter 2014 and fall 2011 respectively.” (See: pickering-nuke-plant-extension-to-cost-307m-may-prove-uneconomical-opg.pdf, attached)

a. To what extent has this newly discovered thinning changed OPG’s assessment of the risk of extending the operation Pickering until 2024?

b. Will this thinning of the steam generator tubes require increased inspections and monitoring moving forward? If so, how will it impact OPG’s production forecasts and operation and maintenance costs?

**GEC Attachment**

**Response**

a) Unit 4 Steam Generator (“SG”) issues are not expected to impact OPG’s ability to achieve extended operations. OPG has performed comprehensive assessments of its SG and Fitness-For-Service for the safe and economical continued operation up to 2024 and has identified and incorporated SG Life Cycle Management actions for inspection, maintenance and modifications within its outage programs.

Ongoing SG Life Cycle Management actions have been effective in controlling and mitigating SG tubes and internal degradation and as a result there have been no incidents of a SG Tube leak for over 15 years, since 2001, and there has been no new degradation reported in any of Units 1, 5, 6, 7 and 8.

The new degradation detected in the pre-heater top support plate region is limited to Unit 4 SGs 11 and 12 only. This assessment is based on the inspection of all 12 SGs in Unit...
b) Additional inspection and maintenance activities are planned for Unit 4 in 2017 but are being accommodated within the existing generation plan. The full impact, if any, to the generation plan beyond 2017 will not be known until the follow up inspections are completed. However, based on the critical path durations currently in OPG’s plan for reactor component inspections, potential future incremental inspections and maintenance activities could likely be accommodated within the existing generation plan.
Pickering nuke plant extension to cost $307M, may prove ‘uneconomical’: OPG

20.05.2016 Geoff Zochodne 0

The plan to keep the province's oldest nuclear power plant humming until 2024 is being budgeted to cost more than $300 million, yet Ontario Power Generation is hedging in case sticker shock strikes, according to recent financial filings.

The Liberal government said in January it had approved OPG's pursuit of another four years of operation for the Pickering station, from 2020 to 2024. The provincially-owned power company is performing "component condition assessments" to determine what work must be done - or if the plan is even practical.

"There is a risk that the station’s extended operation to 2024 may be determined to be uneconomical to pursue,” stated OPG's first-quarter financial results, which were released last Friday.
Nuclear projects in the province also have a history of running over-budget, including work done at the Pickering plant. The price of restarting two mothballed reactors at the station earlier this century was $2.6 billion, after it was initially estimated that it would cost $1.3 billion to put four of the units back in service.

Environmental advocates have pointed out the Pickering facility, just east of Toronto, is no spring chicken. The province's most recent long-term energy plan expected the station to operate until 2020, and even allowed for an earlier shutdown; OPG says the 2020 date was built around conservative estimates, and that there's an opportunity for a longer life.

A recent inspection also found issues with two of the 12 steam generators in the plant’s Unit 4. The reactor had been taken offline in January for scheduled maintenance, and was anticipated to return to service on Friday, although it had not as of that afternoon.

Meanwhile, the work required to grant Pickering a stay of decommissioning is expected to cost $307 million, OPG says. That does not include the daily costs of running the facility.

“We have estimated additional funding of $307 million from 2016-2020 over and above normal operating costs, to enable extended operations to 2024,” said OPG spokesman Neal Kelly in an email.

The Pickering plant provides about 13 per cent of Ontario’s electricity while producing little to no greenhouse gas emissions – indeed, extending its life could contribute to the Liberal government meeting its climate change goals. And while Environment and Climate Change Minister Glen Murray has been pilloried by the Progressive Conservatives for seemingly questioning whether nuclear would be needed later this century, Premier Kathleen Wynne has reiterated that the power source is part of the government’s long-term energy plan.

A spokesperson for Energy Minister Bob Chiarelli said the government has "no reason to believe that it will be uneconomical to move forward with continued operations at Pickering."

"In January, we approved OPG’s plan to seek regulatory approvals for ongoing operation of Pickering up to 2024," said Dan Moulton in an email. "OPG is in the process of completing confirmatory work and engage with the Canadian Nuclear Safety Commission and the Ontario Energy Board to seek approvals. OPG will seek final government approval to proceed after these activities have been completed."
However, there are concerns about the staying power of the aging Pickering plant. Four of its reactors began producing electricity in the early 1970s, and two of its eight units have been shut down since 1997.

In the foreword to a March, 2016, report arguing for the immediate decommissioning of the plant, the Ontario Clean Air Alliance said Pickering “is operating beyond its original ‘design lifetime’ which came to a close in 2015.

“In other words, systems are being pushed past the operational period for which they were originally designed despite the materials problems caused by the intensely inhospitable environment inside the reactor cores that have taken their toll over years of operation,” added the group.

But OPG has faith in its plan: “OPG is still confident that extending Pickering operations to 2024 is safe, technically feasible and will be economic,” said Kelly.

Greenpeace senior energy analyst Shawn-Patrick Stensil told QP Briefing that the “only way Pickering can continue operating is if the Wynne government and the federal nuclear regulator [Canadian Nuclear Safety Commission] allow OPG to forgo needed safety upgrades and inspections.”

“Keeping Pickering running is not only dangerous but a huge waste of money,” Stensil added. “The government rubber-stamped running these reactors without full cost estimates from OPG and knowing full well the station is the cause of ongoing surplus generation.”

OPG and the province – the company’s sole shareholder – are backing a plan to run all six of Pickering’s operating reactors until 2022, when two units would shut down and four would continue pumping out power to 2024. Doing so, they say, would save electricity customers up to $600 million, prevent eight million tonnes in greenhouse gas emissions, and save 4,500 jobs in Durham Region.

Under Wynne's watch, the province has also committed to a $12.8-billion refurbishment of OPG’s Darlington nuclear plant – which begins later this year – and a $13-billion rebuild by Bruce Power at the facility it leases from OPG (with the latter project's upfront costs to be borne by Bruce Power, recouped through the electricity rates it receives). Keeping Pickering running longer would bridge the gap in base-load electricity during those overhauls, OPG says.

A case for keeping Pickering open past 2020 started to come into focus last year, including arguments made by the Power Workers’ Union (whose members work at
the facility), stating that a life-extension for the plant was a lower-cost option that could plug the hole in base electricity supply.

There are no guarantees OPG will receive regulatory approval from the Canadian Nuclear Safety Commission to operate the Pickering facility past 2018, when the current licence expires. The same goes for the Ontario Energy Board, which sets electricity rates and establishes what costs are eligible to be recovered. OPG said in its first-quarter filing that it is aiming to file a five-year rate application with the OEB this quarter.

In answering questions about electricity rates, the energy minister said last week that the government is “assuming” the Pickering life-extension plan will be approved, “but we can’t 100 per cent assume that at this point.”

Chiarelli told *QP Briefing* in March that OPG will ask the government for a "final" approval for the Pickering extension after all the regulatory hurdles have been cleared. "There's a fairly high confidence level, but we don’t certainly take it for granted," said the energy minister.

This was part of a February, 2016, submission by OPG to the OEB.

OPG stated in a February, 2016, filing to the OEB that the Pickering life-extension plan is “a project that is yet to yield a high confidence result.” The company said in its most recent financial statements that it is still doing assessments to figure out what work needs to be done to keep the plant running to 2024. Initially, Pickering was slated to operate until 2020, but OPG says it must also do more technical work to back that up.

Furthermore, an April, 2016, status report from the Canadian Nuclear Safety Commission (CNSC) says an inspection conducted during a planned maintenance
outage of the plant's Unit 4 reactor “showed significant steam generator tube thinning in a number of tubes since the last outage inspections in Steam Generators 11 and 12, winter 2014 and fall 2011 respectively.”

A page from an April CNSC report on the status of nuclear reactors in Canada.

“The extent of condition carried out by OPG did not show the same tube thinning in the rest of the steam generators,” added the report. “OPG conducted a root cause assessment to determine the thinning mechanism and is working on a return to service plan.”

At an April 7 public meeting, CNSC president Michael Binder asked if the tube thinning would affect the Pickering life-extension plan. An OPG official responded that “we clearly have to address this issue," but that it doesn’t affect the unit’s operation. The issue, the CNSC was told, was “chemistry related." The OPG official said they were taking action.

Pickering’s 500-megawatt Unit 4 had been out of service since Jan. 7, for the aforementioned planned maintenance. Kelly told QP Briefing earlier in May that the unit had been refurbished in the early 2000's, making it one of the plant's newer units, but that all outages are unique.
Kelly said OPG had decided to widen the scope of its work during the maintenance outage because of the lower demand for electricity at this point in the year.

The CNSC said it wouldn’t come back online before mid-April, and OPG was expecting it to be up and running for Friday, although it was not in service as of that afternoon.
GEC Interrogatory #36

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Exhibit F2-2-3, Attachment 2, pg. 9.

OPG’s current licence requires “OPG confirm, in writing, by June 30, 2017 the planned end-of-life date for Pickering.” However, a government representative has said that OPG won’t receive final government approval for the life-extension until after the CNSC hearings. (See: pickering-nuke-plant-extension-to-cost-307m-may-prove-uneconomical-opg.pdf, attached).

In the event OPG doesn’t receive final government approval to operation Pickering until 2024, will OPG submit plans for closing Pickering in 2020 and 2024 as part of its licence application to the CNSC?

Response

OPG’s intent is to apply to the CNSC for a licence that would enable it to operate Pickering to 2022/24 as discussed in Ex. F2-2-3, pages 1 and 3. Please see Ex. L-6.5-8 GEC-21 (b), which explains that no decision on the plant’s service life can be final until the CNSC issues its relicensing decision.
Pickering nuke plant extension to cost $307M, may prove ‘uneconomical’: OPG

20.05.2016 Geoff Zochodne 0

The plan to keep the province's oldest nuclear power plant humming until 2024 is being budgeted to cost more than $300 million, yet Ontario Power Generation is hedging in case sticker shock strikes, according to recent financial filings.

The Liberal government said in January it had approved OPG's pursuit of another four years of operation for the Pickering station, from 2020 to 2024. The provincially-owned power company is performing "component condition assessments" to determine what work must be done - or if the plan is even practical.

“There is a risk that the station’s extended operation to 2024 may be determined to be uneconomical to pursue,” stated OPG's first-quarter financial results, which were released last Friday.
Nuclear projects in the province also have a history of running over-budget, including work done at the Pickering plant. The price of restarting two mothballed reactors at the station earlier this century was $2.6 billion, after it was initially estimated that it would cost $1.3 billion to put four of the units back in service.

Environmental advocates have pointed out the Pickering facility, just east of Toronto, is no spring chicken. The province's most recent long-term energy plan expected the station to operate until 2020, and even allowed for an earlier shutdown; OPG says the 2020 date was built around conservative estimates, and that there's an opportunity for a longer life.

A recent inspection also found issues with two of the 12 steam generators in the plant’s Unit 4. The reactor had been taken offline in January for scheduled maintenance, and was anticipated to return to service on Friday, although it had not as of that afternoon.

Meanwhile, the work required to grant Pickering a stay of decommissioning is expected to cost $307 million, OPG says. That does not include the daily costs of running the facility.

“We have estimated additional funding of $307 million from 2016-2020 over and above normal operating costs, to enable extended operations to 2024,” said OPG spokesman Neal Kelly in an email.

The Pickering plant provides about 13 per cent of Ontario’s electricity while producing little to no greenhouse gas emissions – indeed, extending its life could contribute to the Liberal government meeting its climate change goals. And while Environment and Climate Change Minister Glen Murray has been pilloried by the Progressive Conservatives for seemingly questioning whether nuclear would be needed later this century, Premier Kathleen Wynne has reiterated that the power source is part of the government’s long-term energy plan.

A spokesperson for Energy Minister Bob Chiarelli said the government has "no reason to believe that it will be uneconomical to move forward with continued operations at Pickering."

"In January, we approved OPG’s plan to seek regulatory approvals for ongoing operation of Pickering up to 2024," said Dan Moulton in an email. "OPG is in the process of completing confirmatory work and engage with the Canadian Nuclear Safety Commission and the Ontario Energy Board to seek approvals. OPG will seek final government approval to proceed after these activities have been completed."
However, there are concerns about the staying power of the aging Pickering plant. Four of its reactors began producing electricity in the early 1970s, and two of its eight units have been shut down since 1997.

In the foreword to a March, 2016, report arguing for the immediate decommissioning of the plant, the Ontario Clean Air Alliance said Pickering “is operating beyond its original ‘design lifetime’ which came to a close in 2015.

“In other words, systems are being pushed past the operational period for which they were originally designed despite the materials problems caused by the intensely inhospitable environment inside the reactor cores that have taken their toll over years of operation,” added the group.

But OPG has faith in its plan: “OPG is still confident that extending Pickering operations to 2024 is safe, technically feasible and will be economic,” said Kelly.

Greenpeace senior energy analyst Shawn-Patrick Stensil told QP Briefing that the “only way Pickering can continue operating is if the Wynne government and the federal nuclear regulator [Canadian Nuclear Safety Commission] allow OPG to forgo needed safety upgrades and inspections.”

“Keeping Pickering running is not only dangerous but a huge waste of money,” Stensil added. “The government rubber-stamped running these reactors without full cost estimates from OPG and knowing full well the station is the cause of ongoing surplus generation.”

OPG and the province – the company’s sole shareholder – are backing a plan to run all six of Pickering’s operating reactors until 2022, when two units would shut down and four would continue pumping out power to 2024. Doing so, they say, would save electricity customers up to $600 million, prevent eight million tonnes in greenhouse gas emissions, and save 4,500 jobs in Durham Region.

Under Wynne's watch, the province has also committed to a $12.8-billion refurbishment of OPG’s Darlington nuclear plant – which begins later this year – and a $13-billion rebuild by Bruce Power at the facility it leases from OPG (with the latter project's upfront costs to be borne by Bruce Power, recouped through the electricity rates it receives). Keeping Pickering running longer would bridge the gap in base-load electricity during those overhauls, OPG says.

A case for keeping Pickering open past 2020 started to come into focus last year, including arguments made by the Power Workers’ Union (whose members work at
the facility), stating that a life-extension for the plant was a lower-cost option that could plug the hole in base electricity supply.

There are no guarantees OPG will receive regulatory approval from the Canadian Nuclear Safety Commission to operate the Pickering facility past 2018, when the current licence expires. The same goes for the Ontario Energy Board, which sets electricity rates and establishes what costs are eligible to be recovered. OPG said in its first-quarter filing that it is aiming to file a five-year rate application with the OEB this quarter.

In answering questions about electricity rates, the energy minister said last week that the government is “assuming” the Pickering life-extension plan will be approved, “but we can’t 100 per cent assume that at this point.”

Chiarelli told QP Briefing in March that OPG will ask the government for a "final" approval for the Pickering extension after all the regulatory hurdles have been cleared. "There's a fairly high confidence level, but we don’t certainly take it for granted," said the energy minister.

This was part of a February, 2016, submission by OPG to the OEB.

OPG stated in a February, 2016, filing to the OEB that the Pickering life-extension plan is “a project that is yet to yield a high confidence result.” The company said in its most recent financial statements that it is still doing assessments to figure out what work needs to be done to keep the plant running to 2024. Initially, Pickering was slated to operate until 2020, but OPG says it must also do more technical work to back that up.

Furthermore, an April, 2016, status report from the Canadian Nuclear Safety Commission (CNSC) says an inspection conducted during a planned maintenance
outage of the plant's Unit 4 reactor “showed significant steam generator tube thinning in a number of tubes since the last outage inspections in Steam Generators 11 and 12, winter 2014 and fall 2011 respectively.”

A page from an April CNSC report on the status of nuclear reactors in Canada.

“The extent of condition carried out by OPG did not show the same tube thinning in the rest of the steam generators,” added the report. “OPG conducted a root cause assessment to determine the thinning mechanism and is working on a return to service plan.”

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Pickering’s 500-megawatt Unit 4 had been out of service since Jan. 7, for the aforementioned planned maintenance. Kelly told QP Briefing earlier in May that the unit had been refurbished in the early 2000’s, making it one of the plant's newer units, but that all outages are unique.
Kelly said OPG had decided to widen the scope of its work during the maintenance outage because of the lower demand for electricity at this point in the year.

The CNSC said it wouldn’t come back online before mid-April, and OPG was expecting it to be up and running for Friday, although it was not in service as of that afternoon.
**GEC Interrogatory #37**

**Issue Number: 6.5**

**Issue:** Are the test period expenditures related to extended operations for Pickering appropriate?

**Interrogatory**

**Reference:**


OPG states that an updated Periodic Safety Review, which evaluates the station against modern standards, will be required in advance of the 2018 re-licensing hearings. A briefing note with respect to OPG’s decision to forgo refurbishing the Pickering B reactors in 2010 said “The CNSC requirement to review as built plant standards versus modern standards every ten years results in the potential for significant plant upgrades in the future.” It states that the continued operation of Pickering in a targeted population growth area “carries the potential for significant regulatory sanction in response to public intervention.” (See: 2010 Pickering Closure Briefing Note - FOI(1).pdf, attached)

a. Please describe when and how safety upgrades and enhancements will be identified and gain CNSC approval?

b. Has OPG identified any plant upgrades that may be required in response to Periodic Safety Review? If so, please describe them and their cost.

c. Please describe how cost benefit decisions are made regarding possible plant upgrades. Please provide copies of any CNSC or OPG policies that guide such decisions.

d. OPG’s “Technical and Economic Assessment of Pickering Extended Operations beyond 2020” states there is a medium risk that the results of this updated assessment may require physical modifications to the plant. Please define medium risk and quantify the potential costs. Has this assessment of media risk changed since this document was produced in October 2015?

e. Please provide a list reports or analysis OPG must submit to CNSC staff before the 2018 licence renewal hearings to meet the requirements for a Period Safety Review. What percentage of these submissions has been completed?

f. Please explain why “Management is confident that a list of reasonable and practicable safety enhancements can be reached with the CNSC staff in view of the 4 years of additional operation that is sought”? Please explain how “the 4 years of additional operation that is sought” would impact decisions on safety enhancements. How does the length of additional operation affect the list?
g. Did the CNSC impose additional (i.e. unplanned by OPG) licence conditions or safety enhancements during the 2013/2014 Pickering licence renewal? If so, please describe these conditions and their associated costs.

h. Did OPG reach an agreement with the CNSC regarding safety enhancements when it proposed to operate Pickering to 2020 before the 2013 licence renewal hearings. If so, what was that agreement?

Response

(a) OPG declines to provide the requested information on the basis of relevance. This interrogatory seeks information on matters that are within the CNSC’s regulatory jurisdiction and that are not relevant to deciding any issue on the approved Issues List in OPG’s application to set payment amounts.

(b) Work associated with the Periodic Safety Review (PSR) in support of the 2018 relicensing process is currently in progress and has not been finalized at this time (see L-6.5-1 Staff-119, part (b)). As a result, a list of potential modifications is not available and cannot be provided.

c) As part of OPG’s aging management program, components are reviewed for fitness for service/aging degradation. This includes safety-related components. Options are evaluated using a systematic risk based approach that takes into consideration costs while ensuring the safety and reliability of plant components and systems are maintained. Potential improvements identified as part of the PSR process will follow a risk-based approach to ensure potential improvements are reasonable and practicable.

d) Medium risk is typically characterized between 30% and 70% probability. Cost estimates for potential modifications were developed as part of the economic assessment to extended operations (see Ex. F2-2-3 Attachment 2 p. 22). In addition, project spending was increased to return to normal levels pre-2020 to accommodate potential modifications (see Ex. F2-2-3 Attachment 2, p. 6 Table E2). The assessment of medium risk has not changed.

(e) OPG declines to provide the requested information on the basis of relevance. This interrogatory seeks information on matters that are within the CNSC’s regulatory jurisdiction and that are not relevant to deciding any issue on the approved Issues List in OPG’s application to set payment amounts.

(f) OPG’s nuclear facilities are already safe and existing programs and processes monitor performance to ensure safety and reliability is maintained (refer to part c). Adding 4 years of additional operation can bring into play some components which would not have had to be replaced otherwise. In this situation, a replacement system or a reverse-engineered component would need to be implemented. OPG has had success with both of these approaches.
(g) OPG declines to provide the requested information on the basis of relevance. This interrogatory seeks information on matters that are within the CNSC’s regulatory jurisdiction and that are not relevant to deciding any issue on the approved Issues List in OPG’s application to set payment amounts.

(h) OPG declines to provide the requested information on the basis of relevance. This interrogatory seeks information on matters that are within the CNSC’s regulatory jurisdiction and that are not relevant to deciding any issue on the approved Issues List in OPG’s application to set payment amounts.
Briefing Note

Issue:

The OPG Board of Directors approved a recommendation by OPG management to extend the nominal life of the Pickering B units instead of refurbishing them at this time.

Summary:

On November 19, 2009, the OPG Board of Directors approved taking initiatives to extend the nominal life of the Pickering units (referred to as Continued Operations), and not to refurbish the Pickering B units at this time.

In providing this recommendation to the Board, OPG management assessed the technical, regulatory, financial, and schedule implications of the options.

OPG Decision Framework:

The recommendation by OPG management was based on analyses of several factors, namely:
- cost effectiveness
- technical feasibility based on plant condition
- regulatory impacts, and
- schedule

The outcome of the analyses of each of these factors is provided below:

Cost Effectiveness:

- Significant investments would be required to mitigate regulatory risks associated with extending the life of the units beyond 2016. The costs would result from the need to perform increased maintenance and inspections.

- The refurbished units retain a significant risk of less than optimal performance post refurbishment.

- Comparative analysis showed that operating costs for the units would be high relative to industry standards due to design complexity.
• The complexity of the plant results in more people being required to operate it when compared to the industry at large.

• The cost to refurbish the units would be approximately $10.7 billion, or $2 billion per unit plus a contingency.

• This compares to 2008 estimates for refurbishment of Bruce power units at $1.7 billion per unit, and Point LePreau at $1.1 billion.

• The cost of all electricity produced over the life of the refurbished units was estimated to be about 9.6 cents per kilowatt hour.

• By comparison, estimates for electricity costs produced by refurbished Darlington units show less than 8 cents per kilowatt hour.

• Cost benefit analysis showed that little safety improvement would have been derived as a result of investing 100 M dollars would result in little safety improvement.

**Technical feasibility based on plant condition:**

• The plant design, in addition to being complex, the units are small and include a large number of components relative to today’s designs. Pickering B units are nominally 515 MW, compared to Darlington at 881 MW, or new build designs at approximately 1,000 MW or larger.

• There exists high potential for discovery of defects which could make refurbishment unfeasible.

**Regulatory impacts:**

• As an older design, the Pickering B units do not meet modern standards. For example, whereas modern plants may contain dual safety trains, the Pickering unit safety units are typically single trains. This has the potential to present regulatory challenges in the future. This would result in significant ongoing regulatory scrutiny.

• The CNSC requirement to review as built plant standards versus modern standards every ten years results in the potential need for significant plant upgrades in the future.

• The ability to continue to operate for 30 years in a targeted population growth area (as defined by the Province of Ontario) also carries the potential for significant regulatory sanction in response to public intervention.
Schedule impacts:

- Shutting the Pickering B units down for refurbishment at their end of nominal life would result in a significant impact on the overall availability of OPG's fleet to meet power demands at a time when a number of the Province's units would also be shut down for refurbishment.

- The time frame for the shut down of the Pickering units would overlap with the shut down of both the Darlington and Bruce units due to the need to procure steam new generators. Steam generator procurement requires a 5-6 year lead time.

Background:

- Pickering B units (5 – 8) were initially placed in service in 1983 – 1986 with a nominal life expectancy of 30 years based on pressure tube life.

- The current predicted nominal end of service life is 2014 – 2016 for the units

- OPG, in response to a government directive of 2006, began the assessment of the feasibility of refurbishing existing nuclear plants as well as the environmental assessment of the impacts of refurbishing Pickering B.

- The feasibility studies on Pickering B have progresses significantly allowing OPG management to develop an improved understanding of the regulatory requirements, environmental impacts, scope of the project and refurbishment costs.

- OPG management has explored the Continued Operation of the Pickering B units for an additional 4 years beyond their current nominal operating lives and is of the view that continued operation is possible with additional investments

- Realization of this option would be of significant benefit to Ontario's electricity system during the 2014 – 2020 period when significant refurbishments will be occurring across the fleet.
**MEI Staff Position**

- After discussing OPG’s rationale and review of the decision making framework, MEI staff concurred with OPG on their decision to continue to operate the Pickering B units and not refurbish them at this time.

Prepared by: Cedric Jobe (5-6545)  
Director, Nuclear Supply Branch  
January 08, 2010

Approved by: Rick Jennings  
ADM, Office of Energy Supply, Transmission and Distribution  
January 08, 2010.
## GEC Interrogatory #38

**Issue Number:** 6.5

**Issue:** Are the test period expenditures related to extended operations for Pickering appropriate?

**Interrogatory**

**Reference:**

Please provide Pickering's total allocated operating costs between 2015 and 2024.

**Response**

Pickering actual and projected total allocated operating costs between 2015 and 2021 are provided below in Chart 1. OPG declines to provide annual operating costs between 2022 and 2024 as they are outside the test period and are not relevant to any issue on the approved Issues List for this application. See Ex. L-6.5-1 Staff-118 for aggregate 2022-2024 costs.

### Chart 1

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<td>Total Actual Operating Costs</td>
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<td>Total Planned Operating Costs per Board Staff # 116</td>
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<td>Inventory Obsolescence</td>
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<td>Pickering portion of Tritium Removal Facility</td>
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<td>12</td>
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<td>12</td>
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<td>Asset User Fees</td>
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<td>(15)</td>
<td>(15)</td>
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<td>(11)</td>
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<tr>
<td><strong>Total Operating Costs</strong></td>
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<td>1,476</td>
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<td>1,471</td>
<td>1,527</td>
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</tbody>
</table>
GEC Interrogatory #39

Issue Number: 6.5
Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Please provide Pickering’s projected non-fuel operating costs between 2015 and 2024.

Response
Pickering actual and projected non-fuel operating costs between 2015 and 2021 are provided in Chart 1 below. OPG declines to provide annual non-fuel operating costs between 2022 and 2024 as they are outside the test period and are not relevant to any issue on the approved Issues List for this application. See Ex. L-6.5-1 Staff-118 for aggregate 2022-2024 costs.

Chart 1

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<thead>
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<td>Total Operating Costs per GEC Interrogatory #038</td>
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<td>1,476</td>
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<td>Capital Costs per SEC Interrogatory #63 for 2017-21</td>
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<td>Fuel Costs per GEC Interrogatory #038</td>
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<td>(114)</td>
<td>(116)</td>
<td>(117)</td>
<td>(120)</td>
<td>(118)</td>
<td></td>
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<tr>
<td>Total Non-Fuel Operating Costs</td>
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<td>1,249</td>
<td>1,275</td>
<td>1,331</td>
<td>1,372</td>
<td>1,327</td>
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**GEC Interrogatory #40**

**Issue Number:** 6.5  
**Issue:** Are the test period expenditures related to extended operations for Pickering appropriate?

**Interrogatory**

**Reference:**

Please provide Pickering’s non-fuel operating costs by year since it began operating.

**Response**

Consistent with OPG’s conduct in EB-2007-0905, EB-2010-0008 and EB-2013-0321, historical information for the period prior to 2005 is not provided. The information from before 2005 is not relevant as OPG was not regulated prior to April 1, 2005.

In issuing an earlier version of the filing guidelines for OPG’s prescribed facilities (EB-2006-0064), the OEB stated:

> OPG, along with some other stakeholders, submitted that data should not be required for 2004 or earlier years, as proposed in staff’s discussion paper. As the current payment regime was implemented in April 2005, these stakeholders questioned the relevance of 2004 and pre-2004 information. OPG, for its part, also indicated that providing the information would be a significant burden for it. The Board has accepted these submissions, and has not included information relating to 2004 or earlier years in the Filing Guidelines.


Pickering actual non-fuel operating costs between 2012 to 2015 are provided in Chart 1 below. For the period prior to 2012, Pickering A and Pickering B were run as separate stations before being amalgamated in 2011.

**Chart 1**

<table>
<thead>
<tr>
<th>Pickering ($M)</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
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<tbody>
<tr>
<td>Total Non-Fuel Operating Costs</td>
<td>1,144.5</td>
<td>1,149.8</td>
<td>1,148.2</td>
<td>1,144.8</td>
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</table>

Witness Panel: Nuclear Operations and Projects
**GEC Interrogatory #41**

**Issue Number: 6.5**

**Issue:** Are the test period expenditures related to extended operations for Pickering appropriate?

**Reference:**
Exhibit F2-2-3, Attachment 2 page 5 says “data was provided to the IESO in December 2014 and again in October 2015 to facilitate the completion of an independent system economic value analysis.”

Please provide the information OPG provided to the IESO in December 2014 and October 2015.

**Response**
Refer to L-6.5-1 Staff–126.
**GEC Interrogatory #42**

**Issue Number: 6.5**

**Issue:** Are the test period expenditures related to extended operations for Pickering appropriate?

**Interrogatory**

**Reference:**
Exhibit F2-2-3, Attachment 2 page 5 says the value of operating Pickering beyond 2020 ranges from $0.5 billion to $0.6 billion. In contrast, in its 2013 application, EB-2013-0321, in F2-2-3, Schedule 3, OPG stated it estimated the net present value of operating Pickering to 2020 to be “approximately $520 million (2012 PV dollars).”

a. Please convert each of these estimates to 2016 dollars.

b. Using actual electricity demand since 2013 and current forecasts until 2020, please provide an updated estimate of the net present value of operating Pickering until 2020 using the same methodology used in EB-2013-0321 F2-2-3, Schedule 3 (i.e. holding other factors constant).

**Response**

(a) and (b):

OPG declines to provide the requested information on the basis of relevance. This interrogatory seeks an update of OPG’s analysis of operating Pickering to 2020 that was presented in EB-2013-0321. This analysis has been superseded by the evidence filed in this application and is not relevant to any issue in this proceeding. The OEB has previously held that the decision on how long to operate Pickering is not within its jurisdiction (See Decision on Issues List, September 23, 2016, page 7). OPG’s evidence presents its current estimate of the costs to operate Pickering in the test period (2017 through 2021) in detail.
GEC Interrogatory #43

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:

In EB-2013-0321 F2-2-3, Attachment 2 OPG filed the Ontario Power Authority’s assessment of the prudency of operating Pickering until 2020. It stated: “On balance, the OPA’s assessment of system cost impacts suggests an expected cost advantage to Pickering continued operation (in the order of approximately $100 Million). This advantage predominately reflects expected costs savings from reduced natural gas-fired energy production and lower replacement capacity requirements. Based on evaluation to date of the broader uncertainties, the OPA estimates a range of up to approximately $1.3 billion in potential net-benefit from Pickering continued operation to $0.76 billion in potential net-cost (dis-benefit). These estimates represent illustrative bookends and explore combinations of factors that together would increase or decrease the cost impacts of Pickering continued operations."

In EB-2013-0321, F2-2-3, Schedule 3, OPG’s 2012 assessment of the Pickering continued operation estimates the net present value to be “approximately $520 million (2012 PV dollars)."

In contrast, EB-2010-0008, Exhibit F2-2-3, Attachment 2 states: “Depending on the amount of gas-fired generation or similarly-priced imports replaced by Pickering NGS generation, the overall system benefit could be up to 1.6 B$ (104 TWH multiplied by 15 $/MWh) due to the reduction of system costs."

a. Please provide a table comparing the demand forecasts used in the OPA’s reviews of operating Pickering until 2020 filed in the past cases against actual demand and current forecasts.

b. Based on actual demand and current demand forecasts until 2020, is the continued operation of Pickering until 2020 a net system benefit or dis-benefit according to the OPA’s earlier assessments?

c. Please define “system benefit” as used in these assessments. In answering this question please describe any differences between OPG and the OPA/IESO’s definition of system benefit and explain if and how OPG and/or the OPA/IESO’s definitions of “system benefit” have changed since the earlier assessments.

Witness Panel: Nuclear Operations and Projects
Response

The following response has been prepared by the IESO:

a.  EB-2010-0008 – To our best recollection, the following forecasts were used in EB-2010-0008, Exhibit F2-2-3

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b.  EB-2013-0321 – The following forecasts were used in EB-2013-0321, F2-2-3

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### Net Energy (TWh)

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<td>165</td>
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#### iii) Historical Actual Demand

The actual weather corrected demand for the province of Ontario from 2011-2015 is shown in the table below.

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<td>24,804</td>
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iv) Ontario Planning Outlook (OPO)

The following forecasts were used in the published Ontario Planning Outlook (OPO). The OPO documents can be found [here](http://www.ieso.ca/Pages/Ontario's-Power-System/Ontario-Planning-Outlook/default.aspx).

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b. The IESO’s most recent outlooks for long-term electricity demand are described in the Ontario Planning Outlook at [http://www.ieso.ca/Pages/Ontario's-Power-System/Ontario-Planning-Outlook/default.aspx](http://www.ieso.ca/Pages/Ontario's-Power-System/Ontario-Planning-Outlook/default.aspx) and are summarized in the tables immediately above (in response “b.iv.”). The IESO has not updated its assessment of Pickering continued operations to reflect these updated electricity demand outlooks or other recent developments such as the cancellation of the Large Renewables Procurement II Request for Qualifications process, introduction of the Climate Action Plan, etc.
c. Exhibit F2/T2/S3/Attachment 1, Page 58 of 116 describes the approach taken by the IESO in its economic evaluation of Pickering extended operation options and provides context for the expression “system benefit”. In brief, the cost of extending Pickering life was compared to the savings resulting from reduced electricity system replacement energy and capacity costs relative to a base case where Pickering operated until 2020. If the estimated cost of Pickering extended operation was less than the estimated cost of replacement energy and capacity, a net benefit was the result. Conversely, if the estimated cost of Pickering extended operation was more than the estimated cost of replacement energy and capacity, a net cost or ‘dis-benefit” was the result. The expression “system benefit” in this context refers to any cost savings that might result from extended Pickering operation. System benefits can be compared against system costs to derive an estimate of net system benefits or dis-benefits. Other types of system benefits were also identified, but were not economically quantified. These include carbon emission reductions and some coverage during a period of supply system change and risk.

To the IESO’s knowledge, OPA/IESO’s current approach for assessing benefits of extended Pickering operations is consistent with the approach take in earlier assessments. Also to the IESO’s knowledge, there are differences of detail between the IESO and OPG’s assessments. Items of difference include discount rate assumptions, supply/demand outlooks and natural gas price assumptions (for example, as indicated at F2/T2/S3/Attachment 2, Page 18 of 22).
GEC Interrogatory #44

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Has the decision to delay the refurbishment of a Bruce reactor from 2016 until 2020 changed the system benefit or dis-benefit of operating Pickering until 2020. Please explain.

Response

The following response has been prepared by the IESO:

All else being equal, the decision to defer the refurbishment of Bruce from 2016 to 2020 would tend to reduce the benefit of Pickering operating until 2020. However, this is expected to be offset by the value Pickering provides in the period beyond 2020. Further, the benefit of Pickering operations to 2020 should be assessed in the context of overall changes in system demand and supply conditions.
Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:

Please provide a table showing how much of Pickering’s output has been surplus generation since 2010 and how much is forecast to be surplus until 2024.

Response

The following response has been prepared by the IESO:

Surplus baseload generation is often defined as the sum of: all available nuclear, must-run hydroelectric, constrained-on generation, self-scheduling, commissioning, intermittent and variable (including wind and solar) generation compared with the expected demand. Since this is an aggregate metric, all of the nuclear units with similar operating preferences are lumped together making any isolation of Pickering’s specific contribution subjective and open to interpretation. Additionally, supply and demand must be constantly kept in balance to maintain the safety and reliability of the power system. As such, in real-time there are numerous mitigating actions taken to ensure that no generation is surplus, i.e. supply and demand is balanced.
**GEC Interrogatory #46**

**Issue Number:** 6.5

**Issue:** Are the test period expenditures related to extended operations for Pickering appropriate?

**Interrogatory**

**Reference:**

What work is being delayed or could be delayed until such time as the Canadian Nuclear Safety Commission approves the safety case for operating Pickering until 2024.

**Response**

The work that is being done now is to enable OPG to file its relicencing application with the CNSC and to confirm the technical ability of Pickering to operate to 2022/24. This work cannot be delayed if OPG is to file its CNSC relicensing application in time to receive a new operating licence by August 31, 2018, the date that the current licence expires.
GEC Interrogatory #47

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Based on regulatory guide:
CNSC Regulatory guide REGDOC-2.3.3, Periodic Safety Reviews, (http://nuclearsafety.gc.ca/pubs_catalogue/uploads/REGDOC-2-3-3-Periodic-Safety- Reviews-eng.pdf) says the following documentation must be submitted to the CNSC:

- PSR basis document
- reports on the review of each safety factor(safety factor reports)
- global assessment report (GAR)
- integrated implementation plan (IIP)

Please provide a timeline for the submission of these documents. If the documentation has been submitted, please provide copies. Please indicate whether CNSC has accepted any submitted documentation.

Response

OPG declines to provide the requested information on the basis of relevance. This interrogatory seeks information on matters that are within the CNSC's regulatory jurisdiction (being technical information related to approval of the operation of Pickering) and that are not relevant to deciding any issue on the approved Issues List in OPG's application to set payment amounts.
Canadian Nuclear Safety Commission
P.O. Box 1046, Station B
280 Slater Street
Ottawa, Ontario K1P 5S9
Fax: (613) 995-5086

Commission canadienne de sûreté nucléaire
C.P. 1046, Succursale B
280, rue Slater
Ottawa (Ontario) K1P 5S9
Télécopieur: (613) 995-5086

JUL 06 2015

Mr. Shawn-Patrick Stensil
Energy and Climate Campaigner
Greenpeace Canada
33 Cecil St.
Toronto, ON M5T 1N1

Dear Mr. Stensil:

This letter is in response to your request under the Access to Information Act for:

"a copy of the letter president Binder sent to industry stakeholders regarding the CNSC’s regulatory framework in December 2014."

Enclosed please find copies of all the accessible records you requested.

You have the right to file a complaint with the Information Commissioner of Canada about this aspect of the processing of your request for a period of 60 days following the receipt of this notice. The address is:

Information Commissioner of Canada
30 Victoria Street
Gatineau, Québec
K1A 1H3

If you have any questions regarding this request, do not hesitate to contact Yvonne Robinson, at 613-944-1973.

Sincerely,

Philip Dubuc
Senior Advisor
Access to Information and Privacy

Attach. pp. 1-20
DEC 16 2014

Mr. Frank Saunders  
Vice President Nuclear  
Oversight and Regulatory Affairs  
Bruce Power  
P.O. Box 1540  
B10 4th floor W  
Tiverton ON N0G 2T0

Ms. Laurie Swami  
Senior Vice President, Decommissioning and Nuclear Waste Management  
Ontario Power Generation  
1340 Pickering Parkway  
P84-4  
Pickering ON L1V 0C4

Mr. Sean Granville  
Site Vice President and Chief Nuclear Officer  
Point Lepreau Generating Station  
New Brunswick Power  
PO Box 600  
Lepreau NB E5J 2S6

Dear Mr. Saunders, Ms. Swami and Mr. Granville,

Thank you for your letters of November 20, December 4 and December 11, 2014 (enclosed). The CNSC welcomes feedback on its regulations and regulatory documents, as well as on our processes to develop them. I particularly appreciate the nuclear power industry’s active engagement in the CNSC’s efforts to clarify our regulatory framework.

As you noted, over the past several years, the CNSC has undertaken a concerted effort to document and clarify regulatory expectations. To be blunt, when I arrived at the CNSC in 2008, there was no clear idea of how many CNSC regulatory documents were in force (recall the old collection of R-, S-, P-, G-, C-documents, etc. I was told there were more than 150 such documents). There were also very few references to industry standards in our licences. Furthermore, there were literally hundreds of exchanges between our specialists that were, de facto, regulatory in nature, leading to inconsistent and unclear regulatory expectations.

Recognizing the critical importance of having clear, documented regulatory expectations, we set out to develop a modern regulatory framework to replace an old and inconsistent set of documents; clarifying the role of documents in our licences and dealing with significant new events, including 9/11, new build, refurbishment and the more recent accident at the Fukushima Daiichi nuclear power plant. This led us to develop a comprehensive framework of 56 REGDOCs, allowing us to better identify and resolve areas of duplication and overlap.

Furthermore, we have structured the framework to be on a five year cycle, where each REGDOC will be reviewed regularly to ensure its ongoing relevance. This schedule is available on our website and is regularly updated. It provides a transparent roadmap to plan future work. Once the first cycle is complete, we expect future revisions to be significantly simpler and less onerous.
In developing regulatory documents, the CNSC puts particular emphasis on ensuring its processes are transparent and that its public consultation and stakeholder engagement activities are robust. Consultation activities— including posting all comments received on regulatory initiatives for additional feedback from stakeholders, as well as publicly addressing all comments received— go above and beyond the standard practice for federal regulators. The CNSC adopted this practice to recognize that extensive stakeholder input is necessary to meet the standard of clear regulatory expectations. To support this work, the CNSC has begun issuing discussion papers to facilitate early stakeholder engagement, allowing early input on regulatory approaches and potential impacts on licensees.

I am particularly interested in your comment about a regulatory impact analysis-like statement. Moving forward, I have asked staff to explore this, and to continue their efforts to improve our engagement practices with all stakeholders throughout the development process, with a particular emphasis on opportunities for early engagement on new initiatives. In addition, they will be following up with you to discuss and explore your work to develop consistent means for estimating costs and benefits of regulatory proposals. Finally, the CNSC will be exploring opportunities to clearly outline regulatory objectives and estimated impacts of new initiatives. In return, it is incumbent on you, and all our stakeholders, to provide clear and specific feedback that can help us refine, or revisit, our initial assumptions and objectives.

In conclusion, the CNSC owes it to the regulated community, and to all Canadians, to provide clear, documented and comprehensive regulatory expectations. Leveraging the licence conditions handbooks to reference a comprehensive suite of regulatory documents will help ensure that all licensees have a common understanding of what is expected of them, providing a solid foundation for ensuring a balanced, consistent and responsive regulatory oversight for many years into the future.

Yours sincerely,

Michael Binder

Enclosure:  

C.C.: Ramzi Jammal, CNSC
      Terry Jamieson, CNSC
      Jason Cameron, CNSC
      Brian Torrie, CNSC
      Greg Rzentkowski, CNSC
November 20, 2014

NK21-CORR-00531-11731
NK29-CORR-00531-12120

Dr. M. Binder
President and CEO
Canadian Nuclear Safety Commission
P.O. Box 1046
280 Slater Street
Ottawa, Ontario
K1P 5S9

Dear Dr. Binder:

Development of New Regulatory and Guidance Documents

In response to your request for feedback on CNSC processes, the purpose of this letter is to provide constructive comment on the CNSC process for development of new regulatory requirements and guidance documents.

In recent years, the CNSC has made a concerted effort to clarify regulatory requirements and further enhance nuclear safety by implementing a plan to document the regulatory framework, thus providing regulatory direction in each of the safety and control areas. Included among the clarifications are amendments to several CNSC regulations, but also a large and growing number of regulatory and guidance documents [1]. As a result, in the last Power Reactor Operating Licences issued to Bruce Power in 2009, 20 new or revised CSA Standards and CNSC Regulatory Documents were adopted in the licence and currently there are an additional 25 new or revised CSA Standards and CNSC regulatory documents under review for inclusion in the 2015 licence renewal.

There has been a 10 fold increase in the number of CNSC regulatory documents incorporated into the licences since 2004, which results in significant management effort to track compliance. We note that the current CNSC practice of adding chapters of new requirements to existing CNSC regulatory documents only complicates this issue further. The large number of new requirements included in regulatory documents also results in significant additional resource demands on Licensees. The resource impact normally occurs in one of three ways:

- Incremental one-time costs to establish or install a new or upgraded capability required by the document.
- Ongoing direct costs that are required to maintain the capability year over year.
- Overhead costs that are required to place the document as a regulatory requirement within the managed system, demonstrate ongoing compliance, control changes, monitor performance, report on results, and support CNSC staff inspections.

Bruce Power  Frank Saunders  Vice President - Nuclear Oversight and Regulatory Affairs
P.O. Box 1540  B10  4th Floor W  Tiverton ON  N0G 2T0
Telephone 519 361-5025  Facsimile 519 361-4559
frank.saunders@brucepower.com

A0047180_3-000063
Over the last 10 years new regulatory documents have resulted in incremental one-time costs to Bruce Power measured in the hundreds of millions as well as ongoing year over year costs to maintain the capability measured in several tens of millions. The nuclear industry, as demonstrated by its excellent safety record, fully supports the improvements to health and safety, security, and the environment that is the intended purpose of regulatory documents but the efficiency and effectiveness of such controls is also important. Resources have finite limits so increased cost may result in the diversion of resources from other areas or ultimately may result in increased costs to the Canadian public. Bruce Power has never resisted making investments that are reasonably expected to improve the safe, reliable operations of the Bruce Power Site. However, we want to ensure, that as the regulatory process evolves, that these resources are being focused in the right areas and effectively deployed.

Many documents have now been issued under the current approach but many more are planned for issue under the regulatory document framework plan. Bruce Power believes that this is an appropriate time to reflect on this process and based on our own review and experience offer the following high level comments and observations for consideration:

- To our knowledge there is no equivalent in the current CNSC regulatory document process to the Regulatory Impact Analysis Statement (RIAS) which explains what a regulatory proposal is intended to address, what it is intended to achieve, and what are the benefits and costs [2]. The RIAS assesses the potential impacts to “health and safety, security, the environment, and the social and economic well-being of Canadians” [3]. We would argue that given the significant impact of these documents there should be a demonstrable benefit to health, safety, security, or the environment before any regulatory document is developed. The relationship between the added safety, or other value and the implementation effort is not clear or frequently even discussed in the current regulatory document process.

- Only infrequently is there a period early in the process where directly affected stakeholders can discuss the benefits and cost implications of the documents. Recent efforts to hold workshops on new documents go some way towards fulfilling this need, but the emphasis must be on early involvement. In our view this implies before irreversible decisions are made regarding the need for and content of regulatory and guidance documents. Documents that have been shared publicly do not fall within our definition of early because our experience has shown that for the most part the decision to proceed in some form becomes irreversible at this point. There is an over reliance on external parties for the submission of cost-benefit information through public consultation or Commission proceedings rather than through early fact finding. Many documents reach the public consultation period with significant errors still present. Early assessment of regulatory proposals would allow for the streamlining of approval processes and the proper allocation of resources.

- It is frequently not clear what prompted the development of the CNSC regulatory and guidance documents, what gap the documents are intended to fill, or what safety or other benefit will be gained. The benefits of the regulatory proposal should be considered as well as potential alternatives including no regulatory action where other alternatives are shown to be effective.
Increasingly, regulatory documents go well beyond simply establishing requirements and include detailed discussion about how to meet the requirements. This reduces Licensees ability to determine the most cost effective manner of implementation or adds cost to demonstrate another method is equally effective.

Central to the establishment of new regulatory documents must be the assurance that the regulatory proposals will result in the greatest overall benefit to Canadians. Based on our observations above we recommend that the CNSC:

- Introduce a process similar or equivalent to the Regulatory Impact Analysis Statement into the CNSC regulatory document process to ensure it is clear what the regulatory document is intended to address, what it is intended to achieve, and what are the benefits and costs.
- Require a period early in the process before decisions are made, especially for significant documents, where directly affected stakeholders can discuss the benefits and cost implications of the planned document as an input to the process.
- Assess the potential impacts to health and safety, security, the environment, and the social and economic well-being of Canadians when reviewing regulatory documents for final approval by requiring the presentation of information that clearly specifies and quantifies all new requirements and the potential positive and negative impacts of the regulatory document.

Industry is currently working to develop a consistent way of estimating impacts and cost across all licensees and would be interested in discussing how CNSC staff currently accomplish this as well as sharing our approach. We would also like to reinforce the value in applying a sober second thought to the need for the development of new regulatory requirements and guidance documents. The list of proposed documents is growing at a pace that is making it increasingly difficult for industry to respond.

If you require further information or have any questions regarding this submission, please contact myself, at (519) 361-5025.

Yours truly,

Frank Saunders
Vice President Nuclear Oversight and Regulatory Affairs
Bruce Power

cc: R. Jammal                CNSC Ottawa
    T. Jamieson               CNSC Ottawa
    J. Cameron               CNSC Ottawa
    G. Rzentkowski           CNSC Ottawa
    K. Lafrenière            CNSC Ottawa
    CNSC Bruce Site Office (Letter only)
References:


December 4, 2014

CD# N-CORR-00531-07346

Dr. M. Binder
President and CEO
Canadian Nuclear Safety Commission
P.O. Box 1046
280 Slater Street
Ottawa, Ontario
K1P 5S9

Dear Dr. Binder:

**Development of New Regulatory Documents**

The purpose of this letter is to provide comments and recommendations on the Canadian Nuclear Safety Commission (CNSC) process for development of new regulatory requirements, guidance and documents.

With the goal of enhancing nuclear safety and documenting CNSC expectations and requirements, in recent years the CNSC has put substantial effort into better documenting the regulatory framework as noted in the CNSC Forward Regulatory Plan 2014-16 [1], by providing regulatory direction in each of the safety and control areas.

OPG has actively participated in the regulatory framework improvement initiative currently underway and offers the following recommendations for your consideration:

1) CNSC should implement a cost benefit analysis similar to the Regulatory Impact Analysis Statement [2];

2) Regulatory documents should be streamlined to provide requirements only without providing details on how to implement the requirements;

3) CNSC should prioritize new regulatory documents in the context of the existing and planned safety initiatives to ensure priority is on addressing the improvements with the greatest net benefit to Canadians.

OPG has always supported making investments that are reasonably expected to improve the safe, reliable operations of our nuclear facilities. The Canadian nuclear industry's demonstrated excellent safety record is evidence of our support for the improvements to health and safety, security, and the environment that is the intended purpose of regulatory documents, but the efficiency and effectiveness of such controls is also important.
In fact, OPG and the Canadian utilities are active members of industry organizations which look to best practices for implementation of programs to continuously improve safety performance. These benchmarking activities provide us ample opportunity to define how to implement these safety improvement activities.

The CNSC initiative to more fully document the regulatory framework has resulted in a significant increase in the amount of regulatory and guidance documents [3] with more planned for issue in the near future (see Attachment A). As examples, in the Power Reactor Operating Licence (PROL) issued for the Pickering Nuclear Generating station in 2013, a total of eleven new or revised CSA Standards and CNSC Regulatory Documents were adopted in the licence, and currently approximately twenty new or revised CSA Standards and CNSC Regulatory Documents (REGDOCs) are proposed for inclusion in the 2015 Darlington licence on its renewal. Each of these new regulatory documents have resulted in increased requirements and costs.

OPG has consulted with our peer NPP licensees on this issue, and we would like to offer the following observations on the existing process:

- Increasingly, regulatory documents go well beyond simply establishing requirements and include detailed discussion about how to meet the requirements. This reduces licensees’ ability to determine the most cost effective manner of implementation or adds cost to demonstrate effectiveness of an alternative.

- We believe that given the significant impact of CNSC’s REGDOCs there should be a documented and demonstrable benefit to health, safety, security, or the environment before any regulatory document is developed. To industry’s knowledge there is no equivalent in the current CNSC regulatory document process to the Regulatory Impact Analysis Statement (RIAS) [2]. The RIAS assesses the potential impacts to “health and safety, security, the environment, and the social and economic well-being of Canadians”.

- Only infrequently is there a period early in the process where stakeholders can discuss the benefits and cost implications of the documents. CNSC appears to rely on public consultation for the submission of cost-benefit information rather than through early fact finding.

- It is frequently not clear what prompted the development of the CNSC regulatory and guidance documents, what gap the documents are intended to fill, or what safety or other benefit will be gained.

- The large number of new requirements included in REGDOCs results in significant additional resource impacts on licensees. The resource impact normally occurs in one or more of three ways:
  - Incremental one-time costs to establish a new or upgraded capability required by the document.
  - Ongoing direct costs to maintain the capability year over year.
  - Overhead costs to administer the program, demonstrate compliance, and monitor and report on results.

Based on our observations as noted above we recommend the following:
1) The CNSC should assess the potential impacts to health and safety, security, the environment, and the social and economic well-being of Canadians when reviewing regulatory documents for final approval. This could be done by requiring the presentation of information that clearly identifies what problem the regulatory document is intended to address, all new requirements, and the anticipated safety benefits and costs. This could be accomplished through a process similar or equivalent to the Regulatory Impact Analysis Statement.

Consultation should require a process step where all stakeholders can participate in a forum to discuss the benefits and cost implications of the planned document early on before decisions to proceed are made, especially for significant documents.

2) The CNSC should include only the necessary requirements in regulatory documents without details on how to implement the requirements.

3) The CNSC should consider the relative priority and benefits of new regulatory document requirements alongside other improvement initiatives, however initiated, and develop plans and schedules for implementation that take account of these relative benefits. The benefits of the regulatory proposal should be considered as well as potential alternatives including taking no regulatory action where other alternatives are shown to be effective or where proposals do not generate sufficient benefit, compared to the cost, to be implemented at all.

Industry is currently working to develop a means of estimating impacts, costs and benefits, and would be interested in discussing how CNSC staff currently accomplish this as well as sharing our approach.

If you require further information or have any questions regarding this submission, please contact Mr. Robin Manley, Director Nuclear Regulatory Affairs and Stakeholder Relations, at (905) 839-6746, extension 5264.

Sincerely,

Laurie Swahn
Senior Vice President
Decommissioning and Nuclear Waste Management Division
Ontario Power Generation

Att.

cc: R. Jammal  CNSC (Ottawa)
    T. Jamieson  CNSC (Ottawa)
    J. Cameron  CNSC (Ottawa)
    G. Rzentkowski  CNSC (Ottawa)
References:


Attached to OPG Confidential letter Laurie Swami to Dr. M. Binder, “Development of New Regulatory Documents,” CD# N-CORR-00531-07346

Attachment A

Regulatory Requirements and Guidance Documents
## Attachment A

### Regulatory Requirements and Guidance Documents

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<td></td>
</tr>
<tr>
<td>3.5 Information dissemination</td>
<td>G-273</td>
<td>P-299</td>
<td>P-211</td>
<td>P-242</td>
<td>REGDOC-3.5.2</td>
</tr>
</tbody>
</table>
December 11, 2014

Dr. M. Binder
President and CEO
Canadian Nuclear Safety Commission
P.O. Box 1046
280 Slater Street
Ottawa, Ontario
K1P 5S9

Dear Dr. Binder:

Subject: Development of New Regulatory Documents

The purpose of this letter is to provide constructive comments and recommendations on the CNSC process for development of new regulatory requirements and guidance.

With the goal of enhancing nuclear safety, in recent years the Canadian Nuclear Safety Commission (CNSC) has put substantial effort into expansion and clarification of regulatory requirements. The plan (Reference 1) has been to better document the regulatory framework, providing regulatory direction in each of the safety and control areas. Included among the clarifications are amendments to several CNSC regulations, but more significant has been the growing number of regulatory and guidance documents (Reference 2). As a result in the last Power Reactor Operating Licence (PROL) issued for the Point Lepreau Nuclear Generating station in 2014, a variety of new or revised CSA Standards and CNSC Regulatory Documents were adopted in the licence, and currently an even more extensive additional number of new or revised CSA Standards and CNSC Regulatory Documents (REGDOCS) are proposed for inclusion in future licences.

There has been a significant the number of CNSC REGDOCs incorporated into the power reactor operating licences (through the Licence Conditions Handbooks) since 2004, which results in significant management effort to ensure and track compliance. While it is true that in many cases the incorporation of regulatory requirements in REGDOCs serves to document an existing practice or expectation, it is also the case that often the requirement is modified or expanded. The CNSC practice of adding chapters of new requirements to existing CNSC Regulatory Documents complicates this issue further.
The large number of new requirements included in REGDOCs results in significant additional resource impacts on Licensees. The resource impact normally occurs in one or more of three ways:

- Incremental one-time costs to establish or install a new or upgraded capability required by the document.
- Ongoing direct costs that are required to maintain the capability year over year.
- Overhead costs that are required to demonstrate compliance, administer, monitor and report on results.

Over the last 10 years new regulatory documents have resulted in incremental one-time costs to our single unit station measured in the hundreds of millions of dollars (i.e., fire protection; emergency response; Fukushima; environmental; security; PSA; seismic; etc.), as well as ongoing year over year costs to maintain the capability measured in several tens of millions. The Canadian nuclear industry's demonstrated excellent safety record is evidence of our support for the improvements to health and safety, security, and the environment that is the intended purpose of regulatory documents, but the efficiency and effectiveness of such controls is also important. Resources have finite limits so increased cost may result in the diversion of resources from other potentially more beneficial areas, or increased costs to the Canadian public. PLGS has never resisted making investments that are reasonably expected to improve the safe, reliable operations of our nuclear facilities. However, we want to ensure that as the regulatory process evolves, these resources are being focused in the most effective areas.

Many documents have now been issued under the current approach but many more are planned for issue under the regulatory document framework plan (Attachment A). PLGS, along with other NPP licensees, believes that this is an appropriate time to reflect on this process. Based on our reviews and experiences we offer the following high level comments, observations, and recommendations, for your consideration:

- To industry’s knowledge there is no equivalent in the current CNSC regulatory document process to the Regulatory Impact Analysis Statement (RIAS) which explains what a regulatory proposal is intended to address, what it is intended to achieve, and what are the benefits and costs [3]. The RIAS assesses the potential impacts to “health and safety, security, the environment, and the social and economic well-being of Canadians”. We would argue that given the significant impact of CNSC’s REGDOCs there should be a documented and demonstrable benefit to health, safety, security, or the environment before any regulatory document is developed. The relationship between the added safety or other value, and the implementation effort, is not clear or frequently even discussed in the current regulatory document development and consultation process.
- Only infrequently is there a period early in the process where directly affected stakeholders can discuss the benefits and cost implications of the documents. Recent efforts to hold workshops on new documents go some way towards fulfilling this need, but the emphasis must be on early consultation. In our view early consultation is needed before irreversible decisions are made regarding the need for and content of
regulatory and guidance documents. Detailed documents that have been posted for official consultation do not fall within our definition of early consultation because our experience has shown that for the most part the decision to proceed in some form had already been made by that point.

- In terms of content, there is an over reliance on external parties for the submission of cost-benefit information through public consultation or at Commission proceedings rather than through early fact finding. Many documents reach the public consultation period with significant errors still present. Early assessment of regulatory proposals would allow for the streamlining of approval processes and the proper allocation of resources.

- It is frequently not clear what prompted the development of the CNSC regulatory and guidance documents, what gap the documents are intended to fill, or what safety or other benefit will be gained. The benefits of the regulatory proposal should be considered as well as potential alternatives including taking no regulatory action where other alternatives are shown to be effective.

- Increasingly, regulatory documents go well beyond simply establishing requirements and include detailed discussion about how to meet the requirements. This reduces Licensees’ ability to determine the most cost effective manner of implementation or adds cost to demonstrate another method.

Central to the establishment of new regulatory documents must be the assurance that the regulatory proposals will result in the greatest overall benefit to Canadians. Based on our observations above we recommend that the Canadian Nuclear Safety Commission:

- Introduce a process similar or equivalent to the Regulatory Impact Analysis Statement into the CNSC regulatory document development process to ensure it is clear what the regulatory document is intended to address, what it is intended to achieve, and what are the benefits and costs.

- Require a period early in the process before decisions to proceed are made, especially for significant documents, where directly affected stakeholders can discuss the benefits and cost implications of the planned document as an input to the process.

- Assess the potential impacts to health and safety, security, the environment, and the social and economic well-being of Canadians when reviewing regulatory documents for final approval by requiring the presentation of information that clearly quantifies all new requirements and the potential positive and negative impacts of the regulatory document.

- In this process, consider the relative priority and benefits of new regulatory document requirements alongside other improvement initiatives, however initiated, and develop plans and schedules for implementation that take account of these relative benefits. In addition, the process should acknowledge that some proposals may in fact not make the cut to be implemented at all.
Industry is currently working to develop a consistent way of estimating impacts and cost across all licensees and would be interested in discussing how CNSC staff currently accomplish this as well as sharing our approach. We would also like to reinforce the value in applying a sober second thought to the need for the development of new regulatory requirements and guidance documents. The list of proposed documents is growing at a pace that is making it increasingly difficult for industry to respond.

If you require additional information, please contact Rick Gauthier at 506-659-6236 or RGauthier@nbpower.com.

Sincerely,

Sean Granville
Site Vice President and Chief Nuclear Officer

SG/RG/sd

cc. Ben Poulet, Pierre Bélanger, Lisa Love-Tedjoutomo, Bruno Romanelli, (CNSC – Ottawa)
CNSC Site Office
Al MacDonald (NBP)

References:


Attachment:

1. Regulatory Requirements and Guidance Documents
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<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1.1 Reactor Facilities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>RD-345</td>
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<td>RD/GD-369</td>
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<td>DIS-13-02</td>
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<td>1.2 Class IB Facilities</td>
<td></td>
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<td></td>
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<td>1.3 Uranium Mines and Mills</td>
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<td>1.4 Class II Nuclear Facilities</td>
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<td>1.5 Certification of prescribed equipment</td>
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<td>1.6 Nuclear substances and radiation devices</td>
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<td>2.1 Management system</td>
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<td>2.2 Human performance management</td>
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<td></td>
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<td></td>
<td>REGDOC-2.1.2</td>
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<td></td>
<td>P-113</td>
<td>G-229</td>
<td>REGDOC-2.2.2</td>
<td>REGDOC-2.2.3</td>
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<td>RD-363</td>
<td>G-323</td>
<td>REGDOC-2.2.4</td>
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<td>G-313</td>
<td>RD-204</td>
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<td>DIS-12047</td>
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<td>2.3 Operating performance</td>
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<td>2.4 Safety analysis</td>
<td></td>
<td>G-294</td>
<td>REGDOC-2.4.1</td>
<td>RD-310</td>
<td>REGDOC-2.3.1</td>
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<td></td>
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<td>G-276</td>
<td></td>
<td>GD-310</td>
<td>Commissioning</td>
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<td>2.5 Physical design</td>
<td>G-278</td>
<td>G-221</td>
<td>REGDOC-2.5.2</td>
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<td>DIS-14-01</td>
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<td>R-86</td>
<td>G-121</td>
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</thead>
<tbody>
<tr>
<td>2.9 Environmental protection</td>
<td>P-223</td>
<td>S-296</td>
<td>G-295</td>
<td>REGDOC-2.9.1 Policies DIS-12-01</td>
<td>REGDOC-2.9.1 Environmental Assessments</td>
</tr>
<tr>
<td>2.10 Emergency management and fire protection</td>
<td>P-325</td>
<td>REGDOC-2.10.1</td>
<td>RD-353</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.11 Waste management</td>
<td>G-219</td>
<td>P-290</td>
<td>RD/GD-370</td>
<td>G-320</td>
<td></td>
</tr>
<tr>
<td>2.13 Safeguards and non-proliferation</td>
<td>RD-336</td>
<td>GD-338</td>
<td>REGDOC-2.13.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.14 Packaging and transport</td>
<td>RD-364</td>
<td>DIS-12-06</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1 Reporting requirements</td>
<td>R-89</td>
<td>REGDOC-3.1.1</td>
<td>REGDOC-3.1.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2 Public and Aboriginal engagement</td>
<td>G-217</td>
<td>RD/GD-99.3</td>
<td>REGDOC-3.2.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3 Financial guarantees</td>
<td>G-205</td>
<td>DIS-11-01</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.4 Commission proceedings</td>
<td>3.4 Commission proceedings</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3.5 Information dissemination</td>
<td>G-273</td>
<td>P-299</td>
<td>P-211</td>
<td>REGDOC-3.5.2</td>
<td>GD-385</td>
</tr>
</tbody>
</table>
GEC Interrogatory #48

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Regulatory guide REGDOC-2.3.3, Periodic Safety Reviews says “It is expected that the required effort to carry out a subsequent PSR of an NPP will often be considerably less than for the first…”.

Is this the first or second Periodic Safety Review for the Pickering A and B nuclear stations? Is OPG carrying out two separate PSRs for the “A” and “B” nuclear stations or one for the entire site?

Response
OPG declines to provide the requested information on the basis of relevance. This interrogatory seeks information on matters that are within the CNSC’s regulatory jurisdiction (being technical information related to approval of the operation of Pickering) and that are not relevant to deciding any issue on the approved Issues List in OPG’s application to set payment amounts.

Witness Panel: Nuclear Operations and Projects
**GEC Interrogatory #49**

**Issue Number: 6.5**

**Issue:** Are the test period expenditures related to extended operations for Pickering appropriate?

**Interrogatory**

**Reference:**
CNSC Regulatory guide *REGDOC-2.3.3, Periodic Safety Reviews* says that a Periodic Safety Review should review a station’s probabilistic risk assessments.

a. Has OPG completed the probabilistic risk assessments that will be reviewed as part of the Periodic Safety Review required to continue operating Pickering until 2024?

b. If so, please indicate when these probabilistic risk assessments were completed and whether they have been accepted by the CNSC.

c. Please provide a table with the core damage and large release frequencies for the probabilistic risk assessments available.

d. Please provide the latest version of *N-PROG-RA-0016, Risk and Reliability Program*.

**Response**

a) Yes.

b) The Pickering B PSA was submitted on December 31, 2012 and the Pickering A PSA on March 31, 2014. All Pickering NGS PSA studies are in compliance with CNSC S294 requirements and the PSA methodologies have been accepted by the CNSC.

c) The Severe Core Damage and Large Release Frequencies are included in the “NA44-REP-03611-00036 Pickering A Risk Assessment Summary Report” and “P-REP-03611-00006 Pickering NGS PRA Update to Include Enhancements From The Fukushima Integrated Action Plan”. These summary reports were provided as part of EB-2013-0321 JT1.15 and have been attached for reference as Attachments 1 and 2, respectively.

d) Provided is a copy of *N-PROG-RA-0016, Risk and Reliability Program* as Attachment 3.
PICKERING A RISK ASSESSMENT SUMMARY REPORT

Pickering A Risk Assessment Summary Report

NA44-REP-03611-00036-R000

2014-04-25

Other Reference Number:
K-410077-REPT-0001, Rev. 02

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Associated with document type REP N-TMP-10010-R010, Controlled Document or Record (Microsoft® 2007)
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Tables and Figures</td>
<td>5</td>
</tr>
<tr>
<td>Revision Summary</td>
<td>6</td>
</tr>
<tr>
<td>Executive Summary</td>
<td>7</td>
</tr>
<tr>
<td>1.0 INTRODUCTION</td>
<td>9</td>
</tr>
<tr>
<td>1.1 Objectives</td>
<td>10</td>
</tr>
<tr>
<td>1.2 Scope</td>
<td>10</td>
</tr>
<tr>
<td>1.3 Organization of Summary Report</td>
<td>12</td>
</tr>
<tr>
<td>2.0 PLANT DESCRIPTION</td>
<td>13</td>
</tr>
<tr>
<td>2.1 Site Arrangement</td>
<td>13</td>
</tr>
<tr>
<td>2.2 Buildings and Structures</td>
<td>13</td>
</tr>
<tr>
<td>2.3 Reactor</td>
<td>14</td>
</tr>
<tr>
<td>2.4 Fuel and Fuel Handling</td>
<td>14</td>
</tr>
<tr>
<td>2.5 Reactivity Control Mechanisms and Systems</td>
<td>15</td>
</tr>
<tr>
<td>2.6 Heat Transport System</td>
<td>15</td>
</tr>
<tr>
<td>2.7 Moderator System</td>
<td>15</td>
</tr>
<tr>
<td>2.8 Feedwater and Condensate System</td>
<td>16</td>
</tr>
<tr>
<td>2.9 Main Steam System</td>
<td>16</td>
</tr>
<tr>
<td>2.10 Steam Relief System</td>
<td>16</td>
</tr>
<tr>
<td>2.11 Boiler Emergency Cooling System</td>
<td>16</td>
</tr>
<tr>
<td>2.12 Emergency Boiler Water Supply System</td>
<td>16</td>
</tr>
<tr>
<td>2.13 Powerhouse Emergency Venting System</td>
<td>17</td>
</tr>
<tr>
<td>2.14 Special Safety Systems</td>
<td>17</td>
</tr>
<tr>
<td>2.14.1 Shutdown System</td>
<td>17</td>
</tr>
<tr>
<td>2.14.2 Emergency Coolant Injection System</td>
<td>17</td>
</tr>
<tr>
<td>2.14.3 Negative Pressure Containment System</td>
<td>18</td>
</tr>
<tr>
<td>2.15 Support Systems</td>
<td>18</td>
</tr>
<tr>
<td>2.15.1 Electrical Power Systems</td>
<td>18</td>
</tr>
<tr>
<td>2.15.2 Service Water Systems</td>
<td>19</td>
</tr>
<tr>
<td>2.15.3 Instrument Air Systems</td>
<td>19</td>
</tr>
<tr>
<td>2.15.4 Powerhouse Heating and Ventilation Systems</td>
<td>20</td>
</tr>
<tr>
<td>2.16 Emergency Mitigating Equipment</td>
<td>20</td>
</tr>
<tr>
<td>3.0 OVERVIEW OF PSA METHODS</td>
<td>21</td>
</tr>
<tr>
<td>3.1 Bounding Assessments for Shutdown Units</td>
<td>22</td>
</tr>
<tr>
<td>4.0 LEVEL 1 PSA METHODS</td>
<td>24</td>
</tr>
</tbody>
</table>
PICKERING A RISK ASSESSMENT SUMMARY REPORT

4.1 Level 1 At-Power PSA for Internal Events....................................................... 24
4.1.1 Initiating Events Identification and Quantification ....................................... 24
4.1.2 Fuel Damage Categorization Scheme ......................................................... 25
4.1.3 Event Tree Analysis ................................................................................. 26
4.1.4 Fault Tree Analysis .................................................................................. 27
4.1.5 Human Reliability Analysis ................................................................. 28
4.1.6 Fault Tree Integration and Evaluation ...................................................... 30
4.2 Level 1 Outage PSA for Internal Events ....................................................... 31
4.2.1 Plant Operational State (POS) Identification and Analysis ....................... 31
4.2.2 Initiating Event Identification and Quantification ....................................... 31
4.2.3 Fuel Damage Category (FDC) Analysis .................................................... 32
4.2.4 Event Tree Analysis ................................................................................. 32
4.2.5 Outage System Fault Tree Analysis ......................................................... 32
4.2.6 Reliability Data Analysis ........................................................................ 33
4.2.7 Human Reliability Analysis ...................................................................... 33
4.2.8 Fault Tree Integration and Evaluation ...................................................... 33
4.3 Level 1 At-Power PSA for Internal Fires ....................................................... 33
4.3.1 Plant Boundary Definition and Partitioning (Task 1) ................................... 34
4.3.2 Fire PSA Component (Task 2) and Cable Selection (Task 3) ....................... 34
4.3.3 Qualitative Screening (Task 4) ................................................................ 35
4.3.4 Fire-Induced Risk Model (Task 5) .............................................................. 35
4.3.5 Fire Ignition Frequencies (Task 6) ............................................................. 36
4.3.6 Quantitative Screening (Task 7) ................................................................. 36
4.3.7 Scoping Fire Modeling (Task 8) ................................................................. 36
4.3.8 Detailed Circuit Failure (Task 9) and Failure Mode Likelihood Analysis (Task 10) ................................................................. 37
4.3.9 Detailed Fire Modeling (Task 11) ............................................................... 37
4.3.10 Post-Fire Human Reliability Analysis (Task 12) ....................................... 38
4.3.11 Level 1 Fire PSA Quantification (Task 14) ............................................... 39
4.3.12 Uncertainty and Sensitivity Analysis (Task 15) .......................................... 39
4.3.13 Level 2 Analysis (Task 17) .................................................................. 39
4.3.14 Alternate Unit Analysis (Task 18) .............................................................. 39
4.4 Level 1 At-Power PSA for Internal Floods .................................................... 40
4.4.1 Identification of Flood Areas and Affected SSCs (Task 1) ............................... 40
4.4.2 Identification of Flood Sources (Task 2) .................................................... 41
4.4.3 Plant Walkdowns (Task 3) ....................................................................... 42
4.4.4 Internal Flood Qualitative Screening (Task 4) .......................................... 42
4.4.5 Flood Scenario Characterization (Task 5) and Consequence Analysis (Task 7) ................................................................. 42
4.4.6 Initiating Event Frequency Estimation (Task 6) ........................................... 43
4.4.7 Flood Mitigation Strategies (Task 8) .......................................................... 43
4.4.8 PSA Modelling of Flood Scenarios (Task 9) ............................................. 44
4.4.9 Level 1 Flood PSA Quantification (Task 10) ............................................ 44
4.5 Level 1 At-Power PSA Based Seismic Margin Assessment ............................. 44
4.5.1 Seismic Hazard Characterization (Task 1) .............................................. 45
4.5.2 Plant Logic Model Development (Task 2) ............................................... 45
4.5.3 Seismic Response Characterization (Task 3) ........................................... 46
4.5.4 Plant Walkdown and Screening Reviews (Task 4) ...................................... 47
4.5.5 Seismic Fragility Development (Task 5) ................................................... 47
4.5.6 Seismic Risk Quantification (Task 6) ....................................................... 47
4.6 Level 1 At-Power PSA for High Winds ......................................................... 48
# PICKERING A RISK ASSESSMENT SUMMARY REPORT

## 4.6.1 Task 1 - High Wind Hazard Analysis

4.6.2 Task 2 - Analysis of Windborne Missile Risk

4.6.3 Task 3 - High Wind Fragility and Combined Fragility Analysis

4.6.4 Task 4 - Plant Logic Model Development

4.6.5 Task 5 - Plant Response Model Quantification

## 5.0 LEVEL 2 PSA METHODS

5.1 Level 2 At-Power PSA for Internal Events

5.1.1 Interface with Level 1 PSA

5.1.2 Containment Event Tree Analysis

5.1.3 Containment Fault Trees

5.1.4 Release Categorization

5.1.5 MAAP-CANDU Analysis

5.1.6 Integration of the Level 1 and 2 PSA

5.2 Level 2 Outage Assessment for Internal Events

5.3 Level 2 Fire Assessment

5.4 Level 2 Seismic Assessment

5.5 Level 2 Flood Assessment

5.6 Level 2 High Wind Assessment

## 6.0 SUMMARY OF RESULTS

## 7.0 REFERENCES

Appendix A: Abbreviations and Acronyms
PICKERING A RISK ASSESSMENT SUMMARY REPORT

List of Tables and Figures

Page

Figure 1: Pickering Site Layout ................................................................. 67
Figure 2: Typical Pickering NGS A Reactor ............................................. 68
Figure 3: Example LOCA Event Tree ....................................................... 69
Figure 4: Fault Tree and Event Tree Integration ................................. 70
Figure 5: Example Fault Tree ................................................................. 71
Figure 6: Fault Tree Integration ............................................................. 72
Figure 7: Fire PSA Tasks ...................................................................... 73
Figure 8: Internal Flood PSA Tasks ....................................................... 74
Figure 9: PSA-based SMA Tasks .......................................................... 75
Figure 10: Example Seismic Hazard Curve ......................................... 76
Figure 11: Example Fragility Curve ....................................................... 76
Figure 12: High Wind Hazard PSA Tasks ............................................ 77
Figure 13: Pickering NGS A Bridging Event Tree .............................. 78
Figure 14: Generic Containment Event Tree ...................................... 79
Figure 15: Pickering NGS A High Wind Hazard Curve .................... 81

Table 1: OPG's Risk Based Safety Goals ........................................... 82
Table 2: Initiating Events in the PARA-L1P ....................................... 83
Table 3: List of Systems Modelled by Fault Trees in the Internal Events PSAs ................................. 91
Table 4: PARA-L1O Plant Operational States .................................... 92
Table 5: Initiating Events for PARA-L1O ........................................... 93
Table 6: PARA-L2P Plant Damage States ......................................... 94
Table 7: Pickering NGS A Release Categorization Scheme .............. 95
Table 8: Results for the Pickering NGS A PSA .................................. 96
Table 9: PARA-L1P Frequency of Fuel Damage Categories .............. 97
Table 10: PARA-L1O Frequency of FDC2 by POS ......................... 97
Table 11: PARA-L2P Plant Damage State Frequency ...................... 98
Table 12: PARA-L2P Release Category Frequency .......................... 98
Table 13: High Wind Hazard and Wind Speed Ranges .................... 99
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<th>Revision Number</th>
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<td>April 2014</td>
<td>Initial issue.</td>
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Executive Summary

The objective of the Pickering NGS A Probabilistic Safety Assessment (PSA) was to provide a comprehensive and integrated assessment of the safety of the station as currently designed and operated. The Pickering NGS A PSA was prepared to meet the intent of OPG nuclear program N-PROG-RA-0016 Risk and Reliability Program and to comply with Canadian Nuclear Safety Commission Regulatory Standard S-294 Probabilistic Safety Assessment (PSA) for Nuclear Power Plants.

The Pickering NGS A PSA identified the sequences that lead to severe core damage and large releases of radioactive material to the environment, estimated the frequency of these sequences, and identified the major contributors to severe core damage and large releases.

The Pickering NGS A PSA analyzed in detail five hazards:

1. Internal events, e.g. Loss of Coolant Accident or Main Steam Line Break.
2. Internal fires.
3. Internal floods.
4. Seismic events.
5. High winds.

The assessment for each of the above hazards addressed both high power operation and shutdown operation.

Other hazards affecting the reactor were addressed through screening or other deterministic hazard studies.

The Pickering NGS A PSA was limited to hazards affecting the reactors. Accidents affecting other sources of radioactivity such as the Irradiated Fuel Bay were outside of the scope of the Pickering NGS A PSA.

The Pickering NGS A PSA was prepared following a quality assurance plan consistent with Canadian Standards Association standard CSA N286.2-00 Design Quality Assurance for Nuclear Power Plants. The PSA was prepared using computer programs that were consistent with Canadian Standards Association standard CSA N286.7-99 Quality Assurance of Analytical, Scientific and Design Computer Programs for Nuclear Power Plants.

The Pickering NGS A PSA was prepared following methodologies consistent with the current state of practice. All methodologies used in the preparation of the Pickering NGS A PSA were accepted by the Canadian Nuclear Safety Commission.

The following table presents the Severe Core Damage Frequency (SCDF) and the Large Release Frequency (LRF) for each of the analyzed hazards. The table also lists OPG’s risk based safety goals. The intent of these goals is to ensure that the radiological risk arising from nuclear accidents associated with the operation of OPG’s nuclear power reactors is low in comparison to risks to which the public is normally exposed.

The SCDF and LRF for each hazard are less than OPG’s safety goal limit.
Results of the Pickering NGS A PSA

<table>
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<td>OPG’s Safety Goal Limit</td>
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Notes:

1. The risk for a shutdown unit was shown to be bounded by the risk for an at-power unit. These results conservatively assume that all units are continuously at-power.
1.0 INTRODUCTION

The objective of a Probabilistic Safety Assessment (PSA) is to provide a comprehensive and integrated assessment of the safety of a nuclear generating station. OPG prepares PSAs for each of its nuclear generating stations to meet the intent of corporate governance [R1] and to comply with Canadian Nuclear Safety Commission (CNSC) Regulatory Standard S-294 Probabilistic Safety Assessment (PSA) for Nuclear Power Plants [R2].

The Pickering NGS A PSA identified the sequences that lead to severe core damage and large releases of radioactive material to the environment, estimated the frequency of these sequences, and identified the major contributors to Severe Core Damage Frequency (SCDF) and Large Release Frequency (LRF).

Table 1 lists OPG’s risk based safety goals. The intent of these goals is to ensure that the radiological risk arising from nuclear accidents associated with the operation of OPG’s nuclear power reactors is low in comparison to risks to which the public is normally exposed.

The Pickering NGS A PSA analyzed in detail five hazards:

1. Internal events, e.g. Loss of Coolant Accident or Main Steam Line Break.
2. Internal fires.
3. Internal floods.
4. Seismic events.
5. High winds.

The assessment for each of the above hazards addressed both high power operation and shutdown operation.

The Pickering NGS A PSA was prepared following a quality assurance plan consistent with Canadian Standards Association standard CSA N286.2-00 Design Quality Assurance for Nuclear Power Plants [R3]. The PSA was prepared using computer programs that were consistent with Canadian Standards Association standard CSA N286.7-99 Quality Assurance of Analytical, Scientific and Design Computer Programs for Nuclear Power Plants [R16].

The PSA was prepared following methodologies consistent with the current state of practice. All methodologies used in the preparation of the Pickering NGS A PSA were accepted by the CNSC.

A PSA is intended to be a realistic model of the plant; however, if realistic analysis was not available to support PSA modelling and assumptions, conservative analysis was used instead. If the conservative analysis significantly over-estimated risk, new supporting analysis was performed and the PSA model was revised.
1.1 Objectives

The principal objectives of the Pickering NGS A PSA were:

1. To provide a comprehensive and integrated assessment of the safety of the plant as currently designed and operated. This included the estimation of risk metrics and the identification of the key contributors to risk.

2. To prepare a risk model in a form that can be used to assist in safety-related decision making.

1.2 Scope

The Pickering NGS A PSA is referred to as the PARA. The elements of the PARA are as follows:

1. A Level 1 at-power PSA for internal events. This PSA studies the likelihood of severe core damage resulting from events occurring within the station while the reactor is at full power. This report is referred to as PARA-L1P.

2. A Level 2 at-power PSA for internal events. This PSA studies the likelihood of a large airborne release of radioactive material to the environment resulting from events occurring within the station while the reactor is at full power. This report is referred to as PARA-L2P.

3. A Level 1 outage PSA for internal events. This PSA studies the likelihood of severe core damage resulting from events occurring within the station while the reactor is in the Guaranteed Shutdown State (GSS). This report is referred to as PARA-L1O.

4. A limited assessment of the likelihood of a large release of radioactive material to the environment resulting from events occurring within the station while the reactor is in the GSS.

5. A PSA-Based Seismic Margin Assessment. This PSA studies ability of the plant to accommodate an earthquake with a return period of 10,000 years and provides order of magnitude estimates of SCDF and LRF while the reactor is at full power. This report is referred to as PARA-SEISMIC.

6. A PSA for internal fires. This PSA studies the likelihood of severe core damage and a large airborne release of radioactive material to the environment resulting from fires originating within the station while the reactor is at full power. This report is referred to as PARA-FIRE.

7. A PSA for internal floods. This PSA studies the likelihood of severe core damage resulting from floods originating within the station while the reactor is at full power. This report is referred to as PARA-FLOOD.
8. A limited assessment of the likelihood a large airborne release of radioactive material to the environment resulting from floods originating within the station while the reactor is at full power.

9. A PSA for high winds. This PSA studies the likelihood of severe core damage and a large airborne release of radioactive material to the environment resulting from high winds while the reactor is operating at full power. This report is referred to as PARA-WIND.

10. Bounding assessments of the likelihood severe core damage and a large airborne release of radioactive material to the environment resulting from:

- seismic events;
- internal fires;
- internal floods; and
- high winds

while the reactor is in the GSS.

The Pickering NGS A PSA does not cover the following potential sources of risk:

- Fuelling machine accidents while the fuelling machine is in transit between the reactor face and the Irradiated Fuel Bay (IFB). Analysis demonstrated that fuelling machine accidents while in transit cannot result in a large airborne release of radioactive material to the environment.

- Hazards from chemical materials used and stored at the plant.

- Other external initiating events such as external floods, airplane crashes, train derailment, etc.

- Other internal initiating events such as turbine missiles.

These types of hazards were addressed separately through screening studies or deterministic hazard studies.

The Pickering NGS A PSA was limited to hazards affecting the reactors. Accidents affecting other sources of radioactivity such as the IFB were outside of the scope of the Pickering NGS A PSA.

The response of the two Pickering NGS A units to various initiating events is essentially identical. Therefore, it was generally only necessary to model a single unit, with this unit considered representative of the other unit. Unit 4 was selected as the reference unit. Design differences between units were not analyzed in detail as they were not expected to be significant in terms of risk.
1.3 Organization of Summary Report

In addition to the general information presented in this introductory section, this Summary Report provides:

(a) A short description of the Pickering NGS A station and units (Section 2.0).

(b) An overview of risk assessment methods (Section 3.0) and discussions of the methods used for Level 1 PSA (Section 4.0) and Level 2 PSA (Section 5.0).

(c) A discussion of the main results of the PARA (Section 6.0).

Appendix A contains a list of the abbreviations and acronyms used in this report.
2.0 PLANT DESCRIPTION

The following sections provide a short description of the Pickering site and plant.

2.1 Site Arrangement

Pickering NGS A comprises four CANDU nuclear reactors, four turbine generators and their associated equipment, services and facilities. Currently Units 1 and 4 are operating and Units 2 and 3 are in safe storage. The arrangement of the eight-unit Pickering site is shown in Figure 1.

The design net electrical output of each unit is 515 MWe at a 90 percent power factor, yielding a total station net output of 1030 MWe. Power is produced at 24 kV and delivered at 230 kV and 60 Hz to the Southern Ontario grid. The station is designed for base-load operation.

Each unit comprises a power source capable of operating independently of the other units with reliance on certain common services. The power generating equipment of each unit is a conventional steam-driven turbine generator. The associated heat source is a heavy water moderated, pressurized heavy water cooled, natural uranium dioxide fuelled, horizontal pressure tube reactor. This type of nuclear steam supply is used in all nuclear power stations built in the province of Ontario.

2.2 Buildings and Structures

The principal structures at the Pickering A site are as follows:

(a) Four reactor buildings.
(b) A reactor auxiliary bay.
(c) A powerhouse, including the turbine hall and turbine auxiliary bay.
(d) A Vacuum Building, together with associated Pressure Relief Duct (PRD) and Pressure Relief Valves (PRV).
(e) A service wing.
(f) An administration building.
(g) An auxiliary irradiated fuel bay.
(h) A heavy water upgrading building.
(i) A screenhouse.
(j) A water treatment building.
(k) Six standby generator enclosures.
(l) An auxiliary power supply building.
(m) A High Pressure Emergency Coolant Injection (HPECI) pumphouse.
(n) An HPECI water storage tank.
(o) Two buildings housing unitized instrument rooms for Shutdown System Enhancement (SDSE).

The administration and service buildings, the heavy water upgrading building, the vacuum building, the HPECI structures and the auxiliary power supply building serve the entire eight-unit station.
The containment boundary is formed by the reactor buildings, the PRD, the vacuum ducts and the vacuum building. Each reactor building is a reinforced concrete structure with cylindrical walls and an elliptical dome. The vacuum building is also a reinforced-concrete structure with a cylindrical wall and a flat roof. A tank in the top of the vacuum building contains water for the dousing system. A reinforced concrete ring around the vacuum building, outside the perimeter wall near the base, provides additional pressure retaining capability. The PRD, also a reinforced concrete structure, is rectangular in section and is linked to the vacuum building by steel vacuum ducts 1.8 m in diameter.

The reactor auxiliary bay runs the full length of the station, joining at its eastern end, the 'B' station reactor auxiliary bay. It is a conventional four-story steel frame building fitted around the northern halves of the four reactor buildings. It houses some reactor auxiliary systems, the Main Control Room (MCR) and the IFB.

The service wing extension is located at the eastern end of the Pickering A station, i.e., in the center of the eight units, and provides additional space for waste management, laboratories, stores, locker and change facilities, maintenance shops, fuelling machine dismantling facilities and offices.

2.3 Reactor

The reactor consists of a horizontal cylindrical structure, the calandria, filled with heavy water. The calandria is penetrated by 390 horizontal fuel channel assemblies, and reactivity monitoring and control units. Below the calandria is a large cylindrical tank, the dump tank, connected to the calandria by four goose neck pipes. These pipes provide for rapid draining of the heavy water from the calandria to the dump tank.

The calandria and dump tank are housed in an air-filled, concrete vault, the calandria vault. The ends of the calandria assembly, the end shields, are located in the walls of the calandria vault and form part of the calandria vault enclosure. The end shields and shield plugs in the fuel channels provide sufficient shielding against radiation to allow personnel to access the fuelling machine vault when the reactor is shutdown.

An arrangement of embedded pipes carrying natural water provides cooling for the calandria vault concrete.

A typical Pickering NGS A reactor assembly is illustrated in Figure 2.

2.4 Fuel and Fuel Handling

The fuel is in the form of compressed and sintered natural uranium dioxide pellets, sheathed and sealed in Zircaloy-4 tubes. Twenty-eight tubes are assembled between two end plates to form one fuel bundle. Each of the reactor’s 390 fuel channels contains 12 fuel bundles.

The reactors are fuelled on-power. Each reactor is serviced by two remotely controlled fuelling machines, one at each reactor face, which operate at opposite sides of the same fuel channel.
Irradiated fuel is transferred from the fuelling machines to the IFB. The irradiated fuel remains in the IFB, or an auxiliary IFB, until it can be transferred to dry storage containers in the Pickering Waste Management Facility.

2.5 Reactivity Control Mechanisms and Systems

In-core neutron flux detectors and ion chambers are used to measure neutron flux in specific areas of the reactor. Signals from these detectors are supplied to the Reactor Regulating System (RRS) and the Shutdown System (SDS).

Fast shutdown of the reactor following a plant upset is accomplished by the SDS. The SDS releases stainless steel clad cadmium shutoff rods into the reactor core. To augment shutdown, the heavy water moderator in the calandria can be dumped into the dump tank.

A liquid zone control system is used for reactivity control and consists of vertical tubes containing natural water. Varying the level of the water in each tube changes the local neutron absorption, thereby controlling local neutron flux. Varying the water level in all of the tubes provides control of overall reactor power.

2.6 Heat Transport System

The Heat Transport System (HTS) consists of two identical loops, linked by two interconnect valves, one of which is open during full power operation. Each loop consists of fuel channels filled with natural uranium fuel bundles surrounded by pressurized heavy water, boilers, circulation pumps, valves and associated piping. The coolant in the fuel channels removes the heat generated by the fuel. During normal operation the heat from the fuel is generated by nuclear fission, following shutdown heat from the fuel is generated by fission product decay. During normal operation, the HTS main circulating pumps transport the heat to the boilers.

The HTS interfaces with a number of systems, e.g.:

- the Shutdown Cooling System (SDCS), which removes decay heat when the reactor is shutdown;
- the feed and bleed system, which provides pressure and inventory control for the coolant;
- the D\textsubscript{2}O recovery system, which recovers lost heavy water from leaks; and
- the Emergency Coolant Injection System (ECIS), which adds light water following a loss of coolant accident beyond the capacity of the D\textsubscript{2}O recovery system.

2.7 Moderator System

During normal plant operation the moderator system is used to slow the neutrons produced by the reactor in order to maintain a critical fission reaction. During normal
operation a small fraction of the heat produced by the fuel is transferred to the moderator. The moderator system includes pumps and heat exchangers to remove this heat.

After an accident, the calandria sprays can be used as an additional heat sink to remove decay heat from the reactor.

2.8 Feedwater and Condensate System

The main role of the HTS is to transport the heat generated in the fuel channels to the boilers. The role of the boilers is to transfer this heat and boil the light water on the secondary side of the boilers. The steam generated in the boilers is then used to spin the turbine generator to convert the thermal energy to electrical power. During this process, the boiling water condenses. The condensate is returned to the feedwater system and eventually returned to the boilers to continue the process.

2.9 Main Steam System

Steam is produced in 12 boilers and fed into four separate steam mains which pass through the reactor building wall to the turbine building where they connect to the turbine steam chest. Over-pressure protection is provided by the steam relief system.

2.10 Steam Relief System

Overpressure protection of the main steam system is provided by 16 safety valves, four on each steam main. The safety valves have staggered setpoints between 5.38 and 5.54 MPa(g).

Eight steam reject valves, six large valves and two small valves, are provided to permit a poison prevent capability. The large steam reject valves also provide the capability to rapidly depressurize the boilers and the HTS in an emergency.

2.11 Boiler Emergency Cooling System

The Boiler Emergency Cooling System (BECS) is designed to provide a short term supply of cooling water to the boilers in the event of a total loss of feedwater. This system is designed to be used until an alternative heat sink can be placed in service.

2.12 Emergency Boiler Water Supply System

The Emergency Boiler Water Supply System (EBWS) supplies emergency make-up to the Pickering NGS A boilers from the Pickering NGS B High Pressure Service Water System (HPSW). The piping system runs from the Pickering B HPSW through the basement of the turbine auxiliary bay to the Pickering A units. The piping contains manual valves and motorized valves. The motorized valves are supplied from the Class III power system, with a backup from the Site Electrical System via the interunit transfer busses. The motorized valves may also be opened manually.
The Pickering NGS A PSA includes models for the Pickering NGS B systems that are required to support the Pickering NGS B HPSW.

2.13 Powerhouse Emergency Venting System

The powerhouse emergency venting system is used to mitigate harsh environments caused by high temperature or high humidity in the powerhouse due to steamline or feedline breaks.

2.14 Special Safety Systems

Three special safety systems are incorporated into the plant design to limit radioactive releases to the public following an abnormal event:

(a) Shutdown System (SDS).

(b) Emergency Coolant Injection System (ECIS).

(c) Negative Pressure Containment System (NPCS).

2.14.1 Shutdown System

The function of the SDS is to shut down the reactor when any one of the trip parameters in either SDSA or SDSE exceeds its setpoint. SDSA and SDSE each have channelized instrumentation to monitor their trip parameters and channelized logic to activate the shutdown mechanisms. SDSA monitors 10 parameters and SDSE monitors 4 parameters.

The shutdown mechanisms are:

- The shutoff rod system.
  
  Each reactor has 23 shutoff rods normally suspended above the reactor. When a trip signal is received, an electromagnetic clutch on each shutoff rod is de-energized and the shutoff rod falls into the core.

- Moderator dump.
  
  A moderator dump system is provided to augment the shutoff rods. A dump signal causes large valves between the calandria and the dump tank to open, equalizing the pressure between the two tanks, allowing the heavy water moderator in the calandria to rapidly drain to the dump tank.

2.14.2 Emergency Coolant Injection System

The ECIS provides cooling water to the HTS following a loss of coolant accident. The Pickering NGS A ECIS includes an initial high pressure injection from the HPECI system, shared with Pickering NGS B, and a low pressure recovery injection.
2.14.3 Negative Pressure Containment System

The NPCS provides a physical barrier designed to limit the release of radioactive material to the environment which might result from a process or system failure. The containment system is a reinforced concrete envelope around the nuclear components of the reactor cooling system, with provisions for controlling and maintaining a negative pressure within the envelope before and after accidents.

The NPCS includes a number of sub-systems required for providing normal and post-accident functions such as reactor building cooling, pressure suppression, control of hydrogen, and air discharge filtration.

2.15 Support Systems

Support systems are considered in the risk assessment as they provide common services to the systems described above. Failure of the support systems can result in failure of the mitigating systems credited to remove heat after an initiating event.

2.15.1 Electrical Power Systems

The electrical systems at Pickering A are organized into four classes:

1. Class IV power is the normal alternating current supply to service unit loads.
2. Class III power is the alternating current supply for safety related equipment and auxiliaries.
3. Class II power is primarily used to supply control and monitoring systems, instrumentation, and protection systems.
4. Class I power is a continuous direct current supply primarily used to supply motive power to electrical breakers.

Class II and Class I both have battery backup supplies.

Standby power supplies to the unit loads are provided by three distinct systems:

1. The Site Electrical System. This standby power source is comprised of two permanently energized busses to which all eight units at the Pickering site have access.
2. The Standby Generators. This power source is comprised of six independent gas turbine driven generators. The standby power is available to only the portion of the service loads required to support safe shutdown of a unit.
3. The Auxiliary Power System. This system is comprised of two 100% redundant combustion turbine units that can supply Class 4 power to the station through the Site Electrical System. The APS supply is independent of the Bulk Electrical System and the normal station Class IV power supply.
2.15.2 Service Water Systems

The service water systems provide cooling water for various loads. The service water systems for Pickering NGS A consist of:

(a) High and Low Pressure Service Water System.

The service water system provides cooling water from Lake Ontario for various loads. Service water is drawn from Lake Ontario through an open canal bounded by two rock filled groynes extending into the lake. The water is drawn from the canal to an open forebay, then through a common screen house into an enclosed concrete duct or intake channel. The service water system is divided into two sub-systems referred to as low pressure service water and high pressure service water. The low pressure service water pumps, powered from the Class IV electrical system, draw water from the intake channel. The high pressure service water pumps, also powered from the Class IV electrical system, draw water from the discharge of the low pressure service water pumps, and provide a pressure boost to deliver service water to higher elevations in the plant. Service water is used once and returned to the lake.

In the event of a failure of the Class IV electrical power system, service water is provided to key safety related loads by the emergency low pressure service water system and the emergency high pressure service water system. These systems are powered from the Class III electrical system and draw water directly from the intake channel.

(b) Recirculated Cooling Water System (RCWS).

The RCWS provides clean, demineralized cooling water to equipment that might become contaminated or plugged if supplied by lake water. The RCWS recirculates water via a set of pumps and cools the water via a set of heat exchangers. The low pressure service water system is used on the secondary side of the RCWS heat exchangers for cooling purposes.

2.15.3 Instrument Air Systems

The instrument air supply is a support system providing compressed air. This compressed air is used for various plant activities including operating valves, starting motors, and inflating airlock seals. The instrument air systems are comprised of the high pressure instrument air system, the low pressure instrument air system and the backup instrument air system.

The backup instrument air system is designed to provide instrument air to key safety related loads following failure of the high and low pressure systems. Its source is a central bottle station, consisting of compressed air cylinders, and piping to critical equipment in the reactor auxiliary bay and the pressure relief duct.
2.15.4 Powerhouse Heating and Ventilation Systems

The cooling and ventilation system provides heating and cooling to the station buildings. Failure of the cooling and ventilation in these rooms may result in equipment failures in the support or mitigating systems.

2.16 Emergency Mitigating Equipment

The EME is stored in a light frame structure located north of the Brock Road security building. The EME building is not seismically robust; however, collapse of the building is not expected to damage the EME. The EME building is not robust with respect to wind damage; however, the EME itself will be tied down to prevent wind induced toppling or sliding. Provision has been made to clear the damaged structure following an earthquake or wind storm, and allow access to the EME.

Following an Initiating Event (IE), the EME is deployed to pre-determined locations in the plant and connected to the designated tie-in points. Deployment of the EME is initiated by the Shift Manager in the Main Control Room and follows pre-approved procedures. EME deployment is routinely drilled.

Provision has been made to clear debris from the path between the EME building and the plant following an external event.

The EME is comprised of:

- Two portable uninterruptible power supplies per unit to provide short-term power to the instrumentation necessary to monitor key plant parameters.

- One diesel generator per unit to provide long-term power to the instrumentation necessary to monitor key plant parameters.

- One self powered pump for each unit that can be deployed either in the Reactor Auxiliary Bay or the Turbine Auxiliary Bay. The pump draws lake water through hose routed from the suction channel of the Condenser Cooling Water pumps, and can provide make-up to the secondary side of the boilers, to the Heat Transport System (HTS) and to the calandria.

The EME is currently included in only two Pickering PSAs: PARA-FIRE and PARA-WIND.
3.0 OVERVIEW OF PSA METHODS

Risk is defined as the product of the frequency of a hazardous event and the consequences of the event. Risk is expressed in units of consequence per unit time.

\[ \text{Risk} = \text{Frequency} \times \text{Consequences} \]

Risk provides a means of quantifying the degree of safety associated with a potentially hazardous activity and provides a common basis for comparing the relative safety of different activities. One of the principles of risk assessment is that the larger the numerical value of risk for a particular event, the more important the event is to safety. Thus, measures taken to reduce risk improve the level of safety.

OPG uses PSA to quantify the risk associated with accidents at its nuclear generating stations. For a nuclear generating station, the events studied are those leading to fuel damage in the reactor core or airborne releases of radioisotopes into the environment.

OPG used a two level approach to assess risk in the Pickering NGS A PSA:

- A Level 1 PSA to assess the frequency of severe core damage. Events resulting in severe core damage release radioactive material from the fuel into containment.

- A Level 2 PSA to assess the frequency and magnitude of airborne releases of radioactive material from containment to the environment.

OPG has defined two risk parameters based upon the PSA approach: Severe Core Damage Frequency (SCDF) and Large Release Frequency (LRF). These parameters are estimated in the Level 1 PSA and the Level 2 PSA, respectively.

OPG has defined safety goals for both SCDF and LRF, these are shown in Table 1. The intent of these goals is to ensure that the radiological risks arising from nuclear accidents at OPG’s nuclear power reactors is low in comparison to risks to which the public is normally exposed.

For Pickering NGS-A, detailed Level 1 PSAs were prepared for:

- Internal events while both reactors are at full power.
- Internal events while one reactor is in the GSS.
- Seismic events while both reactors are at full power.
- Internal fires while both reactors are at full power.
- Internal floods while both reactors are at full power.
- High winds while both reactors are at full power.
The methodologies for the detailed Level 1 PSAs are summarised in Section 4 of this report.

For Pickering NGS A, a detailed Level 2 PSA was prepared for internal events while both reactors are at full power. This study also analyzed events involving both Pickering NGS A and Pickering NGS B. The methodology for the detailed Level 2 PSA is summarised in Section 5 of this report.

Limited Level 2 PSAs were prepared for internal events while one reactor is in the GSS, and internal fires, internal floods, seismic events and high winds while both reactors are at full power. The methodologies for these limited assessments are summarised in Sections 5.7 to 5.11 of this report.

For Pickering NGS-A, bounding assessments were prepared for seismic events, internal fires, internal floods and high winds while one reactor is in the GSS. The rationale for these bounding assessments is described below.

3.1 **Bounding Assessments for Shutdown Units**

OPG did not prepare detailed PSAs for internal floods, internal fires, seismic events and high winds while one Pickering NGS A unit was shutdown. The rationale for this approach is based upon five high level premises:

1. The level of detail in a PSA should reflect the level of risk.

2. The risk from each of these hazards while a unit is shutdown is low and bounded by the risk from the equivalent hazard for a high power unit. The key factors supporting this assertion are that:

   - An event and failure to remain shutdown is not a significant contributor to risk. This results from the provision of two reliable lines of defence to prevent criticality: the shutdown guarantee and the shutdown system.

   - Given the above, the risk from these hazards is dominated by sequences involving the failure of all heat sinks.

   Initial reactor power is at least two orders of magnitude less for a shutdown unit than for a high power unit. Therefore, fuel temperatures will be lower, accident progression will be slower, and the amount of energy deposited into containment will be lower for a shutdown unit.

   Analysis demonstrated that:

   - For single unit sequences, only those sequences in which Early Calandria Vessel Failure (ECVF) occurs progress from severe core damage to a large release. Only 13% of the sequences that
progress to severe core damage will progress to a large release as a result of ECVF.

- Single and two-unit sequences only progress to a large release if the transient is initiated in the earliest part of an outage.

- The operation of key containment systems is unaffected if a single unit is shutdown.

3. Accident progression for a shutdown unit is well understood from the analysis prepared in support of the limited Level 2 PSA for internal events while the reactor is in the GSS. Therefore, additional analysis of accident progression is not warranted.

4. On average, a Pickering NGS A unit is shutdown for a planned outage for approximately 22% of the operating cycle. Therefore, the exposure to these low frequency hazards is much lower for a shutdown unit than for a high power unit.

5. Risk management programs at the station are adequate to control the risk from these hazards while a unit is shutdown.
4.0 LEVEL 1 PSA METHODS

The goal of the Pickering NGS A Level 1 PSA was to identify the events at the plant that can challenge fuel cooling, to identify the systems that can mitigate the event, to determine if the event results in severe core damage should the mitigating systems fail, to determine the total frequency of events that result in severe core damage, and to identify the major contributors to SCDF.

Typically, the first PSA study for a station is the Level 1 at-power PSA for internal events. The Level 1 at-power PSA for internal events is used as an aid in the development of the Level 1 at-power PSAs for the other hazards; therefore, the methodology for the Level 1 at-power PSA for internal events will be described in the most detail.

4.1 Level 1 At-Power PSA for Internal Events

The PARA-L1P for internal events was prepared following the methodology described in [R4]. This methodology was accepted by the CNSC in [R5].

The major activities of the PARA-L1P were:

(a) Identification and quantification of initiating events.

(b) Development of a Fuel Damage Category (FDC) scheme.

(c) Development of event trees.

(d) Development of system-level fault trees needed to quantify the probability of failure of the mitigating systems credited in the event trees.

(e) Development of a component reliability database using, to the extent possible, information specific to Pickering NGS A.

(f) Assessment of the effect of human error on accident progression and system performance using Human Reliability Analysis (HRA).

(g) Integration of the event trees with the system-level fault trees, and risk quantification.

Each of the above activities is summarised in the following sections of this report.

Although the activities listed above are generally carried out in the indicated order, the PSA process is iterative in nature and entails re-assessing the results of an earlier task based on insights gained from a later task.

4.1.1 Initiating Events Identification and Quantification

An Initiating Event (IE) is a disturbance at the plant that challenges reactor operation or fuel integrity either by itself or in conjunction with other failures. Identifying the IEs and quantifying the frequency of IEs are the first steps in a Level 1 PSA.
In the PARA-L1P, the initiating events under consideration were those plant failures that could lead directly, or in combination with other failures, to severe core damage in a Pickering NGS A reactor. The list of initiating events in the PARA-L1P included:

- Events that only affect a single unit at Pickering NGS A.
- Events that can affect both units at Pickering NGS A. This includes, for example, events leading to a hostile environment in the powerhouse (e.g. steam line breaks), losses of off-site power and events leading to failure of the service water intake.
- Events occurring at Pickering NGS B that can also affect Pickering NGS A.

The objective of initiating event selection is to develop a comprehensive list of credible initiating events. For the PARA-L1P, the initiating event list was developed from past OPG PSAs, other published PSAs, safety reports for OPG’s nuclear generating stations, operating experience from CANDU nuclear generating stations, and insights gained from the system-level fault tree modelling. The complete set of initiating events used in the PARA-L1P is listed in Table 2.

The frequency of initiating events was quantified primarily using Bayes’ Theorem. In a Bayesian approach, generic experience is updated with station-specific experience. This technique allows general experience and knowledge about a given event to be combined with actual operating experience gained at the station under study. It is especially useful for quantifying the frequency of IEs unlikely to be experienced within the lifetime of a single station.

4.1.2 Fuel Damage Categorization Scheme

Each accident sequence, consisting of an initiating event and failures of mitigating systems, may result in a different end state. The end states may vary in terms of the severity and the timing of fuel damage. Fuel damage categorization is carried out to simplify the subsequent evaluation of consequence and frequency.

Each FDC represents a collection of event sequences judged to result in a similar degree of fuel damage. The FDCs are used as end-states in the Level 1 event trees, discussed in Section 4.1.3 of this report, and are used to transition from the Level 1 PSA to the Level 2 PSA, see Section 5.1 of this report.

The PARA-L1P used three FDCs:

1. Fuel Damage Category 1 (FDC1). This FDC represents the loss of core structural integrity due to the failure to shutdown the reactor following an initiating event.
2. Fuel Damage Category 2 (FDC2). This FDC represents the loss of core structural integrity due to the failure of post-accident heat sinks following a successful shutdown in response to an initiating event.
3. Core Structural Integrity Maintained (CSIM). This FDC represents all other end states for the event sequences.

SCDF is defined to be the sum of the frequencies of FDC1 and FDC2.

4.1.3 Event Tree Analysis

The potential for an accidental release of fission products contained in the nuclear fuel constitutes the main risk from a nuclear power plant. In the Level 1 PSA, event trees are used to systematically review the possible ways that radioisotopes can be released from the fuel into containment.

The accident sequences are constructed using inductive logic. The graphical representation of this inductive logic is called an Event Tree (ET). The start of this inductive method is the IE, usually a plant malfunction. Following the identification of the IE, the next step is to identify the systems required to mitigate the IE and to show how the accident would progress if the mitigating systems were also to fail.

ET analysis requires the following to be predefined:

(a) The list of IEs to be considered (Section 4.1.1 of this report).

(b) The definition of sequence end states (Section 4.1.2 of this report).

(c) The identification of mitigating systems.

A simplified ET for a large Loss Of Coolant Accident (LOCA) is presented in Figure 3. Following a large LOCA, three systems can mitigate fuel damage: the SDS, the ECIS and the heat sink function of the moderator system. The plant state must be assessed if one or more of these mitigating systems fail. These three systems form the branch points in the event tree.

The event tree is read from the left:

- Starting at the left is the initiating event “IE-LOCA”.

- Moving to the right, the first system credited with preventing fuel damage is the SDS. Failure of the shutdown system is represented by the ET branch point “SD”.

The convention used to read an ET is that success of the mitigating system is the top branch of the event tree and failure is the lower.

If the SDS fails, rapid loss of core structural integrity is expected. This sequence is assigned to the FDC1 end state.

- If reactor shutdown is successful, the decay heat must still be removed from the fuel to prevent fuel damage.

Two systems are credited for this function: the ECIS and the moderator as a heat...
sink. If both systems fail, a slow loss of structural integrity is expected. This sequence is assigned to the FDC2 end state.

- If either the ECIS or the moderator as a heat sink are successful, core structural integrity is maintained. These sequences are assigned to the CSIM end state.

In the PARA-L1P, an ET was prepared for each of the IEs listed in Table 2.

Once the Level 1 event trees have been created, the failure probability of the mitigating systems that have been identified in the ET must be assessed. This is achieved using fault tree analysis.

4.1.4 Fault Tree Analysis

A Fault Tree (FT) is a logic diagram that is used to model the possible causes of a particular fault and to estimate the probability that the fault occurs.

In the PARA-L1P, FT analysis was used to calculate the probability of ET branch points. That is, FTs were used to quantify the probability of failure of the mitigating systems that appear in the ET. FTs were also used to calculate the probability of failure of the systems that support the mitigating systems that appear in the ETs.

Figure 4 depicts the relationship between the ETs and the FTs. Table 3 lists the systems modelled by FTs in the PARA-L1P.

For example, consider the moderator dump function of Shutdown System A. For this system, the failure mode of interest is “moderator dump fails to shutdown the reactor following a SDSA trip”. Figure 5 shows a partially completed FT with this event at the top. Starting from this top event, the FT analyst poses the question “How can this event occur?” The answers to this question are inputs to this top event. For example, Figure 5 shows that the moderator dump function of SDSA can fail if the dump valves fail, the SDSA logic fails, or if a combination of SDSA logic failures and dump valve failures occur. For each of these contributors, the process of examining how they can occur is repeated until no further insights can be obtained about the behaviour of the system. Typically, a FT is developed either to predefined system boundaries or to individual system components.

The basis for system capability and the failure criteria, e.g. the number of dump valves that must open in Figure 5, is based on analysis from a variety of sources. In the PARA-L1P, these sources included the Pickering NGS A Safety Report, the Operational Safety Requirements, the Abnormal Incidents Manuals, and other assessments and regulatory submissions.

Once a FT is constructed, it is linked with a database containing the information required to calculate the probability of each event in the FT. In the PARA, failure rate, test data and maintenance data are assigned to the FT primary events from a central type-code table that is linked to the system reliability database. The use of the CAFTA compatible reliability database and a central type-code table ensures that the same
The FTs include both equipment failures that occur prior to the IE and equipment failures that occur following the IE. Failures that occur following the IE are called mission failures. In the Level 1 PSAs for Pickering NGS A, the mission time in the reliability analysis was chosen to either reflect the expected mission of a particular system, e.g. approximately one hour for the BECS, or as 72 hours.

In the PARA-L1P, a Bayesian approach was adopted for estimating component failure rates. The Bayesian approach uses both generic data and plant-specific data in deriving failure rates. In the PARA-L1P, generic data was obtained from the U.S. Nuclear Regulatory Commission (NRC) [R13], the T-book [R14] and the Westinghouse Savannah River generic database [R15]. The Pickering NGS A plant-specific data documented in the 2011 Annual Reliability Report [R12] was used for the Bayesian update.

The reliability database also contains information on human errors modelled in the fault tree and event trees. The analysis of human errors and their quantification is discussed in the next section of this report.

4.1.5 Human Reliability Analysis

Human errors can affect accident progression and the performance of mitigating systems, and in some cases can be significant contributors to risk. Thus, the potential for human errors must be systematically identified and incorporated into the event trees and the system level fault trees. Probabilities for the identified human errors must be estimated in a systematic fashion.

In principle, every piece of equipment or system in the plant is susceptible to failure because of human error; however, human errors that contribute directly to the failure of individual components are reflected in the components’ failure rates and need not be identified in fault trees.

The human errors of interest to the ET / FT analyst arise under five sets of circumstances:

1. Where a system or component is inadvertently disabled by a human action prior to an IE. For example, a component may be left inadvertently disabled following a routine test or routine maintenance.

2. Where a system or component fails prior to an IE, and the failure is annunciated, but the operator fails to respond to the annunciation prior to an IE.

3. Where an operator action or a closely related series of actions simultaneously disables more than one piece of parallel / redundant equipment prior to an IE.

4. Where an operator fails to respond appropriately following an IE, either by not taking an action or by taking an inappropriate action.

Filed: 2016-10-26
EB-2016-0152
Exhibit L, Tab 6.5
Schedule 8 GEC-049
Attachment 1
Page 28 of 101
5. Where an operator can *plausibly* interfere with the correct response of a mitigating system following an IE either by inhibiting the system or by activating the system.

Items 1 to 3, above may occur while performing normal operating, testing and maintenance procedures. Items 4 and 5, above may occur while following an emergency operating procedure.

Wilful or vengeful actions were not included in the PARA-L1P.

In order to systematically quantify the human interactions in the PARA, OPG used a human interaction taxonomy. This taxonomy classified human interactions in the PARA-L1P as one of: *simple* interactions, *complex* human interactions that occur prior to an IE; and *complex* interactions that occur after an IE.

Simple human interactions have the following characteristics:

(a) They occur while performing written or learned procedures (as opposed to cognitive or creative tasks).

(b) They involve directly manipulated components (e.g., a valve handwheel or a handswitch) or directly viewed main control room display devices.

(c) They occur prior to an IE.

The task of assigning preliminary (screening) human error probabilities for the simple human interactions uses a simple method requiring only the selection of an unmodified basic human error probability and predefined modifying factors. This method quantifies the human interaction based on the type of task, the location where the task is performed, whether the error can be detected in the main control room, and if any annunciations or inspections can detect the error.

For the complex human interactions that occur prior to an IE, the same process may be followed to obtain a preliminary (screening) quantification. These human interactions are complex because they include system-level functions that involve more than just direct physical manipulation of a component, such as the setting of computer control program parameters or modes.

Post-initiating event complex human interactions occur during abnormal conditions and are, therefore, more difficult to identify, analyze, and quantify. Additionally, interactions involved in handling unit upsets are also unlike other interactions as they may take place in dynamic and uncertain situations. These actions are knowledge-based; they are based on fundamental principles of process and safety system operation and on an understanding of the interactions amongst these systems. For the post-initiating event complex human interactions, the preliminary (screening) human error probabilities are assigned based on three criteria: complexity of the task, the time available, and the quality of indication available in the main control room to indicate that action is required.
Human interactions that are identified as risk significant can be further refined using a detailed methodology such as THERP.

4.1.6 Fault Tree Integration and Evaluation

Integration is the process of merging the system FTs with the ETs to create a logic model for each FDC. The goal of integration is to use the logic model to calculate the frequency of occurrence of each FDC. Combining the information in one model allows dependencies between systems to be identified and quantified correctly.

In order to combine the FTs and ETs, the ET logic is first converted into FT logic with a top event for each FDC. These fault trees are referred to as the high level logic. The events in the high level logic are the IEs and the branch points from the event trees. The high level logic is then integrated with the mitigating system FTs; the top events in the mitigating system FTs are inserted where the mitigating system branch point labels exist in the high level logic model. Finally, the support systems are added to the integrated high level logic. Figure 6 illustrates this process.

In the PARA, CAFTA [R17] was used to evaluate the integrated fault trees and FTREX [R18] was used as the solution engine to quantify the results.

The solution of a FT is expressed as a listing of the combination of an initiating event, equipment failures, and human errors that leads to the occurrence of the FDC. Each combination contains the minimum number of failures that have to occur to cause the top event, such combinations are called minimal cutsets.

The solution of the fault tree calculated using CAFTA is truncated. That is, contributors below a certain frequency are not included in the solution. Truncation is necessary because of computational limits. The truncation limit selected should be low enough that all significant contributors are captured. The Level 1 at-power PSA guide for internal events [R4] recommends that the solution of the integrated fault tree for each FDC be truncated at either four orders of magnitude below the most likely minimal cutset in that FDC or at $1 \times 10^{-12}$ occ/yr, whichever is the highest. For FDC2 in the PARA-L1P, the frequency of the top minimal cutset was $6 \times 10^{-7}$ occ/yr and a truncation of $1 \times 10^{-11}$ occ/yr was used.

Following the development of the baseline PSA results, an additional understanding of the station risk is obtained by supplementing the baseline solution with the following:

- Accident sequence quantification to provide sequence by sequence cutset ranking.
- Importance analysis to identify systems and components that are important to the FDC results.
- Parametric uncertainty analysis to determine the lower and upper limits of the two-sided 90% confidence interval for the frequency of each FDC.
- Sensitivity analysis to evaluate the impact on the results of a number of potentially critical assumptions made in the study.
4.2 Level 1 Outage PSA for Internal Events

The PARA-L1O was prepared following the methodology described in [R19]. This methodology was accepted by the CNSC in [R20].

The PARA-L1O considered internal events occurring while a reactor is in the GSS. At Pickering NGS A, a reactor is in the GSS for approximately 22% of the operating cycle.

A Level 1 outage PSA for internal events is developed following the same steps and general methodology as a Level 1 at-power PSA for internal events. However, an outage PSA must reflect the changing status of the plant through an outage, e.g. not all initiating events are possible during all phases of an outage and not all mitigating systems are available during all phases of an outage. This section of this report highlights the differences between an at-power PSA and an outage PSA.

4.2.1 Plant Operational State (POS) Identification and Analysis

The purpose of POS analysis is to manage the dynamic nature of an outage, specifically the varying system configurations, process parameters and system failure mechanisms. This is achieved by grouping the various outage configurations into a manageable number of POSs during which the plant configuration and system failure criteria can be considered to be constant.

The first step in the POS analysis is to define Pre-Plant Operational States (Pre-POSs). Pre-POSs are defined as unique outage plant configurations during which all parameters of interest are stable. Pre-POS are developed based upon actual experience from planned outages and are the highest resolution of the outage states.

The Pre-POSs are then grouped into POSs. The POSs are bounding states based on the pre-POSs; the conditions in a POS are considered to be sufficiently stable for the purposes of an outage PSA. In the PARA-L1O, six pre-POSs were grouped into three POSs. Table 4 defines the three POSs used in the PARA-L1O.

4.2.2 Initiating Event Identification and Quantification

The development of a Level 1 outage PSA requires the identification, grouping and quantification of a set of outage IEs. IE identification and quantification for a Level 1 outage PSA for internal events follows the same steps and general methodology as for a Level 1 at-power PSA for internal events (Section 4.1.1 of this report). However, it is important to note that:

- There are system failures unique to an outage, e.g. failure of an ice plug on a HTS feeder.
- There are at-power IEs that cannot occur on a shutdown unit, e.g. a main steam line break.
- Not all IEs can occur in all POSs. For example, a large LOCA can only occur in a POS where the HTS is pressurized.

- IEs on the adjacent at-power units can affect the shutdown unit, e.g. a main steam line break on Unit 1 can induce a transient on U4.

Table 5 lists the outage IEs used in the PARA-L1O and lists the POSs in which each IE can occur.

4.2.3 Fuel Damage Category (FDC) Analysis

In the PARA-L1O, event tree sequences were assigned to either FDC2 or CSIM. The PARA-L1O did not model loss of core structural integrity due to failure to shutdown, i.e. FDC1. FDC1 was not modelled due its very low frequency. The very low frequency results from the provision of two very reliable lines of defence to prevent the reactor from regaining criticality, i.e. the shutdown guarantee and the SDS.

In a shutdown unit, the SDS is only required to prevent a reactor from regaining criticality. The SDS is not required to lower power following a total loss of heat sinks. If the reactor remains in the GSS, power is only a function of the decay heat level which itself is only a function of the time since shutdown.

4.2.4 Event Tree Analysis

The development of a Level 1 outage PSA requires the preparation of an ET for each outage IE.

ET analysis for a Level 1 outage PSA for internal events follows the same steps and general methodology as for a Level 1 at-power PSA for internal events (Section 4.1.3 of this report). However, a separate ET must be prepared for each IE/POS combination.

4.2.5 Outage System Fault Tree Analysis

The development of a Level 1 outage PSA requires the preparation of a FT for each branch point in the outage ETs. FT analysis is used to calculate the probability of ET branch points.

FT analysis for a Level 1 outage PSA for internal events follows the same steps and general methodology as for a Level 1 at-power PSA for internal events (Section 4.1.4 of this report). However, the outage FTs may be significantly different from the at-power FTs, these differences reflect the differences in system configuration and success criteria. For example, the automatic logic of the ECIS is usually blocked during an outage; therefore, only manual initiation of ECIS can be credited in the ECIS FT for a shutdown unit.

Table 3 lists the systems modelled by fault trees in PARA-L1O.
4.2.6 Reliability Data Analysis

Reliability data analysis for a Level 1 outage PSA for internal events follows the same steps and general methodology as for a Level 1 at-power PSA for internal events (Section 4.1.4 of this report).

4.2.7 Human Reliability Analysis

The possibility of component or system failure due to human error is recognized by the inclusion of human interactions in the FTs and ETs.

Human reliability analysis for a Level 1 outage PSA for internal events follows the same steps and general methodology as for a Level 1 at-power PSA for internal events (Section 4.1.5 of this report). However, in an outage PSA, human error probabilities for the same action may vary between POSs and may be different from the values calculated in the at-power PSA. These differences reflect the different outage configurations.

Human interactions that can only occur during an outage are also addressed in this task.

4.2.8 Fault Tree Integration and Evaluation

Integration is the process of merging the system FTs with the ETs to create a logic model for each FDC. The goal of integration is to use the logic model to calculate the frequency of occurrence of each FDC. Combining the information in one model allows dependencies between systems to be identified and quantified correctly.

Fault tree integration and evaluation for a Level 1 outage PSA for internal events follows the same steps and general methodology as for a Level 1 at-power PSA for internal events (Section 4.1.6 of this report). However, it is important to note that:

1. Only the frequency of FDC2 was estimated in the PARA-L1O.
2. The integration was performed for FDC2 separately for each POS.
3. The estimated SCDF is time averaged. That is, the SCDF for each POS is weighted according to the fraction of a year that a unit is expected to be in that POS.

4.3 Level 1 At-Power PSA for Internal Fires

The Pickering NGS A at-power fire PSA (PARA-FIRE) was prepared following the methodology described in [R6]. The methodology described in [R6] is based upon NUREG/CR-6850 [R8] and was accepted by the CNSC in [R7].
The objectives of the PARA-FIRE were:

- To identify areas of the plant particularly vulnerable to fires while both units are at high power.
- To identify the fire scenarios that make the greatest contribution to risk while both units are at high power.
- To characterize differences between the units that may affect risk.
- To estimate the SCDF and the LRF for both single-unit and multi-unit fire scenarios.

The methodology described in [R6] is broken into 17 tasks; these tasks are briefly described in Sections 4.3.1 to 4.3.14 of this report. The relationship between the 17 tasks is shown in Figure 7.

Seismic-fire interaction (Task 13) was outside the scope of the PARA-FIRE and is not addressed in this report.

The PARA-FIRE was prepared following an iterative approach. That is, the initial estimate of risk was based upon conservative and simplifying assumptions. With each subsequent iteration, the methods used to estimate risk for the various scenarios were refined, with effort focused on the most important contributors to risk.

### 4.3.1 Plant Boundary Definition and Partitioning (Task 1)

In this task the global boundary of the analysis is identified, i.e. the areas within the site where a fire could affect risk, and then partitioned into smaller Physical Analysis Units (PAU).

In the PARA-FIRE, a PAU is an area of the plant within which all fire scenarios are subject to similar conditions. In general, the boundaries of PAUs are defined by either physical barriers or a change in the fire detection and suppression capability. In some cases, large areas with no physical boundaries or changes in detection and suppression capability were subdivided into multiple PAUs to make the analysis more manageable.

The PAUs used in the PARA-FIRE were based on those identified in the Pickering NGS A Fire Hazard Assessment (FHA) [R9]. This approach allowed the PARA-FIRE to rely on the existing programmatic controls and design requirements for maintaining the integrity of the associated compartment boundaries.

### 4.3.2 Fire PSA Component (Task 2) and Cable Selection (Task 3)

In these tasks, the components and associated cables necessary for safe shutdown and long-term decay heat removal following a fire are identified. The cables may be associated with power supply to or control of the affected components.
In the PARA-FIRE, components and cables were divided into three groups:

1. Group B is the set of systems and components credited in the Fire Safe Shutdown Analysis (FSSA) [R10] for safe shutdown and decay heat removal. For these systems cable routing data was available from the FSSA.

2. Group A is the set of systems and components that, although not credited in the FSSA, may be capable of mitigating fires. These systems were only credited for fires which could be shown not to affect cables.

3. Group A was augmented by two additional functions:
   i) Make-up from the Emergency Mitigating Equipment (EME) to the boilers and to the calandria.
   ii) Make-up from the firewater system to the calandria.

The cables and cable routing required for operation of these additional functions were identified using the online wiring database.

The above grouping of components and cables was for the purposes of the PARA-FIRE only; it does not reflect any design or operational consideration.

4.3.3 Qualitative Screening (Task 4)

This task involves the identification and screening of PAUs that can be shown qualitatively to have little or no risk significance. This task was not performed in the PARA-FIRE; all PAUs were conservatively retained for later tasks.

4.3.4 Fire-Induced Risk Model (Task 5)

This task involves the development of a logic model that reflects plant response to a fire.

The fire-induced risk model was developed from the PARA-L1P event tree for a forced shutdown. The PARA-L1P event tree was augmented to include:

- The impact of fire upon operator response (Task 12).
- The EME supply to the boilers and the calandria.
- The firewater supply to the calandria.

In fire PSA quantification (Task 14), this model was used to calculate the Conditional Core Damage Probability (CCDP) for each postulated fire scenario.

In the PARA-FIRE, the fire induced risk model was limited to scenarios that may result in severe core damage due to the failure of all heat sinks. Sequences involving failure...
to shutdown were not modelled as the potential for internal fires to adversely affect the fail safe shutdown system was judged to be minimal.

4.3.5 Fire Ignition Frequencies (Task 6)

To calculate the risk due to an internal fire, fire ignition frequencies (FIFs) for each PAU identified in Task 1 must be assessed.

The key steps in the development of FIFs are:

- Plant walkdowns to identify fixed ignition fire sources. In the PARA-FIRE, the walkdowns were completed for PAUs in Unit 4 and PAUs in common areas that may affect Unit 4, e.g. the Main Control Room.

- Where Pickering experience was available, a Bayesian update of the generic fire frequencies obtained from [R8] and [R11] with Pickering site specific experience was performed.

Where Pickering experience was not available, the generic FIFs from [R8] and [R11] were used. A review of Canadian CANDU fire data performed as part of the Darlington fire PSA indicated that use of generic data would not lead to an under-estimate of the FIFs.

- Development of transient fire ignition frequencies. This was based upon walkdowns and engineering judgment from site personnel who were familiar with plant operation.

4.3.6 Quantitative Screening (Task 7)

In the PARA-FIRE, this task was performed in conjunction with Task 8.

In this task, a bounding assessment is made of the risk impact of fires in each PAU. The bounding assessment assumes that the FIF for each PAU is the sum of the FIFs for all equipment inside the PAU and that all credited equipment in the PAU fails. If the SCDF based on the bounding assessment is very low, then no further analysis is performed for the PAU and the conservatively estimated SCDF is carried forward for use in Level 1 quantification (Task 14).

4.3.7 Scoping Fire Modeling (Task 8)

This task is a conservative and simplified initial refinement to the bounding treatment in Task 7. Ignition sources that do not pose a threat to targets in a PAU are screened out of the PSA.

The scoping fire modelling is used to develop explicit fire scenarios for individual fixed ignition sources, transient ignition sources, and self-ignited cable fires within the risk significant PAUs. The development of these detailed fire scenarios was supported with plant walkdowns, during which information was collected on each ignition source,
and distances measured from each ignition source to potential target equipment and cabling.

Only the target cables and equipment within the zone of influence of a particular ignition source were assumed to fail in the fire scenario and then carried forward into the PSA quantification (Task 14). The zone of influence for a particular fire was determined using generic fire models.

4.3.8 Detailed Circuit Failure (Task 9) and Failure Mode Likelihood Analysis (Task 10)

The purpose of these tasks is to:

- Screen out cables that do not affect a component’s response to a fire.
- Determine the response of components to the different cable failure modes.
- Estimate the probability of the cable failure modes that can affect the operation of components.

For Group B components and cables, the analysis completed in the Pickering NGS A FSSA [R10] was used in the PARA-FIRE.

The only components included in the PARA-FIRE that were not in the Pickering NGS A FSSA were the Group A components, the EME supply to the boilers and the calandria, and the firewater make-up to the calandria:

- For Group A components, fires were either shown not to affect the control circuits and power cabling of Group A components or the whole of Group A was assumed to fail. Therefore, these tasks were not required for Group A components.
- The routing of the cables for the EME and firewater systems were identified from the online wiring database, and a simplified and bounding approach for these tasks was applied to these cables.

4.3.9 Detailed Fire Modeling (Task 11)

The purpose of this task is to develop more detailed fire models that more realistically assess the impact of fire scenarios upon equipment, cables and human response.

In the PARA-FIRE, three fire-related scenarios were developed in greater detail:

1. Hot Gas Layer (HGL) Formation.

   The HGL analysis evaluated the potential for temperature related failures of equipment and cables due to the formation of a HGL. HGL formation increases the zone of influence of an ignition source fire, potentially increasing it to the whole of the PAU.

The main objective of MCA is to evaluate the potential for a HGL formed in one PAU affecting a second PAU following the failure of a barrier. This can further increase the zone of influence of an ignition source.

Non-HGL interactions between two PAUs were separately analysed in Task 8.

3. Main Control Room Abandonment.

A fire in the MCR may force the operators to abandon the MCR. This degrades the capability of operations staff to control the configuration of the plant, including the deployment of emergency heat sinks.

In the PARA-FIRE, MCR abandonment times were assessed for electrical fires and transient combustibles within the MCR envelope.

4.3.10 Post-Fire Human Reliability Analysis (Task 12)

The purpose of this task is to evaluate the impact of fire scenarios upon the human actions addressed in fire induced risk model (Task 5) and to identify new actions that may be specific to the fire PSA, e.g. the plant’s fire response procedures. The probability of failure of each of these actions is estimated and used as input to the Level 1 fire PSA quantification (Task 14).

The fire risk model was developed from the forced shutdown event tree in the PARA-L1P. Therefore, the first step in this task was to identify the post-initiator operator actions modeled as human failure events in the fire risk model / forced shutdown event tree. Pre-fire operator actions and operator actions associated with non-fire induced events were not revised.

For each human failure event that represents a post-fire operator action, multipliers were developed to adjust the human error probability assumed in the forced shutdown event tree. The multipliers considered the following factors:

- Location (either inside the MCR actions or outside the MCR actions).
- Time available.
- Complexity of the action.
- Availability of instrumentation.
- Availability of the path to equipment in field actions.

In addition, human error probabilities were calculated for the deployment and monitoring of the EME.
4.3.11 Level 1 Fire PSA Quantification (Task 14)

The development of a fire PSA requires the integration of the fire risk model with the damage consequences calculated for each scenario. The development of the fire risk quantification is typically an iterative process, as various analysis refinement strategies are developed, they are incorporated into the fire risk model.

The impact of each fire scenario upon equipment and cables determined in Tasks 8 – 11 is reflected in the fire PSA model (Task 5), and the fire PSA model is solved to estimate the CCDP for each fire scenario.

The CCDP is multiplied by the appropriate FIF to estimate the fire induced SCDF for each of the fire scenarios. The total fire SCDF is the sum of the SCDFs from all of the fire scenarios.

The SCDF contribution from the PAUs that were screened out as part of quantitative screening analysis (Task 7) was added to estimate the total fire-induced SCDF.

4.3.12 Uncertainty and Sensitivity Analysis (Task 15)

Sources of uncertainty were identified and the sensitivity of the results of the PARA-FIRE to the sources of uncertainty was assessed. In general, uncertainties associated with each of the fire PSA tasks were minimized and those that remained lend a conservative bias to the results.

Sensitivity studies were performed for:

- Credit for incipient fire detection and suppression.
- Credit for EME following the loss of all Group A mitigating functions.
- Credit for firewater make-up to the boilers.
- The probability of fire-induced hot shorts.

4.3.13 Level 2 Analysis (Task 17)

Refer to Section 5.3 of this report.

4.3.14 Alternate Unit Analysis (Task 18)

The PARA-FIRE used Unit 4 as the reference unit. A walkdown was completed to identify differences between Units 1 and 4.

The comparison of Unit 1 to Unit 4 from the fire risk perspective confirmed that the units are generally symmetrical and consistent in their construction. The differences in equipment placement and cable routing are relatively minor and are not expected to have a significant impact upon risk. Therefore, the Unit 4 fire risk analysis can be used as a surrogate for an evaluation of the fire risk for Unit 1.
4.4 Level 1 At-Power PSA for Internal Floods

The PARA-FLOOD was prepared following the methodology described in [R21]. This methodology was accepted by the CNSC in [R22].

The major tasks of a Level 1 at-power PSA for internal floods are:

- Identification of Flood Areas and Affected Systems Structures and Components (Task 1).
- Identification of Flood Sources (Task 2).
- Plant Walkdowns (Task 3).
- Qualitative Screening (Task 4).
- Flood Scenario Characterization (Task 5).
- Internal Flooding Initiating Event Frequency Estimation (Task 6).
- Flood Consequence Analysis (Task 7).
- Evaluation of Flood Mitigation Strategies (Task 8).
- PSA Modelling of Flood Scenarios (Task 9).
- Level 1 Flood PSA Quantification (Task 10).

These tasks are briefly described in Sections 4.4.1 to 4.4.9 of this report. The relationship between these tasks is shown in Figure 8.

Seismic-flood interaction was outside the scope of the PARA-FLOOD and is not addressed in this report.

The PARA-FLOOD was prepared following an iterative approach. That is, the initial estimate of risk was based upon conservative and simplifying assumptions. With each subsequent iteration, the methods used to estimate risk for the various scenarios were refined, with effort focused on the most important contributors to risk.

4.4.1 Identification of Flood Areas and Affected SSCs (Task 1)

The first step of the PARA-FLOOD was to partition the plant into the flood areas that form the basis of the analysis. Flood areas are defined based on physical barriers, mitigation features, and propagation pathways. The flood areas were initially based on the partitions in the FSSA [R10].

In the PARA-FLOOD, the Systems, Structures and Components (SSC) that can mitigate the consequences of a flood were classified as being either:
• Group B – these are the systems that support flood mitigation in Pickering NGS A but that are supplied from Pickering NGS B. In the PARA-FLOOD, these systems were the EBWS, the Inter-Station Transfer Bus (ISTB) and the HPECI.

• Group A – all other systems credited in the forced shutdown event tree of the PARA-L1P.

The above grouping of components and cables was for the purposes of the PARA-FLOOD only; it does not reflect any design or operational considerations.

The potential for floods originating in Pickering NGS A and affecting Group B mitigating equipment located in Pickering NGS B was addressed in this task.

4.4.2 Identification of Flood Sources (Task 2)

This task identified the potential flood sources in the plant and the associated flooding mechanisms. This task included:

• Identifying or confirming the flood sources in each flood area. The potential flood sources included:
  - Normally operating systems that contain water.
  - Standby safety systems that contain water, e.g. the ECIS.
  - Tanks or pools located in the flood area.
  - External sources of water, e.g. Lake Ontario, that are connected to the flood area through a system or structure.
  - In-leakage pathways from other flood areas, e.g. drains and doorways.

• Determining or confirming the flooding mechanisms associated with each flood source.

• Determining or confirming the characteristics of each flooding mechanism.

• Identifying drains and sumps in each flood area, and determining the capacity of these mitigating functions.

• Identifying flood propagation paths.

The potential for floods from Units 2 and 3, currently in safe storage, and the potential for floods originating in Pickering NGS B propagating to Pickering NGS A were considered in this task.
4.4.3 Plant Walkdowns (Task 3)

This task supported the other tasks by identifying or confirming plant data by observing it at the plant during walkdowns.

4.4.4 Internal Flood Qualitative Screening (Task 4)

This task involved the identification and screening of flood scenarios that can be shown qualitatively to have little or no risk significance. The following rules were used when screening:

- Screening criteria for flood areas:
  - The area contains no credible flood source or no sources that could propagate from one area to another.
  - Flooding of the area does not cause an initiating event or the need for an immediate plant shutdown.

- Screening criteria for flood sources:
  - The flood source is insufficient to cause failure of SSCs.
  - The area flooding mitigation systems are capable of preventing unacceptable flood levels and the nature of the flood does not cause equipment failure through other failure mechanisms.
  - The flood only affects the system that is the flood source and the PARA-L1P already addresses this type of failure.
  - Mitigating human actions can be shown to be effective, i.e. all of the following can be shown:
    i) Flood indication is available in the MCR.
    ii) The flood source can be isolated.
    iii) The mitigation action can be performed with high reliability.
  - The flood source is a high energy line already considered in the PARA-L1P.

4.4.5 Flood Scenario Characterization (Task 5) and Consequence Analysis (Task 7)

These tasks identified and characterized the potential flood scenarios to be included in the analysis. The consequences for each flood-induced initiating event were characterized by considering the following factors:

- The specific flood area, flood source, flood source failure mode and flood magnitude.
• The flood failure mechanism, e.g. spray, jet or flood.

• The consequences of the flood, including:
  - Flood propagation.
  - SSCs damaged by the flood.
  - Identification of the type of initiating event caused by the flood. As a minimum all floods were assumed to cause a forced shutdown.

• Operator and mitigation system responses to terminate the flood.

• The means to be used to define the interface with the PARA-L1P model for estimating SCDF.

4.4.6 Initiating Event Frequency Estimation (Task 6)

This task estimated the frequency of internal flood initiating events.

The frequency of internal flood initiating events was estimated by multiplying generic pipe rupture frequencies, expressed in units of per foot of piping per year, by the length of the piping within a specific flood area. Separate frequencies were estimated for sprays, floods and major floods.

The generic pipe rupture frequencies were obtained from [R23].

4.4.7 Flood Mitigation Strategies (Task 8)

This task identified and evaluated the strategies that can be employed by plant operators to mitigate the consequences of a flood. These actions can include terminating the source of the flood by isolating the break, stopping the pumps that supply the flood source, or opening doors to divert water away from sensitive equipment.

The evaluation of human failure events in the PARA-FLOOD is similar to that used in the PARA-L1P; however, flood scenario-specific Performance Shaping Factors were considered for all credited operator actions. The flood specific Performance Shaping Factors addressed:

• Additional workload and stress above that for similar sequences not caused by internal floods.

• Availability of indications.

• Time available.

• Complexity of the action.
• Availability of flooding-specific job aids and training.
• Effect of the flood upon the mitigation actions, e.g. accessibility restrictions due to the flood.

4.4.8 PSA Modelling of Flood Scenarios (Task 9)

This task involved the development of a logic model that reflects plant response to a flood.

The flood-induced risk model was developed from the PARA-L1P event tree for a forced shutdown.

In the PARA-FLOOD, the flood induced risk model was limited to scenarios that may result in severe core damage due to the failure of all heat sinks. Sequences involving failure to shutdown were not modelled as the potential for flooding events to adversely affect the fail safe feature of a shutdown system was judged to be minimal.

4.4.9 Level 1 Flood PSA Quantification (Task 10)

This task involved the construction of an integrated PSA model to evaluate the risk from internal flooding. To quantify the internal at-power flood model, new flooding events were added to the existing integrated loop cut internal events model and this was integrated with the high level logic developed from the flood specific event trees.

Qualitative sensitivity and uncertainly analyses were prepared as part of this task.

4.5 Level 1 At-Power PSA Based Seismic Margin Assessment

OPG prepared a PSA-based Seismic Margin Assessment (SMA) for Pickering NGS A. The PSA-based SMA was prepared following the methodology described in [R24]. This methodology was accepted by the CNSC in [R25].

The major tasks in a PSA-based SMA are:
• Seismic Hazard Characterization (Task 1).
• Plant Logic Model Development (Task 2).
• Seismic Response Characterization (Task 3).
• Plant Walkdown and Screening Reviews (Task 4).
• Seismic Fragility Development (Task 5).
• Seismic Risk Quantification (Task 6).

These tasks are briefly described in in Sections 4.5.1 to 4.5.6 of this report. The relationship between these tasks is shown in Figure 9.
The PARA-SEISMIC was prepared following an iterative approach. That is, the initial estimate of risk was based upon conservative and simplifying assumptions. With each subsequent iteration, the methods used to estimate risk for the various scenarios were refined, with effort focused on the most important contributors to risk.

4.5.1 Seismic Hazard Characterization (Task 1)

The first step in the PARA-SEISMIC was to develop the site-specific seismic hazard. The seismic hazard is a representation of the seismic activity that can be experienced at the site. The seismic hazard is a plot of the peak ground acceleration versus the annual frequency that the ground acceleration will be exceeded (typically described as the frequency of exceedance). Figure 10 shows a typical seismic hazard curve. The curve shows that very small ground accelerations are more likely than very large ground accelerations.

Two hazard curves were produced:

1. Review Level Earthquake (RLE).

   The RLE was the basis of the in-structure response used in estimating the seismic demand upon equipment. The spectral shape for the RLE was based upon the 10 000 year return period 84th percentile Uniform Hazard Response Spectrum (UHRS) for the Pickering site.

2. Mean Hazard Curve.

   The mean hazard curve was used in conjunction with the plant level High Confidence of Low Probability of Failure (HCLPF) to estimate the seismically induced SCDF. The mean hazard curve was filtered through the application of the Cumulative Absolute Velocity filter. The Cumulative Absolute Velocity filter is applied to limit the contribution of low frequency, low severity earthquakes to SCDF.

   As a Pickering specific mean hazard curve filtered with the Cumulative Absolute Velocity filter was not available, the equivalent filtered mean hazard curve for Darlington NGS was used. The use of the Darlington specific curve was considered acceptable given the level of uncertainty in these types of calculations and that estimating SCDF is not normally a part of a PSA-based SMA.

4.5.2 Plant Logic Model Development (Task 2)

This task involves two related but separate sub-tasks: development of the seismic event tree logic and development of the Seismic Equipment List (SEL).

The seismic event tree displays and accounts for the impact of a seismic event upon SSCs required for safe shutdown and decay heat removal following an earthquake. The seismic event tree must address:
The seismically induced failure of buildings such as the powerhouse. The collapse of a building was assumed to result in the failure of all equipment contained in that building.

The seismically induced failure of the seismic route. The seismic route is a qualified pathway that allows operators to safely travel to areas of the plant in which manual field action is required to maintain the long term post-accident heat sink.

The seismically induced failure of unqualified equipment. For example, seismic events were assumed to cause a loss of Class IV power. The loss of Class IV power, in turn, fails many other systems, e.g. main HTS pumps and main boiler feed pumps.

The seismically induced rupture of the HTS and/or the main steam system. Failure of one or both of these systems can significantly affect seismic risk.

The seismically induced failure of rugged equipment. This branch point represents equipment screened in Task 4.

The failure, seismically induced and random, of equipment in the systems that mitigate the consequences of a seismic event.

The SEL is the list of all components that are required to safely shutdown the reactor and remove decay heat following an earthquake. The SEL was derived from:

- The Seismic Safe Shutdown Equipment list that was prepared as part of the Pickering NGS A SMA issued in 1998 [R28]. This list was subsequently updated in 2009 [R29] and 2013 [R30].
- The equipment credited in seismic event tree.

### 4.5.3 Seismic Response Characterization (Task 3)

The next step in the seismic PSA is to characterize how the station buildings respond to a seismic event. The response of the building will not be the same on each elevation. For example, the small earthquakes occasionally experienced in southern Ontario are typically undetectable to people in the basement or lower floors of buildings, but can be easily detected by people in the higher floors of tall buildings.

The ground oscillation of any seismic event can be described by a combination of frequencies. This is called the spectrum of the seismic event. Each seismic event may have a different spectrum. The different frequencies in an earthquake’s spectrum will be transferred to the building in different ways. The response of site buildings determines how the earthquake will affect the equipment in the SEL and is used to calculate the probability of equipment failure due to a seismic event.

The building responses developed in the Pickering NGS A SMA issued in 1998 [R28] were used in the PARA-SEISMIC. This was considered to be reasonable and
bounding as the UHRS developed in 1998 bounded the UHRS developed for the PARA-SEISMIC in the range of spectral frequencies of concern for building response.

4.5.4 **Plant Walkdown and Screening Reviews (Task 4)**

The role of the plant walkdown is to:

- Observe as many of the SEL items as possible and record any deficiencies.
- Screen out SSCs from further evaluation on the basis of high demonstrable seismic capacity. In the PARA-SEISMIC, a peak ground acceleration of 0.3g was used as the screening criterion.
- Define the failure modes of SEL items.
- Identify equipment and structures that are not included in the SEL, but whose structural failure may affect nearby SEL items.

The walkdowns were completed by a team of system engineers, seismic capability engineers and escorts. Each item on the walkdowns was independently assessed by two qualified seismic capability engineers, and the results of the walkdowns were recorded on a Screening Evaluation Worksheet.

4.5.5 **Seismic Fragility Development (Task 5)**

The seismic fragility of a piece of equipment is the conditional probability that the equipment will fail when subjected to a specific seismic demand. The likelihood that equipment will fail increases as it is subject to greater seismic demands. Figure 11 shows an example fragility curve; it shows that if the example equipment is subject to an acceleration of 1g, its failure probability is 0.8.

The fragility analysis conducted for a PSA-based SMA is limited to that of the Conservative Deterministic Failure Margin whereby the seismic capacity is calculated in terms of a HCLPF value using a generic representation of the variability.

4.5.6 **Seismic Risk Quantification (Task 6)**

The process of evaluating seismic risk is similar to that used for the PARA-L1P (Section 4.1.6 of this report). That is:

- The branches of the seismic event tree that result in severe core damage are converted to high level logic in the form of a fault tree.
- The high level logic is then integrated with the fault trees for the mitigating systems and their support systems. It is important to note that the system fault trees must be revised to include seismically induced failures of SSCs based upon tasks 4 and 5.
- All seismically induced failures are assigned a failure probability of 1 and the high level logic is solved using FTREX [R18]. This results in three types of cutsets:
  
  i) Those including only seismically induced failures.
  
  ii) Those including only random, non-seismically induced failures.
  
  iii) Those including a mixture of seismically induced failures and non-seismically induced failures.

- The cutsets including seismically induced failures are reviewed using the MIN-MAX method to identify the limiting accident sequence and the plant level HCLPF.

- The plant level HCLPF is convolved with the mean seismic hazard curve (Task 1) to estimate the seismically induced SCDF.

- The cutsets that included only non-seismically induced failures are evaluated. Human error probabilities are adjusted by a series of multipliers dependent upon the severity of the earthquake.

- The total SCDF is the sum of seismically induced SCDF and the SCDF from cutsets that include only non-seismically induced failures.

The SCDF was estimated for the full range of earthquake recurrence intervals. However, for comparison of the SCDF to OPG’s risk goals, the convolution was limited to earthquakes with a recurrence interval up to and including 10,000 years.

In the PARA-SEISMIC, the seismic risk model was limited to scenarios that may result in severe core damage due to the failure of all heat sinks. Sequences involving failure to shutdown were not modelled as the potential for seismic events to adversely affect the fail safe shutdown system was judged to be minimal.

### 4.6 Level 1 At-Power PSA for High Winds

The Pickering NGS A Level 1 at-power high wind PSA (PARA-WIND) was prepared following the methodology described in [R31]. This methodology was accepted by the CNSC in [R32].

The major tasks of a Level 1 at-power high wind PSA are:

- High Wind Hazard Analysis (Task 1).
- Analysis of Windborne Missile Risk (Task 2).
- High Wind Fragility and Combined Fragility Analysis (Task 3).
- Plant Logic Model Development (Task 4).
- Plant Response Model Quantification (Task 5).
These tasks are briefly described in Sections 4.6.1 to 4.6.5 of this report. The relationship between these tasks is shown in Figure 12.

The PARA-WIND was prepared following an iterative approach. That is, the initial estimate of risk was based upon conservative and simplifying assumptions. With each subsequent iteration, the methods used to estimate risk for the various scenarios were refined, with effort focused on the most important contributors to risk.

4.6.1 Task 1 - High Wind Hazard Analysis

The purpose of this task is to evaluate the frequency and intensity of occurrence of various straight wind and tornado wind hazards based on site-specific and region-specific data.

In the PARA-WIND, the spatial extent of these hazards was analyzed or estimated based on available data sets from sources such as Environment Canada, Ontario Climate Centre, US National Weather Service Storm Prediction Centre, US National Oceanic and the Atmospheric Administration Storm Prediction Center. The tornado point hazard curves were combined with the point hazard curves for other high winds to produce the combined high wind hazard curves. These wind hazards are considered to be independent stochastic events.

A wind hazard analysis was completed for the Pickering NGS B Level 1 at-power PSA for high winds. This Pickering NGS B high wind hazard curve was enhanced for use in the PARA-WIND:

- The tornado hazard was improved through the use of a more complete data set provided by Environment Canada.

- The straight line wind hazard was improved by using all data available in the database rather than a single annual extreme. This provides more accurate extrapolations for rare events and a more accurate assessment of uncertainties.

- The number of wind speed intervals used in the Level 1 quantification (Task 5) was increased to capture the rapid change in the wind hazard curve. This produced a more refined estimate of risk.

The all-winds hazard curve used in the PARA-WIND is shown in Figure 15.

4.6.2 Task 2 - Analysis of Windborne Missile Risk

The purpose of this task is to develop wind-borne missile fragilities for the plant targets.

Windborne missile fragility is defined as the probability of target damage (failure) from windborne missiles for a given value of peak gust wind speed. A list of high wind targets was generated in Task 4. The missile risk was derived based on missile sources, plant layout, and plant design information, supplemented by plant walkdowns.
The EPRI-developed TORMIS methodology was utilised to estimate the probability of tornado missile impact and damage to plant structures and components [R33] [R34].

4.6.3 Task 3 - High Wind Fragility and Combined Fragility Analysis

The purpose of this task is to evaluate the fragility of high wind targets identified in Task 4 due to high wind loading effects.

The SSCs identified in task 4 include both safety related systems and their support systems. For each component in a safety related system, a chain of dependencies from the components through its support systems can be identified. The weakest link in the chain of dependencies with respect to high wind and water exposure was considered in the fragility analysis.

The median wind capacity and associated uncertainty was calculated for the weakest links. These calculations were based on data available from design documentation, National Building Codes and plant walkdowns. The median wind capacities and associated uncertainties were used to derive wind fragility curves.

A refined fragility analysis was prepared for the metal cladding on the Turbine Hall, Turbine Auxiliary Bay, and Class I and II structures inside the turbine building. This provided a more accurate assessment of the cladding fragility and an assessment of the portion of the cladding over the whole building that might fail.

4.6.4 Task 4 - Plant Logic Model Development

This task addresses two related but separate sub-tasks: development of the high wind event tree logic and development a list of components to be credited / analyzed in the high wind PSA.

The high wind event tree displays and accounts for the impact of a high wind event upon SSCs required for safe shutdown and decay heat removal following a storm.

The high wind event tree must address:

- The wind induced failure of buildings. The collapse of a building was assumed to result in the failure of all equipment in that building.

- The failure of SSCs that are required to safely shutdown the reactor and remove decay heat following a storm. This includes both wind-induced failures and random, independent failures.

  In the PARA-WIND, the EME supply to the boilers, the EME supply to the moderator and the firewater system to the moderator were incorporated into the high wind event tree.

The list of SSCs that are required to safely shutdown the plant and remove decay heat was developed from the high wind event tree and its associated fault trees. This list formed the basis for the list of targets to be considered in the analysis of wind borne missile risk (Task 2) and high wind fragility analysis (Task 3).
4.6.5 Task 5 - Plant Response Model Quantification

The purpose of this task is to integrate the risk model and estimate the SCDF due to high winds.

The branches of the high wind event tree that result in severe core damage were converted to high level logic in the form of a fault tree. The high level logic was then integrated with the mitigating system fault trees that had been updated to include both high wind failures and random component failures. The high level logic was then integrated with the wind hazard curve. That is, the model was solved for each of the wind speed sub-intervals (Table 13) using the mean hazard curve and the appropriate component wind fragilities for that sub-interval.

In addition to providing the frequency for each sequence, quantification identifies the dominant accident sequences, component failures, and human actions with respect to high wind risk.

The SCDF was estimated for the full range of high wind recurrence intervals. However, for comparison of the SCDF to OPG’s risk goals, the convolution was limited to high winds with a recurrence interval up to and including 10,000 years.

In the PARA-WIND, the wind induced risk model was limited to scenarios that may result in severe core damage due to the failure of all heat sinks. Sequences involving failure to shutdown were not modelled as the potential for high winds to adversely affect the fail safe shutdown system was judged to be minimal.
5.0 LEVEL 2 PSA METHODS

A Level 2 PSA studies the system failures and accident phenomena that might result in an airborne release of radioactive material to the environment, and the timing and magnitude of the release. This information is combined with the Level 1 PSA to quantify the frequency of releases.

The Level 2 at-power PSA for internal events is used as an aid in the development of the Level 2 at-power PSAs for the other hazards; therefore, the methodology for the Level 2 at-power PSA for internal events will be described in the most detail.

5.1 Level 2 At-Power PSA for Internal Events

The Pickering NGS A Level 2 at-power PSA for internal events was prepared following the methodology described in [R37]. This methodology was accepted by the CNSC in [R38].

5.1.1 Interface with Level 1 PSA

The PARA-L1P identified sequences resulting in severe core damage and estimated their frequency. These sequences form the starting point of the PARA-L2P.

The PARA-L1P categorized the severe core damage states into FDCs. The first step of a Level 2 PSA is to assign the sequences in these FDCs to Plant Damage States (PDS). The PDSs are the interface to the Level 2 PSA and are used as a means of managing the many different scenarios that can result in severe core damage.

Four PDSs were assigned in the PARA-L2P:

1. PDS1 represents sequences resulting in severe core damage as the result of failure to shutdown. That is, all sequences in FDC1 were assigned to PDS1.

2. PDS2 represents sequences resulting in severe core damage at a single unit as the result of failure of all heat sinks. That is, single unit sequences in FDC2 that do not result in a bypass of containment were assigned to PDS2.

3. PDS3 represents sequences resulting in severe core damage at more than one unit. That is, multi-unit sequences in FDC2 were assigned to PDS3.

In the PARA-L2P, PDS3 was subdivided into two categories:

i) PDS3-2U which represents severe core damage at both Pickering NGS A units.

ii) PDS3-6U which represents severe core damage at one or more Pickering NGS A units and severe core damage at one or more Pickering NGS B units.
4. PDS4 represents sequences resulting in severe core damage at a single unit as the result of failure of all heat sinks with a release pathway that bypasses containment, e.g. boiler tube leaks.

PDS2 was further sub-divided into eight, labeled PDS2B to PDS2K, to reflect various random containment failures. The random containment system failures were identified by means of a Bridging Event Tree (Figure 13) and are listed in Table 6.

It is important to note that the branch points in the Bridging Event Tree that represent failures of the Filtered Air Discharge System (FADS) were subsequently eliminated from the PARA-L2P. It was determined that FADS may be initiated many hours into a transient when command and control of the plant has been transferred to the Emergency Response Organization (ERO). OPG's current methodology for human reliability analysis does not include actions initiated by the ERO.

Accident sequences assigned to a particular PDS are expected to result in a similar fission product release to containment and a similar containment response. Therefore, the characteristics of each PDS can be represented and modelled by a single representative accident sequence.

The representative accident sequence for each PDS was chosen by:

- Identifying the initiating events from the PARA-L1P that were the largest contributors to the frequency of the PDS.
- Reviewing the sequences identified above to select a representative sequence that bounds the consequence.

The above approach follows the guidance of the International Atomic Energy Agency. The representative sequences chosen for each PDS are summarized in Table 6.

5.1.2 Containment Event Tree Analysis

A Containment Event Tree (CET) serves two main purposes:

1. It is a logic model that describes the progression of a severe accident, in particular, how severe accident phenomena can challenge the containment boundary.

2. It is a means to estimate the frequency of the various sequences that challenge the containment boundary. This, coupled with an estimate of releases for each sequence (Section 5.1.5), is an input to the estimate of LRF (Section 5.1.6).

Figure 14 shows a generic CET.

CET branch points are not built from system based “success criteria” but from questions that are intended to ascertain the magnitude of phenomenological challenges to the containment boundary (e.g., “Is containment integrity maintained?” or “Does core concrete interaction occur?”). The CET branch points represent major
events in accident progression and the potential for fission product release to the environment. The CET also represents the evolution of the progression with time so the same nodal question may appear more than once in the tree as conditions inside containment change.

Most of the CET branch points represent alternative possible outcomes of a given physical interaction. Depending on the availability of suitable models and data for a given physical interaction or phenomenon, the methods of branch point quantification can vary. The acceptability of these probability estimates is supported via an expert review process.

5.1.3 Containment Fault Trees

Containment system fault trees are required to quantify the frequencies of the end-states of the Bridging Event Tree (Figure 13). FTs are required for the following containment sub-systems:

- **Large breach of containment (LCEI).** This is defined as a breach greater than 0.1 m$^2$ and may result from breaches through:
  - an airlock;
  - a penetration;
  - the D$_2$O vapour recovery system; and
  - the boiler SRVs following a steam line break inside containment.

- **Small breach of containment (SCEI).** This is defined as a breach less than 0.1 m$^2$ and may result from the same sub-systems as a large breach.

- **Failure of the PRVs to open and limit containment pressure (PRV).**

- **Failure of the air cooling units to condense steam and reduce containment pressure (ACU).** This includes:
  - the east fuelling machine vault ACUs;
  - the west fuelling machine vault ACUs; and
  - the boiler room ACUs.

- **Failure of the hydrogen ignition system to control hydrogen concentration inside containment (IGN).** This includes:
  - the igniters in the west fuelling machine vault;
  - the fans in the west fuelling machine vault ACUs;
  - the igniters in the east fuelling machine vault; and
  - the fans in the east fuelling machine vault ACUs.

The FTs were prepared following the same general methodology as the FTs for the PARA-L1P (Section 4.1.4). Where systems are shared between Pickering NGS A and
Pickering NGS B, the FTs from the Pickering NGS B Level 2 at-power PSA for internal events were used.

5.1.4 Release Categorization

The release categories in the PARA-L2P were limited to those that result in a large release of radioactive material to the environment. The Release Categories (RC) are listed in Table 7.

5.1.5 MAAP-CANDU Analysis

MAAP-CANDU (Modular Accident Analysis Program – CANDU) [R39] is a severe accident simulation code for CANDU nuclear stations. It is used to simulate the evolution of a severe accident through events such as core melt, primary heat transport system failure, calandria vessel failure, calandria vault failure, and containment failure. It is also used to estimate the magnitude of airborne releases of radioactive material from containment to the environment.

MAAP-CANDU is an Industry Standard Toolset code. MAAP-CANDU version 4.0.7D was accepted by the CNSC for use in the Pickering NGS A PSAs.

There are five distinct roles for the code:

1. To establish accident progression for each plant damage state.
2. To support CET branch point quantification.
3. To estimate releases to the environment for those sequences in which containment fails.
4. To support systematic sensitivity and uncertainty analysis.
5. To provide information related to plant environmental conditions.

5.1.6 Integration of the Level 1 and 2 PSA

The purpose of integration is to link the Level 1 event trees with the PDSs via the Level 1/Level 2 bridging event tree and containment fault trees, and then with the RCs via the CET end-states using the results of the branch point quantification. The product is a complete set of sequences that contribute to each RC, from which the frequency of each RC can be determined.

Importance analysis is performed to identify the dominant contributors to each RC.

Sensitivity and uncertainty analysis is performed on both the frequency quantification and on the MAAP-CANDU consequence assessment.
5.2 Level 2 Outage Assessment for Internal Events

The Pickering NGS A Level 2 outage assessment for internal events was prepared following the methodology described in [R40]. This methodology was accepted by the CNSC in [R41].

Given the low SCDF for internal events occurring while a unit is in GSS (see Section 6.0 of this report), and given that less energy is available to challenge the containment envelope, a detailed Level 2 outage PSA for internal events was not prepared. Instead, a bounding assessment of the LRF was prepared for a unit in the GSS.

The bounding assessment was based on the following principles:

1. A large release can only occur if severe core damage has occurred. Therefore, the LRF for a unit in the GSS is bounded by the SCDF for a unit in the GSS.

2. Analysis using MAAP-CANDU [R39] demonstrated that accidents initiated in POS C do not progress to severe core damage within a 7-day analysis period. Therefore, transients initiated in POS C do not result in a large release.

   This outcome reflects the very low decay heat available approximately 70 days after shutdown.

3. Analysis using MAAP-CANDU [R39] demonstrated that accidents initiated in POSs A and B where Early Calandria Vessel Failure (ECVF) is postulated can progress to a large release. Based on the results of the PARA-L2P, only 13% of accidents that progress to severe core damage will progress to a large release as a result of ECVF. Therefore, the LRF due to early calandria failure is bounded by 13% of the SCDF.

   This is a conservative assessment as the MAAP-CANDU analysis only investigated sequences initiated early in an outage. It is likely that additional analysis could demonstrate that accidents with ECVF initiated later in an outage do not progress to a large release.

4. Analysis using MAAP-CANDU [R39] demonstrated that single or dual unit accidents without ECVF only progress from severe core damage to a large release in the first six days of an outage. That is, the LRF due to these sequences will be less than 10% of the SCDF.

5. Accidents that result in severe core damage and progress to a large release as a result of random failures of the containment envelope are a small contributor to LRF. This results from the high reliability of the containment envelope.

5.3 Level 2 Fire Assessment

The Pickering NGS A Level 2 fire assessment for internal events was prepared following the methodology described in [R6]. This methodology was accepted by the CNSC in [R7].
The Level 2 assessment of internal fire risk was built on the Level 1 internal fire model. The approach for Level 2 fire risk consisted of five steps:

1. Fire scenarios contributing a summed SCDF of $1 \times 10^{-7}$ per reactor-year were screened from further analysis. The screening SCDF was carried forward as a direct contribution to LRF.

2. Fire scenarios that affect both units at Pickering NGS A, e.g. fires affecting the MCR, were identified. Scenarios that result in severe core damage at both units were assumed to progress directly to a large release.

3. The frequency of single unit fire scenarios that result in severe core damage and progress to a large release as a result of the consequential failure of the containment envelope was estimated. Based on the results of the PARA-L2P, this contribution to LRF was estimated as 13% of the single unit fire related SCDF.

4. Single unit fire scenarios that result in severe core damage where the fire also affects containment components were identified. These scenarios were assumed to progress to a large release. The PARA-L2P was used to identify the containment components of interest and the FSSA was used to identify and characterize the impact of fires upon the containment components.

5. Single unit fire scenarios that result in severe core damage and progress to a large release as a result of random failures of the containment envelope were identified. These scenarios were assumed to progress to a large release. The probability of random failure of containment components was taken from the PARA-L2P.

5.4 Level 2 Seismic Assessment

The Pickering NGS A Level 2 seismic assessment was prepared following the methodology described in [R24]. This methodology was accepted by the CNSC in [R25].

The Level 2 seismic assessment was limited to two main tasks:

- To estimate the seismic fragility of the containment boundary.
- To estimate the frequency of seismically induced containment failures.

Walkdowns and fragility calculations, using the same techniques as those described in Section 4.5.5, were used to assess the seismic fragility of containment components.

The plant level HCLPF for the containment boundary was determined by inspection of HCLPFs for the containment boundary components. The plant level HCLPF for the containment boundary was convolved with the mean seismic hazard curve to estimate the Seismically Induced Containment Failure Frequency (SCFF).
The seismically induced LRF was estimated by conservatively assuming that seismic events affect both Pickering NGS A units identically. If both Pickering NGS A units progress to severe core damage, then containment will fail consequentially and there will be a large release. Therefore, the seismically induced LRF was set equal to the seismically induced SCDF.

5.5 Level 2 Flood Assessment

The Level 2 at-power PSA for internal floods followed the methodology described in [R26]. This methodology was accepted by the CNSC in [R27].

The approach for Level 2 flood risk consisted of five steps:

1. Flood scenarios that affect both units at Pickering NGS A, e.g. floods affecting the MCR, were identified. Scenarios that result in severe core damage at both units were assumed to progress directly to a large release.

2. The frequency of single unit flood scenarios that result in severe core damage and progress to a large release as a result of the consequential failure of the containment envelope were estimated. Based on the results of the PARA-L2P, this contribution to LRF was estimated as 13% of the single unit flood related SCDF.

3. Single unit flood scenarios that result in severe core damage where the flood also affects containment components were identified. These scenarios were assumed to progress to a large release.

4. Single unit flood scenarios that result in severe core damage coupled with random failures of the containment envelope were assumed to progress to a large release. The probability of the random failure of containment components was taken from the PARA-L2P.

5. Sequences where the flood induces a forced shutdown in both units and there are random, independent failures of mitigating equipment on both units leading to severe core damage in both units were identified and assumed to progress to a large release.

5.6 Level 2 High Wind Assessment

The Level 2 at-power PSA for high winds followed the methodology described in [R35]. This methodology was accepted by the CNSC in [R36].

The approach for Level 2 high wind risk consisted of four steps:

1. High wind scenarios that affect both units at Pickering NGS A were identified. Scenarios that result in severe core damage at both units were assumed to progress directly to a large release.
2. The frequency of single unit high wind scenarios that result in severe core damage and progress to a large release as a result of the consequential failure of the containment envelope was estimated. Based on the results of the PARA-L2P, this contribution to LRF was estimated as 13% of the single unit high wind related SCDF.

3. Single unit high wind scenarios that result in severe core damage coupled with random failures of the containment envelope were assumed to progress to a large release. The probability of the random failure of containment components was taken from the PARA-L2P.

4. Sequences where the high wind induces a forced shutdown in both units and there are random, independent failures of mitigating equipment on both units leading to severe core damage in both units were identified and assumed to progress to a large release.
6.0 SUMMARY OF RESULTS

This section presents the results of the following PSA studies that were completed as part of the PARA:

- Level 1 at-power PSA for internal events.
- Level 1 outage PSA for internal events.
- Level 2 at-power PSA for internal events.
- Level 2 outage for internal events.
- At-power PSA for internal fires.
- At-power PSA for internal floods.
- At-power PSA-based Seismic Margin Assessment.
- At-power PSA for high winds.

Table 8 presents the SCDF and LRF for each of the above studies.

OPG did not prepare PSAs for internal floods, internal fires, seismic events and high winds for a single shutdown unit. The risk from each of these hazards while a unit is shutdown was shown to be bounded by the risk from an operating unit.

Results for PARA-L1P

The Level 1 at-power PSA for internal events (PARA-L1P) estimated the frequency of two Fuel Damage Categories, FDC1 and FDC2. These FDCs represent severe core damage due to the failure to shutdown and due to the failure of all heat sinks, respectively. The frequencies of these FDCs are presented in Table 9.

The results in Tables 8 and 9 show that:

1. The overall SCDF is almost one order of magnitude below OPG’s safety goal limit.
2. Sequences involving the failure to shutdown are a very small contributor to SCDF.

The PARA-L1P assumed that the reactor was at full power for 100% of the operating cycle. Therefore, there is a degree of double-counting of SCDF between the PARA-L1P and the PARA-L1O.

Results for PARA-L1O

The Level 1 outage PSA for internal events (PARA-L1O) estimated the frequency of Fuel Damage Category FDC2 only. This FDC represents severe core damage due to
failure of all heat sinks. The frequency of FDC2 for each POS is presented in Table 10.

The contribution of FDC1 to SCDF for a shutdown unit is very low due to the provision of two very reliable lines of defence, the shutdown guarantee and the shutdown systems. Therefore, the frequency of FDC1 was not estimated in the PARA-L1O

The results in Tables 8 and 10 show that:

1. The overall SCDF is more than one order of magnitude below OPG’s safety goal limit.

2. Sequences occurring in POS C do not contribute to SCDF. Analysis demonstrated that there is insufficient decay heat to lead to severe core damage over the seven-day analysis period.

It is likely that additional analysis for POSs A and B could demonstrate that accidents occurring in these POSs long after shutdown also do not result in severe core damage. This could result in a significant reduction in the SCDF.

Results for PARA-L2P

The Level 2 at-power PSA for internal events (PARA-L2P) estimated the frequency of five Plant Damage States (PDS). The frequencies of the five PDS are presented in Table 11.

The PDS analysis was used as an input to estimate the frequency of three Release Categories (RC). The frequencies of the three RCs are presented in Table 12.

The results presented in Tables 8 and 12 show that the LRF is well below OPG’s safety goal limit.

Results for Level 2 Outage for Internal Events

The bounding assessment of Level 2 outage for internal events determined that the LRF is less than $1 \times 10^{-6}$ per reactor-year.

Results for the PARA-FIRE

The at-power fire PSA (PARA-FIRE) estimated the SCDF and LRF resulting from internal fires. The SCDF and LRF are presented in Table 8.

The results in Table 8 show that:

1. The SCDF due to internal fires is well below OPG’s safety goal limit.

2. The LRF due to internal fires is below OPG’s safety goal limit.
Results for the PARA-FLOOD

The at-power flood PSA (PARA-FLOOD) estimated the SCDF and LRF resulting from internal floods. The SCDF and LRF are presented in Table 8.

The results in Table 8 show that:

1. The SCDF due to internal floods is almost one order of magnitude below OPG's safety goal limit.

2. The LRF due to internal floods is well below OPG’s safety goal limit.

Results of the PARA-SEISMIC

The at-power PSA-based seismic margin assessment (PARA-SEISMIC) estimated the plant level HCLPF for heat sinks to be 0.22g. This is very marginally below the peak ground acceleration for an earthquake corresponding to a 10,000 year return period 84th percentile UHRS.

The PARA-SEISMIC estimated the seismically induced SCDF by convolving the plant level HCLPF with the mean seismic hazard curve. The estimated seismically induced SCDF was $2 \times 10^{-8}$ per reactor-year.

The total seismic SCDF was estimated by adding the seismically induced SCDF to the SCDF from non-seismically induced failures. The non-seismically induced failures represent random failures of equipment in response to the unit shutdown forced by the seismic event. The total SCDF was estimated to be $0.26 \times 10^{-5}$ per reactor-year.

The total seismic SCDF is more than one order of magnitude below OPG's safety goal limit.

Random, non-seismically induced failures of SSCs contributed approximately 99% of the SCDF.

The PARA-SEISMIC estimated the plant level HCLPF of containment boundary components to be 0.23g. The PARA-SEISMIC estimated the Seismically Induced Containment Failure Frequency by convolving the plant level containment HCLPF with the mean seismic hazard curve. The estimated SCFF was $1.3 \times 10^{-8}$ per reactor-year.

The PARA-SEISMIC estimated the LRF by assuming that seismic events affect both units identically. If both units simultaneously progress to severe core damage, the containment boundary will fail consequentially and there will be a large release. Therefore, the LRF is also $0.26 \times 10^{-5}$ per reactor-year.

The total seismic LRF is well below OPG’s safety goal limit.
Given that most of SCDF results from non-seismically induced failures, the assumption of perfect correlation between the units is very conservative. Therefore, the estimate of LRF is also very conservative.

Results for the PARA-WIND

The at-power PSA for high winds (PARA-WIND) estimated the SCDF and LRF resulting from high winds. The SCDF and LRF are presented in Table 8.

The results in Table 8 show that:

1. The SCDF due to high winds is well below OPG’s safety goal limit.
2. The LRF due to high winds is below OPG’s safety goal limit.
7.0 REFERENCES


PICKERING A RISK ASSESSMENT SUMMARY REPORT


attachment1

PICKERING A RISK ASSESSMENT SUMMARY REPORT


[R33] Electric Power Research Institute, Tornado Missile Risk Analysis and Appendices, NP768 and NP-769, May 1978.


Figure 1: Pickering Site Layout

1. Reactor Building
2. Main Power Building
3. Primary Reactor Building
4. Breeder Reactor
5. Control Room (1 to 6)
6. Turbine Hall (Units 7 to 8)
7. Steam Generators
8. Reactor Auxiliary Bay
9. Heat-Removal Water Pumping Plant
10. Cooling Water Outlet
11. Water Treatment Building
12. Condenser Building
13. Emergency Water Supply Valves Station (Unit for Unit 1 to 8)
14. Unit Emergency Control Centre (Unit for Units 9 to 8)
15. Emergency Power Supply Generators
16. Emergency Water Supply Pump House (Units 9 to 8)
17. Emergency Water Supply Pump House (Units 9 to 8)
18. Isolated Fuel Rack (Units 9 to 8)
19. DH (Units for Standby Generation)
20. OH-05 Management Building
21. Auxiliary Isolated Fuel Racks
22. Microwave Tower
23. Information Centre
24. Administration Building
25. Heavy Water Uplifting Towers
26. 750 kV Substation
27. Cooling Water Intake Channel
28. Emergency Power Supply Generators
29. Security Gatehouse
30. Emergency Gatehouse
31. Emergency Gatehouse
32. Emergency Gatehouse
33. Emergency Gatehouse
34. Emergency Gatehouse
35. Emergency Gatehouse
36. Emergency Gatehouse
37. Emergency Gatehouse
38. Emergency Gatehouse
39. Emergency Gatehouse
40. Emergency Gatehouse
41. Emergency Gatehouse
42. Emergency Gatehouse
43. Emergency Gatehouse
44. Emergency Gatehouse
45. Emergency Gatehouse
46. Emergency Gatehouse
Figure 2: Typical Pickering NGS A Reactor
Figure 3: Example LOCA Event Tree
Figure 4: Fault Tree and Event Tree Integration
PICKERING A RISK ASSESSMENT SUMMARY REPORT

Figure 5: Example Fault Tree
Figure 6: Fault Tree Integration

FDC LOGIC

Mitigating System Fault Trees

Support System Fault Trees

Initiating Events

IE
MIT

ECI
SDS
BEC
RRS

SDC
PEVS
EBWS
MOD

Service Water
Electrical Systems
Instrument Air
Figure 7: Fire PSA Tasks
Figure 8: Internal Flood PSA Tasks
Figure 9: PSA-based SMA Tasks
Figure 10: Example Seismic Hazard Curve

Figure 11: Example Fragility Curve
PICKERING A RISK ASSESSMENT SUMMARY REPORT

Figure 12: High Wind Hazard PSA Tasks
Figure 13: Pickering NGS A Bridging Event Tree
Figure 14: Generic Containment Event Tree
PICKERING A RISK ASSESSMENT SUMMARY REPORT
Figure 15: Pickering NGS A High Wind Hazard Curve
<table>
<thead>
<tr>
<th>RISK METRIC</th>
<th>AVERAGE RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Target</td>
</tr>
<tr>
<td></td>
<td>(per reactor year)</td>
</tr>
<tr>
<td>Severe Core Damage Frequency</td>
<td>$10^{-5}$</td>
</tr>
<tr>
<td>Large Release Frequency</td>
<td>$10^{-6}$</td>
</tr>
</tbody>
</table>
Table 2: Initiating Events in the PARA-L1P

<table>
<thead>
<tr>
<th>Category</th>
<th>Label IE-44-</th>
<th>Description (PARA-L1P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forced Shutdown</td>
<td>FSD</td>
<td>All reactor shutdowns not included in other initiating events</td>
</tr>
<tr>
<td>LOCA</td>
<td>LOCA1</td>
<td>Small break within the capacity of two D$_2$O pressurizing pumps (initial discharge rate 1 - ~40 kg/s)</td>
</tr>
<tr>
<td></td>
<td>LOCA2A</td>
<td>Small breaks which require ECIS for refilling and repressurization of the HTS (initial discharge rate ~40 - 100 kg/s)</td>
</tr>
<tr>
<td></td>
<td>LOCA2B</td>
<td>Small breaks which require ECIS for refilling and repressurization of the HTS (initial discharge rate 100 - 1000 kg/s)</td>
</tr>
<tr>
<td></td>
<td>LOCA3</td>
<td>Large breaks which require high and subsequently low pressure ECIS for refilling and do not result in flow stagnation into the core (initial discharge rate &gt;1000 kg/s)</td>
</tr>
<tr>
<td></td>
<td>LOCA4</td>
<td>Large breaks which require high and subsequently low pressure ECIS for refilling and lead to flow stagnation into the core (initial discharge rate &gt;1000 kg/s)</td>
</tr>
<tr>
<td></td>
<td>LOCA1-SF</td>
<td>Stagnation feeder break in LOCA1 range</td>
</tr>
<tr>
<td></td>
<td>LOCA2-SF</td>
<td>Stagnation feeder break in LOCA2A range</td>
</tr>
<tr>
<td>Pressure Tube Rupture</td>
<td>PTL</td>
<td>Pressure tube failure resulting in an initial discharge rate of less than 1 kg/s</td>
</tr>
<tr>
<td></td>
<td>PTF</td>
<td>Pressure tube failure resulting in an initial discharge rate in excess of 1 kg/s</td>
</tr>
<tr>
<td>End-fitting Failure</td>
<td>EFL2</td>
<td>End-fitting break of LOCA2-size outside annulus gas bellows in LOCA2 range (includes fuelling machine induced LOCAs)</td>
</tr>
<tr>
<td>Steam Generator Tube Rupture</td>
<td>SGTB1</td>
<td>Boiler tube break within the capacity of the D$_2$O feed system (initial discharge rate 1 - ~40 kg/s)</td>
</tr>
<tr>
<td></td>
<td>SGTB2</td>
<td>Boiler tube break beyond the capacity of the D$_2$O feed system (initial discharge rate &gt; ~40 kg/s)</td>
</tr>
<tr>
<td>Category</td>
<td>Label IE-44-</td>
<td>Description (PARA-L1P)</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>--------------</td>
<td>------------------------------------------------------------</td>
</tr>
<tr>
<td>Loss of HTS Pressure Control (Low)</td>
<td>LRVO</td>
<td>One or more liquid relief valves fail open spuriously</td>
</tr>
<tr>
<td></td>
<td>LBVO</td>
<td>A liquid bleed valve opens spuriously</td>
</tr>
<tr>
<td></td>
<td>2LBVO</td>
<td>Both liquid bleed valves open spuriously</td>
</tr>
<tr>
<td></td>
<td>FVFC</td>
<td>Both $D_2O$ feed valves fail closed</td>
</tr>
<tr>
<td></td>
<td>FPFO</td>
<td>Failure of in-service $D_2O$ pressurizing pump</td>
</tr>
<tr>
<td></td>
<td>XSPR</td>
<td>Bleed condenser spray valve 3332-CV113 opens spuriously</td>
</tr>
<tr>
<td>Loss of HTS Pressure Control (High)</td>
<td>BVFC</td>
<td>Both HTS bleed valves fail closed</td>
</tr>
<tr>
<td></td>
<td>FVFO</td>
<td>Any or both $D_2O$ feed valves fail open</td>
</tr>
<tr>
<td></td>
<td>FP2S</td>
<td>Inadvertent start-up of standby $D_2O$ pressurizing pump</td>
</tr>
<tr>
<td></td>
<td>BCLCVFC</td>
<td>Bleed condenser level control valves fail closed</td>
</tr>
<tr>
<td>Loss of HTS Inventory Control</td>
<td>D2OFC</td>
<td>Pipe break in $D_2O$ feed system upstream of check valve 3331-NV1 or -NV2</td>
</tr>
<tr>
<td>HTS Pump Trip</td>
<td>HTPT</td>
<td>Any or up to four HTS pumps trip</td>
</tr>
<tr>
<td>Channel Flow Blockage</td>
<td>LFB</td>
<td>Channel flow reduced by 90 percent or more</td>
</tr>
<tr>
<td></td>
<td>HTMV</td>
<td>Spurious closure of boiler isolating valve or HTS main pump discharge valve</td>
</tr>
<tr>
<td>Moderator Failure</td>
<td>LOMHS</td>
<td>Loss of moderator heat sink</td>
</tr>
<tr>
<td></td>
<td>LOMF</td>
<td>Loss of moderator flow</td>
</tr>
<tr>
<td></td>
<td>LOMI</td>
<td>Loss of moderator inventory</td>
</tr>
<tr>
<td></td>
<td>DUMP</td>
<td>Spurious moderator dump</td>
</tr>
<tr>
<td>Loss of End Shield Cooling</td>
<td>LOESH5</td>
<td>Loss of end shield heat sink</td>
</tr>
<tr>
<td></td>
<td>LOESF</td>
<td>Loss of end shield flow</td>
</tr>
<tr>
<td></td>
<td>LOESI</td>
<td>Loss of end shield inventory</td>
</tr>
</tbody>
</table>

Title: PICKERING A RISK ASSESSMENT SUMMARY REPORT
# PICKERING A RISK ASSESSMENT SUMMARY REPORT

<table>
<thead>
<tr>
<th>Category</th>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam Line Break</td>
<td>SRV</td>
<td>One or more atmospheric steam rejection valves open spuriously</td>
</tr>
<tr>
<td></td>
<td>SSLB-IC</td>
<td>Small steam line break inside containment</td>
</tr>
<tr>
<td></td>
<td>SSLB-OC</td>
<td>Small steam line break outside containment</td>
</tr>
<tr>
<td></td>
<td>LSLB-IC</td>
<td>Large steam line break inside containment</td>
</tr>
<tr>
<td></td>
<td>LSLB-OC</td>
<td>Large steam line break outside containment</td>
</tr>
<tr>
<td></td>
<td>U1LSLB-OC</td>
<td>Unit 1 large steam line break outside containment</td>
</tr>
<tr>
<td></td>
<td>IE-30-LSLB-OC</td>
<td>Unit 5 large steam line break outside containment at Pickering NGS B.</td>
</tr>
<tr>
<td></td>
<td>IE-30-U678LSLB-OC</td>
<td>Unit 6/7/8 large steam line break outside containment at Pickering NGS B.</td>
</tr>
<tr>
<td>Loss of Feedwater to One or More Boilers</td>
<td>TLOFW</td>
<td>Total loss of feedwater to all quadrants</td>
</tr>
<tr>
<td></td>
<td>PLOFW</td>
<td>Partial loss of feedwater to all quadrants</td>
</tr>
<tr>
<td></td>
<td>ALOFW</td>
<td>Asymmetric loss of feedwater (no feedwater flow to boilers in one quadrant)</td>
</tr>
<tr>
<td>Feedwater Line Break</td>
<td>SFLB-IC</td>
<td>Small feedline break inside containment</td>
</tr>
<tr>
<td></td>
<td>SFLB-OC</td>
<td>Small feedline break outside containment</td>
</tr>
<tr>
<td></td>
<td>LFLB</td>
<td>Large feedline break resulting in total loss of feedwater</td>
</tr>
<tr>
<td></td>
<td>FLBCOND</td>
<td>Break in condensate system resulting in total loss of condensate flow to deaerator</td>
</tr>
<tr>
<td></td>
<td>FWLB-CL1ROOM</td>
<td>Feedwater line break above Class I room</td>
</tr>
<tr>
<td></td>
<td>U1LFLB</td>
<td>Unit1 large feedwater line break</td>
</tr>
<tr>
<td>Turbine Trip</td>
<td>TT</td>
<td>All turbine trips not included in other initiating events (includes loss of condenser vacuum events)</td>
</tr>
<tr>
<td>Loss of Condensate Flow</td>
<td>LOCONDA</td>
<td>Total loss of condensate flow to deaerator (excluding condensate pipe breaks)</td>
</tr>
<tr>
<td></td>
<td>LOCONDB</td>
<td>Loss of main condensate flow to deaerator (excluding condensate pipe breaks)</td>
</tr>
<tr>
<td>Reheater Drains Line Break</td>
<td>RDLB</td>
<td>Breaks in reheater drains line between the boilers and the second check valve</td>
</tr>
</tbody>
</table>

1 Note that events IE-30-LSLB-OC and IE-30-U678-LSLB-OC do not have the IE-44- prefix, since they originate in Pickering B.
# PICKERING A RISK ASSESSMENT SUMMARY REPORT

<table>
<thead>
<tr>
<th>Category</th>
<th>Label</th>
<th>Description (PARA-L1P)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unplanned Increase in Reactivity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLOR</td>
<td>IE-44-</td>
<td>Fast rate of reactivity insertion</td>
</tr>
<tr>
<td>Sror</td>
<td></td>
<td>Slow rate of reactivity insertion</td>
</tr>
<tr>
<td>LZCPMPFL</td>
<td></td>
<td>All liquid zone control system pumps fail</td>
</tr>
<tr>
<td>URIR</td>
<td></td>
<td>Unplanned regional increase in reactivity</td>
</tr>
<tr>
<td>SORD</td>
<td></td>
<td>Spurious shutoff rod drop resulting in a regional increase in reactivity</td>
</tr>
<tr>
<td><strong>Loss of Computer Control</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WDTOX</td>
<td></td>
<td>Controlling computer stall</td>
</tr>
<tr>
<td>DCCF</td>
<td></td>
<td>Dual computer failure</td>
</tr>
<tr>
<td>DCCUF</td>
<td></td>
<td>Unsafe failure of digital control computer leading to reactor power increase</td>
</tr>
<tr>
<td>BPCF</td>
<td></td>
<td>Failure ‘off’ of boiler pressure control program on both computers</td>
</tr>
<tr>
<td>FHCF</td>
<td></td>
<td>Failure ‘off’ of fuel handling system control program on digital control computer DCC2</td>
</tr>
<tr>
<td>RRSF</td>
<td></td>
<td>Failure ‘off’ of reactor power control program on both computers</td>
</tr>
<tr>
<td><strong>Loss of LPSW System</strong></td>
<td></td>
<td></td>
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<tr>
<td>LOLPSW</td>
<td></td>
<td>Total loss of low pressure service water</td>
</tr>
<tr>
<td><strong>Forebay event</strong></td>
<td></td>
<td></td>
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<tr>
<td>FOREBAY</td>
<td></td>
<td>Adverse conditions in the forebay</td>
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<tr>
<td><strong>Loss of HPSW System</strong></td>
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<td></td>
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<tr>
<td>LOHPSW</td>
<td></td>
<td>Total loss of high pressure service water</td>
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<tr>
<td><strong>Loss of RCW System</strong></td>
<td></td>
<td></td>
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<tr>
<td>LORCW</td>
<td></td>
<td>Total loss of recirculated cooling water system flow</td>
</tr>
<tr>
<td><strong>Loss of Instrument Air</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TLOIA</td>
<td></td>
<td>Total loss of instrument air</td>
</tr>
<tr>
<td><strong>Loss of Bulk Electricity Supply</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOBES</td>
<td></td>
<td>Loss of bulk electricity supply</td>
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<tr>
<td><strong>Loss of Switchyard</strong></td>
<td></td>
<td></td>
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<tr>
<td>LOSWYD</td>
<td></td>
<td>Loss of switchyard</td>
</tr>
<tr>
<td><strong>Loss of Power to Unit Class IV 4.16 kV Bus</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOCL4</td>
<td></td>
<td>Total loss of unit Class IV power</td>
</tr>
<tr>
<td>LOSST</td>
<td></td>
<td>Loss of system service transformer or circuit breakers 5320-CB1A or -CB1C causing loss of power supply to Class IV 4.16 kV buses 5320-BUA or -BUC, respectively</td>
</tr>
<tr>
<td>LO5320BUA</td>
<td></td>
<td>Loss of power to unit Class IV 4.16 kV bus BUA</td>
</tr>
<tr>
<td>LO5320BUB</td>
<td></td>
<td>Loss of power to unit Class IV 4.16 kV bus BUB</td>
</tr>
<tr>
<td>LO5320BUC</td>
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<td>Loss of power to unit Class IV 4.16 kV bus BUC</td>
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### PICKERING A RISK ASSESSMENT SUMMARY REPORT

<table>
<thead>
<tr>
<th>Category</th>
<th>Label IE-44-</th>
<th>Description (PARA-L1P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of Unit Class IV 600 V Bus</td>
<td>LO5330BUD</td>
<td>Loss of power to unit Class IV 4.16 kV bus BUD</td>
</tr>
<tr>
<td>Loss of Power to Unit Class III 4.16 kV Bus</td>
<td>LO5412BUA</td>
<td>Loss of power to unit Class III 4.16 kV bus BUA</td>
</tr>
<tr>
<td>Loss of Power to Unit Class III 600 V Bus</td>
<td>LO5413BUA</td>
<td>Loss of power to unit Class III 600 V bus BUA</td>
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<tr>
<td>Loss of Power to Unit Class II 600 V Bus</td>
<td>LO5423BUA</td>
<td>Loss of power to unit Class II 600 V bus BUA</td>
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<tr>
<td>Loss of Power to Unit Class II 120 V Bus</td>
<td>LO5440BUA</td>
<td>Loss of power to unit Class II 120 V ac bus BUA</td>
</tr>
<tr>
<td>Loss of Power to Unit Class II 48 V Bus</td>
<td>LO5520BU1 to LO5520BU22</td>
<td>Loss of power to unit Class II 48 V dc bus BU1 to BU22</td>
</tr>
<tr>
<td>Loss of Unit Class I 250 V Power</td>
<td>LO250</td>
<td>Total loss of unit Class I 250 V dc buses 55100-BUA1 and 55100-BUB1</td>
</tr>
<tr>
<td>Heat Transport Flow Diversion</td>
<td>SDCMV</td>
<td>Spurious opening of both shutdown cooling isolation valves in one or more quadrants</td>
</tr>
<tr>
<td>Powerhouse Freezing</td>
<td>PHFREEZE</td>
<td>Spurious opening of powerhouse venting during an extreme cold outside condition</td>
</tr>
</tbody>
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### PICKERING A RISK ASSESSMENT SUMMARY REPORT

<table>
<thead>
<tr>
<th>Category</th>
<th>Label IE-44-</th>
<th>Description (PARA-L1P)</th>
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<tbody>
<tr>
<td>ECI Blowback</td>
<td>3335MV156</td>
<td>33350-MV156 opens spuriously</td>
</tr>
<tr>
<td></td>
<td>3335MV156TS</td>
<td>33350-MV156 on test</td>
</tr>
<tr>
<td></td>
<td>3335MV157</td>
<td>33350-MV157 opens spuriously</td>
</tr>
<tr>
<td></td>
<td>3335MV157TS</td>
<td>33350-MV157 on test</td>
</tr>
<tr>
<td></td>
<td>3335NV158</td>
<td>33350-NV158 opens spuriously</td>
</tr>
<tr>
<td></td>
<td>3335NV159</td>
<td>33350-NV159 opens spuriously</td>
</tr>
<tr>
<td></td>
<td>3335NV33</td>
<td>33350-NV33 opens spuriously</td>
</tr>
<tr>
<td></td>
<td>3335NV34</td>
<td>33350-NV34 opens spuriously</td>
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<td></td>
<td>3335NV358</td>
<td>33350-NV358 opens spuriously</td>
</tr>
<tr>
<td></td>
<td>3335NV47</td>
<td>33350-NV47 opens spuriously</td>
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<tr>
<td></td>
<td>3335NV48</td>
<td>33350-NV48 opens spuriously</td>
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<tr>
<td></td>
<td>3341MV1</td>
<td>33410-MV1 open spuriously</td>
</tr>
<tr>
<td></td>
<td>3341MV10</td>
<td>33410-MV10 open spuriously</td>
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<tr>
<td></td>
<td>3341MV10TS</td>
<td>33410-MV10 on test</td>
</tr>
<tr>
<td></td>
<td>3341MV11</td>
<td>33410-MV11 open spuriously</td>
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<tr>
<td></td>
<td>3341MV11TS</td>
<td>33410-MV11 on test</td>
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<td>3341MV1TS</td>
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<td>3341MV2</td>
<td>33410-MV2 open spuriously</td>
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<td></td>
<td>3341MV2TS</td>
<td>33410-MV2 on test</td>
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<tr>
<td></td>
<td>3341MV4</td>
<td>33410-MV4 open spuriously</td>
</tr>
<tr>
<td></td>
<td>3341MV4TS</td>
<td>33410-MV4 on test</td>
</tr>
<tr>
<td></td>
<td>3341MV5</td>
<td>33410-MV5 open spuriously</td>
</tr>
<tr>
<td></td>
<td>3341MV5TS</td>
<td>33410-MV5 on test</td>
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<tr>
<td></td>
<td>3341MV7</td>
<td>33410-MV7 open spuriously</td>
</tr>
<tr>
<td></td>
<td>3341MV7TS</td>
<td>33410-MV7 on test</td>
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<tr>
<td></td>
<td>3341MV8</td>
<td>33410-MV8 open spuriously</td>
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<tr>
<td></td>
<td>3341MV8TS</td>
<td>33410-MV8 on test</td>
</tr>
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<td></td>
<td>BM-CHDTEST</td>
<td>LOCA conditioning logic on Test E-5 (Channel D)</td>
</tr>
<tr>
<td></td>
<td>BM-CHETEST</td>
<td>LOCA conditioning logic on Test E-5 (Channel E)</td>
</tr>
<tr>
<td></td>
<td>BM-CHFTEST</td>
<td>LOCA conditioning logic on Test E-5 (Channel F)</td>
</tr>
<tr>
<td></td>
<td>BM-CHSTEST</td>
<td>LOCA conditioning logic on Test E-5 (Channel S)</td>
</tr>
<tr>
<td>Category</td>
<td>Label IE-44-</td>
<td>Description (PARA-L1P)</td>
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<tr>
<td>----------</td>
<td>-------------</td>
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<tr>
<td>ECI Blowback contd.</td>
<td>SPBM-CHD</td>
<td>Spurious signal from LOCA conditioning logic (Channel D)</td>
</tr>
<tr>
<td></td>
<td>SPBM-CHE</td>
<td>Spurious signal from LOCA conditioning logic (Channel E)</td>
</tr>
<tr>
<td></td>
<td>SPBM-CHF</td>
<td>Spurious signal from LOCA conditioning logic (Channel F)</td>
</tr>
<tr>
<td></td>
<td>SPBM-CHS</td>
<td>Spurious signal from LOCA conditioning logic (Channel S)</td>
</tr>
<tr>
<td></td>
<td>SPHTPL-CHD</td>
<td>Spurious signal from LOCA HTS pressure low logic (Channel D)</td>
</tr>
<tr>
<td></td>
<td>SPHTPL-CHE</td>
<td>Spurious signal from LOCA HTS pressure low logic (Channel E)</td>
</tr>
<tr>
<td></td>
<td>SPHTPL-CHF</td>
<td>Spurious signal from LOCA HTS pressure low logic (Channel F)</td>
</tr>
<tr>
<td></td>
<td>SPHTPL-CHS</td>
<td>Spurious signal from LOCA HTS pressure low logic (Channel S)</td>
</tr>
<tr>
<td></td>
<td>SPHTPV-L-CHD</td>
<td>Spurious signal from LOCA HTS pressure low logic (Channel D)</td>
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<td></td>
<td>SPHTPV-L-CHE</td>
<td>Spurious signal from LOCA HTS pressure low logic (Channel E)</td>
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<td>SPHTPV-L-CHF</td>
<td>Spurious signal from LOCA HTS pressure low logic (Channel F)</td>
</tr>
<tr>
<td></td>
<td>SPHTPV-L-CHS</td>
<td>Spurious signal from LOCA HTS pressure low logic (Channel S)</td>
</tr>
<tr>
<td></td>
<td>BLR-CHDTEST</td>
<td>LOCA high boiler room pressure logic on test E-2 or E-6 (Channel D)</td>
</tr>
<tr>
<td></td>
<td>BLR-CHETEST</td>
<td>LOCA high boiler room pressure logic on test E-2 or E-6 (Channel E)</td>
</tr>
<tr>
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<td>BLR-CHFTEST</td>
<td>LOCA high boiler room pressure logic on test E-2 or E-6 (Channel F)</td>
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<tr>
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<td>BLR-CHSTEST</td>
<td>LOCA high boiler room pressure logic on test E-2 or E-6 (Channel S)</td>
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<tr>
<td></td>
<td>HTPLVL-CHDTEST</td>
<td>LOCA HTS pressure low / very low logic on test E-1 or E-6 (Channel D)</td>
</tr>
<tr>
<td></td>
<td>HTPLVL-CHETEST</td>
<td>LOCA HTS pressure low / very low logic on test E-1 or E-6 (Channel E)</td>
</tr>
<tr>
<td></td>
<td>HTPLVL-CHFTEST</td>
<td>LOCA HTS pressure low / very low logic on test E-1 or E-6 (Channel F)</td>
</tr>
<tr>
<td></td>
<td>HTPLVL-CHSTEST</td>
<td>LOCA HTS pressure low / very low logic on test E-1 or E-6 (Channel S)</td>
</tr>
<tr>
<td></td>
<td>MOD-CHDTEST</td>
<td>LOCA high moderator inventory logic on test E-3 or E-7 (Channel D)</td>
</tr>
<tr>
<td>Category</td>
<td>Label</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------</td>
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<tr>
<td>MOD-CHETEST</td>
<td>IE-44-</td>
<td>LOCA high moderator inventory logic on test E-3 or E-7 (Channel E)</td>
</tr>
<tr>
<td>MOD-CHFTEST</td>
<td>IE-44-</td>
<td>LOCA high moderator inventory logic on test E-3 or E-7 (Channel F)</td>
</tr>
<tr>
<td>MOD-CHSTEST</td>
<td>IE-44-</td>
<td>LOCA high moderator inventory logic on test E-3 or E-7 (Channel S)</td>
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### Table 3: List of Systems Modelled by Fault Trees in the Internal Events PSAs

<table>
<thead>
<tr>
<th>System Name</th>
<th>L1 At-Power</th>
<th>L1 Outage</th>
<th>Level 2 At-Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat Transport System Feed, Bleed, Relief and D₂O Storage and Transfer System</td>
<td>Y</td>
<td>Y</td>
<td>*</td>
</tr>
<tr>
<td>Heat Transport System D₂O Recovery System</td>
<td>Y</td>
<td>Y</td>
<td>*</td>
</tr>
<tr>
<td>Heat Transport Pump Gland Seal Supply and Gland Seal LOCA</td>
<td>Y</td>
<td>Y</td>
<td>*</td>
</tr>
<tr>
<td>Heat Transport Shutdown Cooling System</td>
<td>Y</td>
<td>Y</td>
<td>*</td>
</tr>
<tr>
<td>Moderator and ECI Recovery Systems</td>
<td>Y</td>
<td>Y</td>
<td>*</td>
</tr>
<tr>
<td>Boiler Feedwater System</td>
<td>Y</td>
<td>Y</td>
<td>*</td>
</tr>
<tr>
<td>Boiler Emergency Cooling System</td>
<td>Y</td>
<td>N</td>
<td>*</td>
</tr>
<tr>
<td>Steam Relief System</td>
<td>Y</td>
<td>Y</td>
<td>*</td>
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<tr>
<td>Class IV Power Supply System</td>
<td>Y</td>
<td>Y</td>
<td>*</td>
</tr>
<tr>
<td>Class III Power Supply System</td>
<td>Y</td>
<td>Y</td>
<td>*</td>
</tr>
<tr>
<td>Class II Power Supply System</td>
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<td>Y</td>
<td>*</td>
</tr>
<tr>
<td>Class I Power Supply System</td>
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<tr>
<td>Low Pressure Service Water System</td>
<td>Y</td>
<td>Y</td>
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</tr>
<tr>
<td>Recirculated Cooling Water System</td>
<td>Y</td>
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<tr>
<td>High Pressure Service Water System</td>
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<td>Low Pressure Instrument Air System</td>
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<tr>
<td>High Pressure Instrument Air System</td>
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<td>*</td>
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<tr>
<td>Emergency Coolant Injection System</td>
<td>Y</td>
<td>Y</td>
<td>*</td>
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<tr>
<td>Emergency Boiler Water Supply System</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>Standby Generator Fuel Oil System</td>
<td>Y</td>
<td>Y</td>
<td>*</td>
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<tr>
<td>Hostile Environment Events</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>Shutdown System A</td>
<td>Y</td>
<td>N</td>
<td>*</td>
</tr>
<tr>
<td>Shutdown System E</td>
<td>Y</td>
<td>N</td>
<td>*</td>
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<tr>
<td>Annulus Gas System</td>
<td>Y</td>
<td>Y</td>
<td>*</td>
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<tr>
<td>Digital Control Computer</td>
<td>Y</td>
<td>Y</td>
<td>*</td>
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<tr>
<td>Heating and Ventilation (Electrical Rooms, MCR, CER)</td>
<td>Y</td>
<td>Y</td>
<td>*</td>
</tr>
<tr>
<td>Reactivity Control System</td>
<td>Y</td>
<td>N</td>
<td>*</td>
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<tr>
<td>Condensate System</td>
<td>Y</td>
<td>Y</td>
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<td>Emergency Coolant Injection System Blowback</td>
<td>Y</td>
<td>Y</td>
<td>*</td>
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<tr>
<td>Shutdown Heat Sinks</td>
<td>N</td>
<td>Y</td>
<td>*</td>
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<tr>
<td>Pressure Relief Valves</td>
<td>N</td>
<td>N</td>
<td>Y</td>
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<tr>
<td>Containment Isolation, Airlocks and Hydrogen Ignition System</td>
<td>N</td>
<td>N</td>
<td>Y</td>
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<tr>
<td>Boiler Room and Fuelling Machine Vault Air Cooling Units</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Hydrogen Ignition System</td>
<td>N</td>
<td>N</td>
<td>Y</td>
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* Included in Level 2 At-Power Model through integration with Level 1 At-Power Model.
### Table 4: PARA-L1O Plant Operational States

<table>
<thead>
<tr>
<th>Input Parameter</th>
<th>Plant Operational State (POS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>GSS</td>
<td>Dumped</td>
</tr>
<tr>
<td>HTS Inventory Level</td>
<td>Primary side of all boilers full</td>
</tr>
<tr>
<td>HTS Boundary Configuration</td>
<td>Closed</td>
</tr>
<tr>
<td>Typical HTS Pressure (ROH)</td>
<td>HTS depressurized</td>
</tr>
<tr>
<td>Typical Primary Heat Sink</td>
<td>SDCS pumps</td>
</tr>
<tr>
<td>(Circulation)</td>
<td></td>
</tr>
<tr>
<td>Typical Primary Heat Sink</td>
<td>SDCS HXs</td>
</tr>
<tr>
<td>(Heat Removal)</td>
<td></td>
</tr>
<tr>
<td>Typical Backup Heat Sink</td>
<td>SDCS pumps</td>
</tr>
<tr>
<td>(Circulation)</td>
<td></td>
</tr>
<tr>
<td>Typical Backup Heat Sink</td>
<td>SDCS HXs</td>
</tr>
<tr>
<td>(Heat Removal)</td>
<td></td>
</tr>
<tr>
<td>Emergency Heat Sink</td>
<td>EBWS supply to boilers, heat rejection via SRVs</td>
</tr>
<tr>
<td>Time Average (days) - Duration per Unit per Year</td>
<td>34.6</td>
</tr>
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</table>
### Table 5: Initiating Events for PARA-L1O

<table>
<thead>
<tr>
<th>IE-LABEL</th>
<th>DEFINITION</th>
<th>APPLICABLE POS</th>
</tr>
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<tbody>
<tr>
<td></td>
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<td>POS A</td>
</tr>
<tr>
<td>SDC-HX</td>
<td>Loss of SDCS heat removal</td>
<td>Y</td>
</tr>
<tr>
<td>SDC-FLOW</td>
<td>Loss of SDCS flow</td>
<td>Y</td>
</tr>
<tr>
<td>BLDCLR</td>
<td>Loss of bleed cooling</td>
<td>Y</td>
</tr>
<tr>
<td>TLOFW</td>
<td>Total loss of feedwater</td>
<td>Y</td>
</tr>
<tr>
<td>BLOWDOWN</td>
<td>Loss of boiler blowdown</td>
<td>Y</td>
</tr>
<tr>
<td>LEAK1</td>
<td>HTS leak inside containment from depressurized HTS greater than capacity of D2O make-up</td>
<td>Y</td>
</tr>
<tr>
<td>LLEAK</td>
<td>Small HTS leak inside containment from depressurized HTS within capacity of D2O make-up</td>
<td>Y</td>
</tr>
<tr>
<td>LOCA1</td>
<td>Rupture of pressurized HTS within the capacity of D2O make-up</td>
<td>-</td>
</tr>
<tr>
<td>LLOCA</td>
<td>Rupture of pressurized HTS beyond the capacity of D2O make-up</td>
<td>-</td>
</tr>
<tr>
<td>LEAK-SDC</td>
<td>Rupture of SDCS piping</td>
<td>Y</td>
</tr>
<tr>
<td>SDCHXTB</td>
<td>Break of SDCS HX tube</td>
<td>Y</td>
</tr>
<tr>
<td>PTF</td>
<td>Pressure tube failure</td>
<td>-</td>
</tr>
<tr>
<td>PTL</td>
<td>Pressure tube leak</td>
<td>Y</td>
</tr>
<tr>
<td>SGTB</td>
<td>Boiler tube leak</td>
<td>-</td>
</tr>
<tr>
<td>BLOWBACK</td>
<td>Blowback outside containment through ECIS piping</td>
<td>-</td>
</tr>
<tr>
<td>U1LSLB-OC</td>
<td>U1 large steamline break</td>
<td>Y</td>
</tr>
<tr>
<td>U5678-LSLB-OC</td>
<td>Large steamline break at Pickering NGS B</td>
<td>Y</td>
</tr>
<tr>
<td>U1LFB</td>
<td>U1 large feedline break</td>
<td>Y</td>
</tr>
<tr>
<td>PHFREEZE</td>
<td>Spurious operation of powerhouse venting during cold weather</td>
<td>Y</td>
</tr>
<tr>
<td>U15678-BREAK-IC</td>
<td>High energy line break inside containment from any high power unit</td>
<td>Y</td>
</tr>
<tr>
<td>LOPIC-HIGH</td>
<td>Loss of HTS pressure &amp; inventory control leading to high pressure</td>
<td>-</td>
</tr>
<tr>
<td>LOPIC-LOW</td>
<td>Loss of HTS pressure &amp; inventory control leading to low pressure</td>
<td>-</td>
</tr>
<tr>
<td>SDC-INV</td>
<td>Loss of HTS inventory leads to failure of SDCS circulation</td>
<td>Y</td>
</tr>
<tr>
<td>LOBES</td>
<td>Loss of off-site power</td>
<td>Y</td>
</tr>
<tr>
<td>LOSWYD</td>
<td>Loss of switchyard</td>
<td>Y</td>
</tr>
<tr>
<td>LOSST</td>
<td>Loss of System Service Transformers or associated breakers</td>
<td>Y</td>
</tr>
<tr>
<td>LOCL4</td>
<td>Total loss of Class IV power</td>
<td>Y</td>
</tr>
<tr>
<td>LOCL4BU</td>
<td>Loss of one or several Class IV busses</td>
<td>Y</td>
</tr>
<tr>
<td>LOCL3BU</td>
<td>Loss of one or several Class III busses</td>
<td>Y</td>
</tr>
<tr>
<td>LOCL2BU</td>
<td>Loss of one or several Class II busses</td>
<td>Y</td>
</tr>
<tr>
<td>LOCL1BU</td>
<td>Loss of one or several Class I busses</td>
<td>Y</td>
</tr>
<tr>
<td>LOLPSW</td>
<td>Total loss of low pressure service water</td>
<td>Y</td>
</tr>
<tr>
<td>FOREBAY</td>
<td>Adverse conditions in forebay affects service water supply</td>
<td>Y</td>
</tr>
<tr>
<td>LOHPSW</td>
<td>Total loss of high pressure service water</td>
<td>Y</td>
</tr>
<tr>
<td>LORCW</td>
<td>Total loss of recirculated cooling water</td>
<td>Y</td>
</tr>
<tr>
<td>TLOIA</td>
<td>Total loss of instrument air</td>
<td>Y</td>
</tr>
</tbody>
</table>
## Table 6: PARA-L2P Plant Damage States

<table>
<thead>
<tr>
<th>PDS</th>
<th>Representative Accident Sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDS1</td>
<td>No representative sequence required</td>
</tr>
<tr>
<td>PDS2A</td>
<td>Not used.</td>
</tr>
<tr>
<td>PDS2B</td>
<td>Out-of-core LOCA with failure of moderator cooling, ECIS injection and recovery,</td>
</tr>
<tr>
<td></td>
<td>and FADS.</td>
</tr>
<tr>
<td>PDS2C</td>
<td>Out-of-core LOCA with failure of moderator cooling, ECIS injection and recovery,</td>
</tr>
<tr>
<td></td>
<td>FADS, and igniters.</td>
</tr>
<tr>
<td>PDS2D</td>
<td>Not used.</td>
</tr>
<tr>
<td>PDS2E</td>
<td>Out-of-core LOCA with failure of moderator cooling, ECIS injection and recovery,</td>
</tr>
<tr>
<td></td>
<td>ACUs in the accident unit, and FADS.</td>
</tr>
<tr>
<td>PDS2F</td>
<td>Out-of-core LOCA with failure of moderator cooling, ECIS injection and recovery,</td>
</tr>
<tr>
<td></td>
<td>ACUs in the accident unit, igniters, and FADS.</td>
</tr>
<tr>
<td>PDS2G</td>
<td>Out-of-core LOCA with failure of moderator cooling, ECIS injection and recovery,</td>
</tr>
<tr>
<td></td>
<td>igniters, and FADS, and a large containment envelope impairment.</td>
</tr>
<tr>
<td>PDS2H</td>
<td>Out-of-core LOCA with failure of moderator cooling, ECIS injection and recovery,</td>
</tr>
<tr>
<td></td>
<td>ACUs in the accident unit, igniters, and FADS, and a large containment envelope impairment.</td>
</tr>
<tr>
<td>PDS2I</td>
<td>Not used.</td>
</tr>
<tr>
<td>PDS2J</td>
<td>Out-of-core LOCA with failure of moderator cooling, ECIS injection and recovery,</td>
</tr>
<tr>
<td></td>
<td>FADS, igniters, and a small containment envelope impairment.</td>
</tr>
<tr>
<td>PDS2K</td>
<td>Out-of-core LOCA with failure of moderator cooling, ECIS injection and recovery,</td>
</tr>
<tr>
<td></td>
<td>FADS, ACUs in the accident unit and igniters, and a small containment envelope impairment.</td>
</tr>
<tr>
<td>PDS3-2U</td>
<td>Secondary side line break with EBWS failure in Unit 4 and a total loss of heat sinks in Unit 1.</td>
</tr>
<tr>
<td>PDS3-6U</td>
<td>Total loss of heat sinks in all 6 Pickering units.</td>
</tr>
<tr>
<td>PDS4</td>
<td>Multiple steam generator tube rupture, failure of ECIS and moderator cooling.</td>
</tr>
</tbody>
</table>
Table 7: Pickering NGS A Release Categorization Scheme

<table>
<thead>
<tr>
<th>Release Category #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC1</td>
<td>Large early release with potential for acute offsite radiation effects and/or widespread contamination (greater than 3% core inventory of I-131/Cs-137).</td>
</tr>
<tr>
<td>RC2</td>
<td>Release in excess of $10^{14}$ Bq of Cs-137 but less than RC1 occurring within 24 hours.</td>
</tr>
<tr>
<td>RC3</td>
<td>Release in excess of $10^{14}$ Bq of Cs-137 but less than RC1 occurring after 24 hours.</td>
</tr>
</tbody>
</table>
### Table 8: Results for the Pickering NGS A PSA

<table>
<thead>
<tr>
<th>PSA Element</th>
<th>SCDF  ((x \times 10^{-5} \text{ per r-year}))</th>
<th>LRF  ((x \times 10^{-5} \text{ per r-year}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Events At-Power</td>
<td>1.63</td>
<td>0.47</td>
</tr>
<tr>
<td>Internal Events Shutdown</td>
<td>0.66</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>Internal Fires At-Power</td>
<td>4.73</td>
<td>0.84</td>
</tr>
<tr>
<td>Internal Fires Shutdown</td>
<td>(Note 1)</td>
<td>(Note 1)</td>
</tr>
<tr>
<td>Internal Floods At-Power</td>
<td>1.02</td>
<td>0.20</td>
</tr>
<tr>
<td>Internal Floods Shutdown</td>
<td>(Note 1)</td>
<td>(Note 1)</td>
</tr>
<tr>
<td>Seismic Events At-Power</td>
<td>0.26 (Note 2)</td>
<td>0.26 (Note 2)</td>
</tr>
<tr>
<td>Seismic Events Shutdown</td>
<td>(Note 1)</td>
<td>(Note 1)</td>
</tr>
<tr>
<td>High Wind At-Power</td>
<td>2.69 (Note 2)</td>
<td>0.80 (Note 2)</td>
</tr>
<tr>
<td>High Wind Shutdown</td>
<td>(Note 1)</td>
<td>(Note 1)</td>
</tr>
<tr>
<td>OPG’s Safety Goal Limit</td>
<td>10</td>
<td>1</td>
</tr>
</tbody>
</table>

**Notes:**

1. The risk for a shutdown unit was shown to be bounded by the risk for an at-power unit. The PSA conservatively assumed that the unit was continuously at-power.

2. The risk was estimated for seismic events / high winds with a return period up to and including 10,000 years.
Table 9: PARA-L1P Frequency of Fuel Damage Categories

<table>
<thead>
<tr>
<th>Fuel Damage Category</th>
<th>Definition</th>
<th>Frequency (per r-yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDC1</td>
<td>Rapid loss of core structural integrity</td>
<td>$2.80 \times 10^7$</td>
</tr>
<tr>
<td>FDC2</td>
<td>Slow loss of core structural integrity</td>
<td>$1.60 \times 10^5$</td>
</tr>
<tr>
<td>Severe Core Damage</td>
<td>(FDC1 + FDC2)</td>
<td>$1.63 \times 10^5$</td>
</tr>
</tbody>
</table>

Table 10: PARA-L1O Frequency of FDC2 by POS

<table>
<thead>
<tr>
<th>Fuel Damage Category</th>
<th>Plant Operating State</th>
<th>Time-Average Frequency (per r-yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDC2-SD</td>
<td>POS A</td>
<td>$3.68 \times 10^{-6}$</td>
</tr>
<tr>
<td></td>
<td>POS B</td>
<td>$2.95 \times 10^{-6}$</td>
</tr>
<tr>
<td></td>
<td>POS C</td>
<td>0</td>
</tr>
<tr>
<td>Severe Core Damage</td>
<td>All</td>
<td>$6.63 \times 10^{-6}$</td>
</tr>
</tbody>
</table>
Table 11: PARA-L2P Plant Damage State Frequency

<table>
<thead>
<tr>
<th>PDS</th>
<th>Frequency (/r·yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDS1</td>
<td>$2.80 \times 10^{-7}$</td>
</tr>
<tr>
<td>PDS2</td>
<td>$1.28 \times 10^{-5}$</td>
</tr>
<tr>
<td>PDS3 – 2U</td>
<td>$1.89 \times 10^{-6}$</td>
</tr>
<tr>
<td>PDS3 – 6U</td>
<td>$1.30 \times 10^{-6}$</td>
</tr>
<tr>
<td>PDS4</td>
<td>$7.20 \times 10^{-8}$</td>
</tr>
</tbody>
</table>

Table 12: PARA-L2P Release Category Frequency

<table>
<thead>
<tr>
<th>Release Category</th>
<th>Frequency (/r·yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC1</td>
<td>$4.69 \times 10^{-6}$</td>
</tr>
<tr>
<td>RC2</td>
<td>(Note 1)</td>
</tr>
<tr>
<td>RC3</td>
<td>$3.45 \times 10^{-8}$</td>
</tr>
<tr>
<td>LRF</td>
<td>$4.72 \times 10^{-6}$</td>
</tr>
</tbody>
</table>

Notes:

1. No sequences were assigned to this RC.
# PICKERING A RISK ASSESSMENT SUMMARY REPORT

## Table 13: High Wind Hazard and Wind Speed Ranges

<table>
<thead>
<tr>
<th>Sub-interval</th>
<th>Wind Speed [km/hr]</th>
<th>Wind Speed Frequency Distribution Parameters [per year]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Range</td>
<td>Mid Pt.</td>
</tr>
<tr>
<td>F1-1</td>
<td>117 - 137</td>
<td>127</td>
</tr>
<tr>
<td>F1-2</td>
<td>137 - 158</td>
<td>147</td>
</tr>
<tr>
<td>F1-3</td>
<td>158 - 180</td>
<td>169</td>
</tr>
<tr>
<td>F2-1</td>
<td>180 - 203</td>
<td>191</td>
</tr>
<tr>
<td>F2-2</td>
<td>203 - 227</td>
<td>215</td>
</tr>
<tr>
<td>F2-3</td>
<td>227 - 253</td>
<td>240</td>
</tr>
<tr>
<td>F3-1</td>
<td>253 - 285</td>
<td>269</td>
</tr>
<tr>
<td>F3-2</td>
<td>285 - 332</td>
<td>308</td>
</tr>
<tr>
<td>F4</td>
<td>332 - 418</td>
<td>375</td>
</tr>
<tr>
<td>F5</td>
<td>&gt;418</td>
<td></td>
</tr>
</tbody>
</table>
### Appendix A: Abbreviations and Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACU</td>
<td>Air Cooling Unit</td>
</tr>
<tr>
<td>BECS</td>
<td>Boiler Emergency Cooling System</td>
</tr>
<tr>
<td>Bq</td>
<td>Bequerels</td>
</tr>
<tr>
<td>CAFTA</td>
<td>Computer Aided Fault Tree Analysis System</td>
</tr>
<tr>
<td>CANDU</td>
<td>CANadian Deuterium Uranium</td>
</tr>
<tr>
<td>CCDP</td>
<td>Conditional Core Damage Probability</td>
</tr>
<tr>
<td>CER</td>
<td>Control Equipment Room</td>
</tr>
<tr>
<td>CET</td>
<td>Containment Event Tree</td>
</tr>
<tr>
<td>CNSC</td>
<td>Canadian Nuclear Safety Commission</td>
</tr>
<tr>
<td>CSIM</td>
<td>Core Structural Integrity Maintained</td>
</tr>
<tr>
<td>Cs-137</td>
<td>Cesium-137</td>
</tr>
<tr>
<td>D₂O</td>
<td>Deuterium Oxide (Heavy Water)</td>
</tr>
<tr>
<td>DCC</td>
<td>Digital Control Computer</td>
</tr>
<tr>
<td>EBWS</td>
<td>Emergency Boiler Water Supply System</td>
</tr>
<tr>
<td>ECIS</td>
<td>Emergency Coolant Injection System</td>
</tr>
<tr>
<td>ECVF</td>
<td>Early Calandria Vessel Failure</td>
</tr>
<tr>
<td>EME</td>
<td>Emergency Mitigating Equipment</td>
</tr>
<tr>
<td>ERO</td>
<td>Emergency Response Organization</td>
</tr>
<tr>
<td>ET</td>
<td>Event Tree</td>
</tr>
<tr>
<td>FADS</td>
<td>Filtered Air Discharge System</td>
</tr>
<tr>
<td>FDC</td>
<td>Fuel Damage Category</td>
</tr>
<tr>
<td>FHA</td>
<td>Fire Hazard Assessment</td>
</tr>
<tr>
<td>FIF</td>
<td>Fire Ignition Frequency</td>
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<tr>
<td>FSSA</td>
<td>Fire Safe Shutdown Assessment</td>
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<tr>
<td>FT</td>
<td>Fault Tree</td>
</tr>
<tr>
<td>FTREX</td>
<td>Fault Tree Reliability Evaluation eXpert</td>
</tr>
<tr>
<td>GSS</td>
<td>Guaranteed Shutdown State</td>
</tr>
<tr>
<td>HCLPF</td>
<td>High Confidence of Low Probability of Failure.</td>
</tr>
<tr>
<td>HGL</td>
<td>Hot Gas Layer</td>
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<td>HPECI</td>
<td>High Pressure Emergency Coolant Injection</td>
</tr>
<tr>
<td>HPSW</td>
<td>High Pressure Service Water</td>
</tr>
<tr>
<td>HRA</td>
<td>Human Reliability Analysis</td>
</tr>
<tr>
<td>HTS</td>
<td>Heat Transport System</td>
</tr>
<tr>
<td>HX</td>
<td>Heat Exchanger</td>
</tr>
<tr>
<td>Hz</td>
<td>Hertz (1 Hz = 1 cycle per second)</td>
</tr>
<tr>
<td>IE</td>
<td>Initiating Event</td>
</tr>
<tr>
<td>IFB</td>
<td>Irradiated Fuel Bay</td>
</tr>
<tr>
<td>IGN</td>
<td>Hydrogen Igniters</td>
</tr>
<tr>
<td>ISTB</td>
<td>Inter-Station Transfer Bus</td>
</tr>
<tr>
<td>I-131</td>
<td>Iodine-131</td>
</tr>
<tr>
<td>kg/s</td>
<td>Kilograms per second</td>
</tr>
<tr>
<td>km/hr</td>
<td>Kilometres per hour</td>
</tr>
<tr>
<td>kV</td>
<td>Kilo-Volts</td>
</tr>
<tr>
<td>LCEI</td>
<td>Large Containment Envelope Impairment</td>
</tr>
<tr>
<td>LOCA</td>
<td>Loss-of-Coolant Accident</td>
</tr>
</tbody>
</table>
### Acronym | Definition
---|---
LPSW | Low Pressure Service Water
LRF | Large Release Frequency
m | Metres
$m^2$ | Metres squared
MAAP | Modular Accident Analysis Program
MCA | Multi-Compartment Analysis
MCR | Main Control Room
MPa | Mega Pascals (10^6 Pascals)
MPa(g) | Mega Pascals gauge
MWe | Megawatt electrical
NGS | Nuclear Generating Station
NPCS | Negative Pressure Containment System
NRC | U.S. Nuclear Regulatory Commission
occ/yr | Occurrences per year
OPG | Ontario Power Generation
PAU | Physical Analysis Unit
PARA | Pickering NGS A Probabilistic Safety Assessment
PARA-FIRE | Pickering NGS A At-Power Internal Fire PSA
PARA-FLOOD | Pickering NGS A At-Power Internal Flooding PSA
PARA-WIND | Pickering NGS A At-Power High Wind PSA
PARA-L1O | Pickering NGS A Level 1 Outage PSA for Internal Events
PARA-L1P | Pickering NGS A Level 1 At-Power PSA for Internal Events
PARA-L2P | Pickering NGS A Level 2 At-Power PSA for Internal Events
PARA-SEISMIC | Pickering NGS A At-Power PSA-Based Seismic Margin Assessment
PDS | Plant Damage State
PEVS | Powerhouse Emergency Venting System
POS | Plant Operational State
PSA | Probabilistic Safety Assessment
PRD | Pressure Relief Duct
PRV | Pressure Relief Valve
RC | Release Category
RCWS | Recirculating Cooling Water System
RLE | Review Level Earthquake
RRS | Reactor Regulating System
SCDF | Severe Core Damage Frequency
SCEI | Small Containment Envelope Impairment
SCFF | Seismically induced Containment Failure Frequency
SDCS | Shutdown Cooling System
SDS | Shutdown System
SDSE | Shutdown System Enhancement
SEL | Seismic Equipment List
SMA | Seismic Margin Assessment
SRV | Steam Reject Valve
SSC | Systems Structures and Components
THERP | Technique for Human Error Rate Prediction
UHRS | Uniform Hazard Response Spectrum
Pickering NGS PSA Update to Include Enhancements from the Fukushima Integrated Action Plan

P-REP-03611-00006-R000

2014-04-30

Other Reference Number:
K-410077-REPT-0002, Rev.02

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Associated with document type REP N-TMP-10010-R010, Controlled Document or Record (Microsoft® 2007)
# Pickering NGS PRA Update To Include Enhancements From The Fukushima Integrated Action Plan

## Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Tables</td>
<td>4</td>
</tr>
<tr>
<td>Revision Summary</td>
<td>5</td>
</tr>
<tr>
<td>Executive Summary</td>
<td>6</td>
</tr>
<tr>
<td><strong>1.0</strong> INTRODUCTION</td>
<td>10</td>
</tr>
<tr>
<td>1.1 Objectives</td>
<td>10</td>
</tr>
<tr>
<td>1.2 Scope</td>
<td>11</td>
</tr>
<tr>
<td>1.3 Organization of Summary Report</td>
<td>12</td>
</tr>
<tr>
<td><strong>2.0</strong> RISK AND THE FUKUSHIMA INTEGRATED ACTION PLAN</td>
<td>13</td>
</tr>
<tr>
<td>2.1 Risk Terminology</td>
<td>13</td>
</tr>
<tr>
<td>2.2 Fukushima Integrated Action Plan</td>
<td>13</td>
</tr>
<tr>
<td>2.2.1 Emergency Mitigating Equipment at Pickering NGS A</td>
<td>14</td>
</tr>
<tr>
<td>2.2.2 Emergency Mitigating Equipment at Pickering NGS B</td>
<td>15</td>
</tr>
<tr>
<td><strong>3.0</strong> UPDATE OF THE PICKERING NGS A S-294 COMPLIANT PSAS</td>
<td>16</td>
</tr>
<tr>
<td>3.1 Level 1 At-Power PSA for Internal Events</td>
<td>16</td>
</tr>
<tr>
<td>3.1.1 Introduction</td>
<td>16</td>
</tr>
<tr>
<td>3.1.2 Summary of Changes</td>
<td>16</td>
</tr>
<tr>
<td>3.1.3 Results Summary</td>
<td>19</td>
</tr>
<tr>
<td>3.2 Level 2 At-Power PSA for Internal Events</td>
<td>20</td>
</tr>
<tr>
<td>3.2.1 Introduction</td>
<td>20</td>
</tr>
<tr>
<td>3.2.2 Summary of Changes</td>
<td>20</td>
</tr>
<tr>
<td>3.2.3 Results Summary</td>
<td>21</td>
</tr>
<tr>
<td>3.3 Internal Flood At-Power PSA</td>
<td>22</td>
</tr>
<tr>
<td>3.3.1 Introduction</td>
<td>22</td>
</tr>
<tr>
<td>3.3.2 Summary of Changes</td>
<td>22</td>
</tr>
<tr>
<td>3.3.3 Results Summary</td>
<td>23</td>
</tr>
<tr>
<td>3.4 Seismic Events At-Power</td>
<td>24</td>
</tr>
<tr>
<td>3.4.1 Introduction</td>
<td>24</td>
</tr>
<tr>
<td>3.4.2 Summary of Changes</td>
<td>24</td>
</tr>
<tr>
<td>3.4.3 Results Summary</td>
<td>26</td>
</tr>
<tr>
<td>3.5 High Wind At-Power</td>
<td>26</td>
</tr>
<tr>
<td>3.5.1 Introduction</td>
<td>26</td>
</tr>
<tr>
<td>3.5.2 Summary of Changes</td>
<td>26</td>
</tr>
<tr>
<td>3.5.3 Results Summary</td>
<td>27</td>
</tr>
<tr>
<td>3.6 Outage PSAs</td>
<td>28</td>
</tr>
<tr>
<td>3.7 Improved Assessment of LRF at Pickering NGS A</td>
<td>29</td>
</tr>
<tr>
<td>3.7.1 Introduction</td>
<td>29</td>
</tr>
<tr>
<td>3.7.2 Improved LRF Estimates</td>
<td>29</td>
</tr>
</tbody>
</table>

N-TMP-10010-R010 (Microsoft® 2007)
4.0 UPDATE OF THE PICKERING NGS B S-294 COMPLIANT PSAS ......................... 31
  4.1 Level 1 At-Power PSA for Internal Events .............................................. 31
    4.1.1 Introduction ....................................................................................... 31
    4.1.2 Summary of Changes ........................................................................ 31
    4.1.3 Results Summary .............................................................................. 33
  4.2 Level 2 At-Power PSA for Internal Events .............................................. 33
    4.2.1 Introduction ....................................................................................... 33
    4.2.2 Summary of Changes ........................................................................ 34
    4.2.3 Results Summary .............................................................................. 35
  4.3 Internal Fire PSA .................................................................................... 36
    4.3.1 Introduction ....................................................................................... 36
    4.3.2 Summary of Changes ........................................................................ 36
    4.3.3 Results Summary .............................................................................. 37
  4.4 High Wind PSA ....................................................................................... 37
    4.4.1 Introduction ....................................................................................... 37
    4.4.2 Summary of Changes ........................................................................ 38
    4.4.3 Results Summary .............................................................................. 39

5.0 CONCLUSIONS ....................................................................................... 40

6.0 REFERENCES ......................................................................................... 41

Appendix A: Abbreviations and Acronyms .................................................. 50
List of Tables

Table 1: OPG’s Risk Based Safety goals .................................................................42
Table 2: Results of the Pickering NGS A Level 1 At-Power PSA for Internal Events ....42
Table 3: Results of the Pickering NGS A Level 2 At-Power PSA for Internal Events ....43
Table 4: Applicability of Actions in the Fukushima integrated action plan .................44
Table 5: Results of the Updated Level 1 Pickering NGS PSAs ..................................47
Table 6: Results of the Updated Level 2 Pickering NGS PSAs ..................................48
Table 7: Improved Estimate of LRF at Pickering NGS A ........................................49
Report

Title: Pickering NGS PRA Update To Include Enhancements From The Fukushima Integrated Action Plan

Revision Summary

<table>
<thead>
<tr>
<th>Revision Number</th>
<th>Date</th>
<th>Comments</th>
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<tr>
<td>R000</td>
<td>April 2014</td>
<td>Initial issue.</td>
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Executive Summary

OPG prepared Probabilistic Safety Assessments (PSA) for Pickering NGS A and Pickering NGS B to provide comprehensive assessments of the safety of the stations. These PSAs complied with the requirements of Canadian Nuclear Safety Commission Regulatory Standard S-294 Probabilistic Safety Assessment (PSA) for Nuclear Power Plants.

The results of the Pickering S-294 compliant PSAs were reported in:


Pickering Power Reactor Operating Licence 48.00/2018 established a hold-point of 210,000 Effective Full Power Hours for the Pickering pressure tubes. Prior to removal of the hold point, OPG was required to update the Pickering S-294 compliant PSAs to take into account the enhancements required under the Canadian Nuclear Safety Commission’s Fukushima Integrated Action Plan.

OPG updated only the Pickering S-294 compliant PSAs for hazards that were significant to risk. For example, the Pickering NGS B PSA for internal floods was not updated due to the very low risk from internal floods.

The most risk significant enhancement required under the Fukushima Integrated Action Plan was the Emergency Mitigating Equipment (EME). The EME was incorporated into all of the updated PSAs. The Pickering NGS A S-294 compliant PSAs for internal fires and high winds had already incorporated the EME.

OPG also incorporated some of the lessons learned in the preparation of the S-294 compliant PSAs into the updated PSAs. Only lessons that were likely to affect risk and were easily incorporated into the PSA were addressed.

The purpose of this report is to summarize the changes made to the S-294 compliant PSAs and to report the results of the updated PSAs.

OPG uses Severe Core Damage Frequency (SCDF) and Large Release Frequency (LRF) as safety goals. The intent of these safety goals is to ensure that the risk arising from nuclear accidents associated with the operation of OPG’s nuclear power reactors is low in comparison to the risks to which the public is normally exposed.

The following tables summarize the SCDF and LRF for each of the hazards analysed in the PSA.

For Pickering NGS A, the updated SCDF for each hazard is at least one order of magnitude below OPG’s safety goal limit and the updated LRF for each hazard is no more than 20% of OPG’s safety goal limit.

For Pickering NGS B, the updated SCDF for each hazard is at least two orders of magnitude below OPG’s safety goal limit and the updated LRF for each hazard at least one order of magnitude below OPG’s safety goal limit.

OPG further updated the estimate of Pickering NGS A LRF to better take account of the risk associated with a shutdown unit. This further reduced the estimate of LRF for Pickering NGS A.
# Results of the Pickering NGS PSA Update

<table>
<thead>
<tr>
<th>PSA Element</th>
<th>PSA Updated?</th>
<th>Severe Core Damage Frequency (x 10⁻⁵ per reactor-year)</th>
<th>Large Release Frequency (x 10⁻⁵ per reactor-year)</th>
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<tr>
<td></td>
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<tr>
<td>Internal Events At-Power</td>
<td>Y</td>
<td>1.63</td>
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<tr>
<td>Internal Events Shutdown</td>
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</tr>
<tr>
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<td>4.73</td>
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</tr>
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<td>(Note 1)</td>
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<td>1.02</td>
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<td>(Note 1)</td>
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<td>(Note 1)</td>
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<td>0.08</td>
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### Results of the Pickering NGS B PSA

<table>
<thead>
<tr>
<th>PSA Element</th>
<th>PSA Updated?</th>
<th>Severe Core Damage Frequency ((x \times 10^{-5} \text{ per reactor-year}))</th>
<th>Large Release Frequency ((x \times 10^{-5} \text{ per reactor-year}))</th>
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<tr>
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<td></td>
<td>Baseline</td>
<td>Updated</td>
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<td>Internal Events At-Power</td>
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<td>0.08</td>
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<tr>
<td>Internal Events Shutdown</td>
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<td>Internal Fires At-Power</td>
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<tr>
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<td>(Note 1)</td>
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<td>Internal Floods At-Power</td>
<td>N</td>
<td>0.07</td>
<td>n/a</td>
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<tr>
<td>Internal Floods Shutdown</td>
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<td>(Note 1)</td>
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</tr>
<tr>
<td>Seismic Events At-Power</td>
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<tr>
<td>Seismic Events Shutdown</td>
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<td>(Note 1)</td>
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<tr>
<td>High Wind At-Power</td>
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<tr>
<td>High Wind Shutdown</td>
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<td>OPG's Safety Goal Limit</td>
<td>-</td>
<td>10</td>
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</tbody>
</table>
# Pickering NGS PSA Update To Include Enhancements From The Fukushima Integrated Action Plan

## Pickering NGS A LRF with Improved Estimate of Risk

<table>
<thead>
<tr>
<th>PSA Element</th>
<th>Large Release Frequency (x 10^{-5} per reactor-year)</th>
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<td>High Wind At-Power</td>
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<tr>
<td>High Wind Shutdown</td>
<td>0</td>
</tr>
<tr>
<td>OPG's Safety Goal Limit</td>
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</tr>
</tbody>
</table>

## Notes:

1. The risk for a shutdown unit was shown to be bounded by the risk for an at-power unit. These results conservatively assume that all units are continuously at power.

n/a not applicable
INTRODUCTION

OPG prepared Probabilistic Safety Assessments (PSA) for Pickering NGS A and Pickering NGS B to provide comprehensive assessments of the safety of the stations. These PSAs complied with the requirements of Canadian Nuclear Safety Commission (CNSC) Regulatory Standard S-294 Probabilistic Safety Assessment (PSA) for Nuclear Power Plants [R1].

The results of the Pickering S-294 compliant PSAs were reported in:

- NA44-REP-03611-00036 Pickering A Risk Assessment Summary Report [R2].
- NK30-REP-03611-00021 Pickering B Risk Assessment Summary Report [R3].

Pickering Power Reactor Operating Licence 48.00/2018 established a hold-point of 210,000 Effective Full Power Hours for the Pickering pressure tubes. Prior to removal of the hold point, OPG was required to update the Pickering S-294 compliant PSAs to take into account the enhancements required under the CNSC’s Fukushima Integrated Action Plan [R4].

OPG also incorporated some of the lessons learned in the preparation of the S-294 compliant PSAs into the updated PSAs. Lessons were incorporated if they were likely to affect risk and were easily incorporated into the PSAs.

OPG also updated the estimate of Pickering NGS A LRF to better take account of the risk associated with a shutdown unit. This further reduced the estimate of LRF for Pickering NGS A.

The purpose of this report is to summarize the changes made to the S-294 compliant PSAs and to report the results of the updated PSAs.

OPG updated only the S-294 compliant PSAs for hazards that were significant to risk. For example, the Pickering NGS B PSA for internal floods was not updated due to the very low risk from internal floods.

Objectives

The principal objectives of the updated Pickering PSAs were:

1. To update the S-294 compliant PSAs for risk significant hazards at Pickering NGS A to include both the enhancements required under the CNSC’s Fukushima Integrated Action Plan [R4] and the lessons learned during the preparation of the S-294 compliant PSAs.

2. To update the S-294 compliant PSAs for risk significant hazards at Pickering NGS B to include both the enhancements required under the CNSC’s Fukushima Integrated Action Plan [R4] and the lessons learned during the preparation of the S-294 compliant PSAs.
3. To update the LRF estimate for Pickering NGS A to better take account of the risk associated a shutdown unit.

1.2 Scope

The Pickering S-294 compliant PSAs addressed in detail the following hazards:

- Internal events, e.g. Loss of Coolant Accident or Main Steamline Break.
- Internal fires.
- Internal floods.
- Seismic events.
- High winds.

OPG updated only the S-294 PSAs for hazards that were significant to risk. Therefore, the scope of the Pickering PSA update was limited to the following:

- Internal events at-power at Pickering NGS A.
- Internal floods at Pickering NGS A.
- Seismic events at Pickering NGS A.
- High winds at Pickering NGS A.
- Internal events at-power at Pickering NGS B.
- Internal fires at-power at Pickering NGS B.
- High winds at-power at Pickering NGS B.

Neither the Pickering S-294 compliant PSAs nor the updated PSAs cover the following sources of risk:

- Fuelling machine accidents while the fuelling machine is in transit between the reactor face and the Irradiated Fuel Bay (IFB). Analysis demonstrated that fuelling machine accidents while in transit cannot result in a large release of radioactive material to the environment.
- Hazards from chemical materials used and stored at the plant.
- Other external initiating events such as external floods, airplane crashes, train derailment, etc.
- Other internal initiating events such as turbine missiles.
These types of hazards were addressed separately through screening studies or other deterministic hazard studies.

The Pickering S-294 compliant PSAs and the updated PSAs were limited to hazards affecting the reactors. Accidents affecting other sources of radioactive material such as the IFB are outside of the scope of this report.

1.3 Organization of Summary Report

This summary report includes:

- A brief summary of risk terminology and the PSA-related elements of the CNSC’s Fukushima Integrated Action Plan (Section 2.0).

- A summary of the changes made to the Pickering NGS A S-294 compliant PSAs and the results of the updated PSAs (Section 3.0). This section includes the assessment of LRF at Pickering NGS A that better accounts for the risk associated with a shutdown unit.

- A summary of the changes made to the Pickering NGS B S-294 compliant PSAs and the results of the updated PSAs (Section 4.0).

- Conclusions (Section 5.0).

Appendix A contains a list of abbreviations and acronyms used in this report.
2.0 RISK AND THE FUKUSHIMA INTEGRATED ACTION PLAN

2.1 Risk Terminology

Risk is defined as the product of the frequency of a hazardous event and the consequences of the event. Risk is expressed in units of consequence per unit time.

\[
\text{Risk} = \text{Frequency} \times \text{Consequences}
\]

Risk provides a means of quantifying the degree of safety associated with a potentially hazardous activity and provides a common basis for comparing the relative safety of different activities. One of the principles of risk assessment is that the larger the numerical value of risk for a particular event, the more important the event is to safety. Thus, measures taken to reduce risk improve the level of safety.

OPG uses PSA to quantify the risk associated with accidents at its nuclear generating stations. For a nuclear generating station, the events studied are those leading to fuel damage in the reactor core or airborne releases of radioisotopes into the environment.

OPG uses a two level approach to assess risk:

- A Level 1 PSA to assess the frequency of severe core damage. Events resulting in severe core damage release radioactive material from the fuel into containment.
- A Level 2 PSA to assess the frequency and magnitude of airborne releases of radioactive material from containment to the environment.

OPG has defined two risk parameters based upon the PSA approach: Severe Core Damage Frequency (SCDF) and Large Release Frequency (LRF). These parameters are estimated in the Level 1 PSA and the Level 2 PSA, respectively.

OPG has defined safety goals for both SCDF and LRF, see Table 1. The intent of these safety goals is to ensure that the radiological risk arising from nuclear accidents at OPG’s nuclear power reactors is low in comparison to risks to which the public is normally exposed.

2.2 Fukushima Integrated Action Plan

In response to the accident at the Fukushima Daiichi Nuclear Power Plant, the CNSC prepared an action plan [R4]. The Integrated Action Plan applied to all nuclear facilities and addressed:

- Strengthening defence in depth.
- Enhancing emergency response.
- Improving the regulatory framework.
Pickering NGS PSA Update To Include Enhancements From The Fukushima Integrated Action Plan

- Enhancing international collaboration.
- Communications and public consultation.

The actions related to nuclear power plants were summarized in Annex A of the CNSC’s Integrated Action Plan [R4].

Table 4 lists the actions in the Fukushima Integrated Action Plan that were potentially relevant to the updated PSAs and explains how these actions were addressed by OPG. In summary, the following changes were made in the updated PSAs:

1. The Emergency Mitigating Equipment (EME) was incorporated into all updated PSAs.
2. An improved model of calandria vault pressure relief was incorporated into the thermal hydraulic analysis in the updated Pickering NGS B Level 2 PSA for internal events (Section 4.2.2).
3. The Passive Autocatalytic Recombiners (PARS) were included in the updated thermal-hydraulic analysis in the updated Pickering NGS B Level 2 PSA for internal events (Section 4.2.2).

### 2.2.1 Emergency Mitigating Equipment at Pickering NGS A

The EME is stored in a light frame structure located north of the Brock Road security building. The EME building is not seismically robust; however, collapse of the building is not expected to damage the EME. The EME building is not robust with respect to wind damage; however, the EME itself will be tied down to prevent wind induced toppling or sliding. Provision has been made to clear the structure if it is damaged in an earthquake or wind storm, and so allow access to the EME.

Following an Initiating Event (IE), the EME is deployed to pre-determined locations in the plant and connected to the designated tie-in points. Deployment of the EME is initiated by the Shift Manager in the Main Control Room (MCR) and follows pre-approved procedures. EME deployment is routinely drilled.

Provision has been made to clear debris from the path between the EME building and the plant following an external event.

The EME is comprised of:

- Two portable uninterruptible power supplies per unit to provide short term power to the instrumentation necessary to monitor key plant parameters.
- One diesel generator per unit to provide long term power to the instrumentation necessary to monitor key plant parameters.
- One self powered pump for each unit that can be deployed either in the Reactor Auxiliary Bay or in the Turbine Auxiliary Bay. The pump draws lake water.
through hose routed from the suction channel of the Condenser Cooling Water pumps, and can provide make-up to the secondary side of the boilers, to the Heat Transport System (HTS) and to the calandria.

### 2.2.2 Emergency Mitigating Equipment at Pickering NGS B

The EME for use at Pickering NGS B is stored in the same building as the EME for use at Pickering NGS A, see Section 2.2.1.

The EME is comprised of:

- One portable uninterruptible power supply per unit to provide short term power to the instrumentation necessary to monitor key plant parameters.
- One diesel generator per unit to provide long term power to the instrumentation necessary to monitor key plant parameters.
- One common self powered pump that is deployed to the west side of the Pickering NGS B screenhouse. This pump can supply make-up to the secondary side of the boilers and the HTS for all four Pickering B units, and to the high pressure Emergency Coolant Injection System (ECIS) storage tank.
- One common self powered pump that is deployed to the east side of the Pickering NGS B screenhouse. This pump can supply make-up to the HTS and calandria for all four Pickering B units, and to the IFB.
- One self powered pump for each unit that is deployed in the Reactor Auxiliary Bay or in the Turbine Auxiliary Bay, and can provide make-up to the secondary side of the boilers, to the HTS and to the calandria.
3.0 UPDATE OF THE PICKERING NGS A S-294 COMPLIANT PSAs

3.1 Level 1 At-Power PSA for Internal Events

3.1.1 Introduction

The goal of a Level 1 at-power PSA for internal events is to identify the initiating events at a plant that can challenge fuel cooling, to identify the systems that can mitigate the initiating events, to determine if the initiating events result in fuel damage should the mitigating systems fail, to determine the total frequency of events that result in fuel damage, and to identify the major contributors to fuel damage.

Internal events are those that occur within the station. In the Pickering NGS A PSAs:

- IEs may affect either a single Pickering NGS A unit or both Pickering NGS A units.
- IEs originating at Pickering NGS B that affect Pickering NGS A are also included.

The methodology for the S-294 compliant Level 1 at-power PSA for internal events was summarized in [R2]. The methodology is consistent with the current state of practice and was accepted by the CNSC.

The updated Level 1 at-power PSA for internal events generally followed the same methodology used in the S-294 compliant Level 1 at-power PSA for internal events. However:

- The methodology was revised to incorporate the EME. This included developing a methodology for estimating human error probabilities associated with EME deployment. The human error methodology was accepted by the CNSC.
- Only those elements of the methodology required to estimate the SCDF were completed. Elements of the methodology not required to estimate the SCDF, e.g. parametric uncertainty analysis, were not completed as part of the updated PSAs.

3.1.2 Summary of Changes

The following summarizes the changes that were incorporated into the updated Pickering NGS A Level 1 at-power PSA for internal events:

1. The S-294 compliant PSA used a single IE, label IE-44-LO250, to represent the simultaneous failure of both unit Class I 250 V dc busses 55100-BUA1 and BUB1. This simplification is conservative as the two busses are generally not connected and operate independently.

In the updated PSA, the failure of the unit Class I 250 V dc supply was represented as two separate IEs, labelled IE-44-LO5510BUA1 and IE-44-LO5510BUB1.
A new Event Tree (ET) was prepared for each of these two new IEs.

2. In the S-294 compliant PSA, Pickering operating experience to the end of 2011 was used in the quantification of IE frequency.

In the updated PSA, Pickering operating experience to the end of 2012 was used in the quantification of IE frequency. The use of the most up to date data set provides a more reliable assessment of risk and ensures consistency between the updated Pickering NGS A PSAs and the updated Pickering NGS B PSAs. However, this change had little impact upon overall risk.

3. In the S-294 compliant PSA, the units were assumed to be at full power for 100% of the operating cycle. This simplification results in overlap and double counting with the Level 1 outage PSA for internal events.

In the updated PSA, the IE frequencies were scaled by the average time fraction that a reactor is not in the Guaranteed Shutdown State (GSS). That is, the at-power IE frequencies were multiplied by a factor of 0.78.

IEs occurring while a reactor is in the GSS are covered in the Level 1 outage PSA for internal events.

4. The EME was not credited in the S-294 compliant Level 1 at-power PSA for internal events.

The EME was incorporated into the updated PSA:

- The ETs were revised to include EME make-up to the boilers, the ECIS and the calandria. However, not all accident sequences credit the EME, for example:
  - For some sequences, e.g. large Loss of Coolant Accident (LOCA) and failure of the ECIS, there is insufficient time to deploy the EME prior to the onset of severe core damage.
  - For some sequences, e.g. a total loss of feedwater, the IE may render an EME injection path unavailable.

- The Fault Trees (FT) for the boiler feedwater system, the HTS and the moderator system were revised to include tie in points for the EME.

- A new FT for the EME was prepared. This FT included failures of the EME equipment and human errors during EME deployment.

- A methodology was developed to estimate human error probability for EME deployment. As EME deployment is initiated from the MCR by the Shift Manager, follows pre-approved procedures and is regularly drilled, the methodology is very similar to that used for post-accident actions in the S-294 compliant PSA. This methodology was accepted by the CNSC.
5. In a PSA, only equipment qualified to operate in a harsh environment is typically credited to mitigate an IE that causes a harsh environment. Non-qualified equipment located in a harsh environment is assumed to fail.

In the S-294 compliant PSA, a large feedwater line break was assumed to cause a harsh environment in both the accident unit and the non-accident unit.

Thermal-hydraulic analysis performed after completion of the S-294 compliant PSA showed that, following a large feedwater line break, a harsh environment does not occur in all areas of the non-accident unit. Therefore, non-qualified equipment in these areas can be credited to operate following a large feedwater line break.

The system level FTs were revised to reflect the new thermal hydraulic analysis for large feedwater line breaks.

6. In the S-294 compliant Level 1 at-power PSA for internal events, the Class III motor control centres 54130-MCC101x and MCC102x were assumed to be supplied only from the inter-station transfer bus. The normal Class III power supply to the motor control centres was not credited as it is not environmentally qualified for all accident scenarios.

Not all accident scenarios result in a harsh environment at the Class III power supplies; therefore, in the updated PSA, the conservative simplification was corrected. That is, in the updated PSA, it was assumed that the Class III motor control centres could be supplied from either the inter-station transfer bus or the normal Class III power supply unless the accident sequence caused a harsh environment.

7. In the S-294 compliant PSA, it was assumed that the Emergency Boiler Water Supply System (EBWS) can not supply water from Pickering NGS B to Pickering NGS A in the event of a loss of Class IV electrical power at Pickering NGS B. This assumption resulted from a contradiction between two documents.

The contradictory documents were made consistent. The updated PSA credits make-up to the Pickering NGS A boilers from the EBWS even in the event of a loss of Class IV electrical power at Pickering NGS B.

8. In the S-294 compliant PSA, it was assumed that failure open of the EBWS test flowpath (6-73140-V853, V854 and V855) can divert sufficient flow to render the EBWS unavailable.

Analysis performed after completion of the S-294 compliant PSA demonstrated that failure open of the EBWS test flowpath will not divert sufficient flow to render the EBWS unavailable.

In the updated PSA, failure open of the EBWS flowpath was removed from the feedwater FT.
9. In the S-294 compliant PSA, it was assumed that at least one moderator room air cooling unit is required to prevent moderator pump overheating following a LOCA. This assumption was a conservative simplification, moderator room cooling is not required for small LOCAs and single channel events.

In the updated PSA, the moderator system FTs were revised to remove the requirement for moderator room cooling for small LOCAs and single channel events.

10. In the S-294 compliant PSA, Pickering operating experience to the end of 2011 was used in the quantification of component failure rates used in the mitigating system FTs.

In the updated PSA, Pickering operating experience to the end of 2012 was used in the quantification of component failure rates. The use of the most up to date data set provides a more reliable assessment of risk and ensures consistency between the updated Pickering NGS A PSAs and the updated Pickering NGS B PSAs. However, this change had little impact upon overall risk.

11. Some systems at Pickering NGS B support accident mitigation at Pickering NGS A. For example, the Pickering NGS B High Pressure Water System supplies the Pickering NGS A EBWS. Therefore, the Pickering NGS A PSAs include FT models for some Pickering NGS-B systems.

The FT models revised as part of the update of the Pickering NGS B PSA (Section 4.1.2 of this report) were incorporated into the updated Pickering NGS A PSA.

3.1.3 Results Summary

Table 2 summarizes the results of the updated Level 1 at-power PSA for internal events:

- The updated SCDF, $0.83 \times 10^{-5}$ per reactor-year, is more than one order of magnitude below OPG’s safety goal limit.
- The updated SCDF is approximately one half of the SCDF estimated in the S-294 compliant PSA.
- The updated SCDF due to sequences involving failure to shutdown (FDC1), $2.12 \times 10^{-7}$ per reactor-year, is less than the frequency estimated in the S-294 compliant PSA. The reduction mainly results from weighting the IE frequency by the time fraction that the reactor is not in the GSS, item 3 in Section 3.1.2.
- The updated SCDF due to the failure of all heat sinks (FDC2), $0.81 \times 10^{-5}$ per reactor-year, is approximately one half of the frequency estimated in the S-294 compliant PSA. The reduction mainly results from:
3.2 Level 2 At-Power PSA for Internal Events

3.2.1 Introduction

The goal of a Level 2 at-power PSA for internal events is to study the events at a plant that result in fuel damage to determine:

- How system failures and accident phenomena might result in an airborne release of radioactive material to the environment.
- The characteristics of the release, e.g. its magnitude and timing.

The above information is combined with the Level 1 PSA for internal events to quantify the frequency of releases. The frequency estimate includes:

- IEs that affect either a single Pickering NGS A unit or both Pickering NGS A units.
- IEs originating at Pickering NGS B that affect Pickering NGS A.

The methodology for the S-294 compliant Level 2 at-power PSA for internal events was summarized in [R2]. The methodology is consistent with the current state of practice and was accepted by the CNSC.

The updated Level 2 at-power PSA for internal events generally followed the same methodology used in the S-294 compliant Level 2 at-power PSA for internal events. However:

- The methodology was revised to incorporate the EME. This included developing a methodology for estimating human error probabilities associated with EME deployment. The human error methodology was accepted by the CNSC.
- Only those elements of the methodology required to estimate the LRF were completed.

3.2.2 Summary of Changes

The following summarizes the changes that were incorporated into the updated Pickering NGS A Level 2 at-power PSA for internal events:

1. Changes made in the Level 1 at-power PSA for internal events (Section 3.1.2) flowed through to the Level 2 at-power PSA for internal events during Level 1 / Level 2 integration.
2. In the S-294 compliant PSA, Pickering operating experience to the end of 2011 was used in the quantification of component failure rates used in the containment system fault trees.

In the updated PSA, Pickering operating experience to the end of 2012 was used in the quantification of component failure rates used in the containment system fault trees. This change is the equivalent of item 10 in Section 3.1.2.

3. The Instrumented Pressure Relief Valves (IPRV) control containment pressure in the hold-up period following an accident. The IPRVs are normally controlled from the Pickering NGS A MCR but control can be transferred to the Pickering NGS B Unit 5 Unit Emergency Control Centre (UECC).

In the S-294 compliant PSA, it was assumed that control could be transferred to the UECC for the full range of accident sequences.

In the updated PSA, it was assumed that control cannot be transferred for LOCAs with an initial discharge rate of more than 100 kg/s. For LOCAs with an initial discharge rate of more than 100 kg/s, the UECC may become uninhabitable due to the transport of fission products along the Pressure Relief Duct.

4. The estimate of LRF includes IEs originating at Pickering NGS B. Some of the sequences for these IEs result in a large release in the Pickering NGS B Level 2 PSA; therefore, counting these sequences in the Pickering NGS A PSA constitutes double counting.

In the S-294 compliant PSA, sequences originating at Pickering B that result in a large release in the Pickering NGS B Level 2 PSA were maintained in the results of the Pickering NGS A Level 2 PSA.

In the updated PSA, sequences originating at Pickering B that result in a large release in the Pickering NGS B Level 2 PSA were eliminated from the results of the Pickering NGS A Level 2 PSA. This reduced the frequency of RC1 and LRF by approximately $3 \times 10^{-7}$ per reactor-year.

### 3.2.3 Results Summary

Table 3 summarizes the results of the updated Level 2 at-power PSA for internal events:

- The updated LRF, $1.72 \times 10^6$ per reactor-year, is almost one order of magnitude below OPG’s safety goal limit.
- The updated LRF is approximately one third of the LRF estimated in the S-294 compliant PSA. The reduction mainly results from:
  - Weighting the IE frequency by the time fraction that the reactor is not in the GSS, item 3 in Section 3.1.2.
3.3 Internal Flood At-Power PSA

3.3.1 Introduction

The goal of a PSA for internal floods is to:

- Study how floods originating within the station may affect fuel cooling and lead to severe core damage or large airborne releases of radioactive material to the environment.
- Estimate the flood-induced SCDF.
- Estimate the flood-induced LRF.

Internal floods are those occurring within the station. In the Pickering NGS A PSAs:

- Internal floods may affect either a single Pickering NGS A unit or both Pickering NGS A units.
- Floods originating at Pickering NGS B that affect Pickering NGS A are also included.

The methodology for the S-294 compliant at-power PSA for internal floods was summarized in [R2]. The methodology is consistent with the current state of practice and was accepted by the CNSC.

The updated at-power PSA for internal floods generally followed the same methodology used in the S-294 compliant at-power PSA for internal floods. However:

- The methodology was revised to incorporate the EME. This included developing a methodology for estimating human error probabilities associated with EME deployment. The human error methodology was accepted by the CNSC.
- Only those elements of the methodology required to estimate the SCDF and the LRF were completed.

3.3.2 Summary of Changes

The following summarizes the changes that were incorporated into the updated Pickering NGS A at-power PSA for internal floods:

1. Changes made in the Level 1 at-power PSA for internal events (Section 3.1.2), including credit for the EME, flowed through to the internal flood PSA through use of the forced shutdown event tree in the preparation of the Level 1 flood model.
2. In the S-294 compliant PSA, the units were assumed to be at full power for 100% of the operating cycle.

   In the updated PSA, the IE frequencies were scaled by the average time fraction that a reactor is not in the Guaranteed Shutdown State (GSS). That is, the estimated IE frequencies were multiplied by a factor of 0.78.

   IEs occurring while a reactor is in the GSS are covered in Section 3.6.

3. In the S-294 compliant Level 1 at-power PSA for internal events, the Class III motor control centres 54130-MCC101x and MCC102x were assumed to be supplied only from the inter-station transfer bus. The normal Class III power supply to the motor control centres was not credited as it is not environmentally qualified for all accident scenarios.

   Internal floods do not result in a harsh environment at the Class III power supplies; therefore, in the updated flood PSA, the conservative simplification was corrected. That is, in the updated flood PSA, it was assumed that the Class III motor control centres could be supplied from either the inter-station transfer bus or the normal Class III power supply.

### 3.3.3 Results Summary

Tables 5 and 6 summarize the results of the updated at-power PSA for internal floods:

1. The updated SCDF for internal floods, $0.56 \times 10^{-5}$ per reactor-year, is:
   - More than one order of magnitude below OPG’s safety goal limit limit.
   - Approximately one half of the SCDF estimated in the S-294 compliant flood PSA.

2. The updated LRF for internal floods at-power, $0.09 \times 10^{-5}$ per reactor-year, is:
   - Approximately one order of magnitude below OPG’s safety goal limit.
   - Approximately one half of the LRF estimated in the S-294 compliant flood PSA.

3. The reduction in the SCDF and the LRF mainly result from:
   - Weighting the IE frequency by the time fraction that the reactor is not in the GSS, item 3 in Section 3.1.2.
   - Credit for the EME to mitigate a total loss of heat sinks, item 4 in Section 3.1.2.
3.4 Seismic Events At-Power

3.4.1 Introduction

The goal of a PSA based Seismic Margin Assessment (SMA) is to:

- Determine the seismic robustness of equipment required to shutdown the reactor, remove decay heat and contain radioactive material.
- Study how seismically induced failures of systems, structures and components may affect fuel cooling and lead to severe core damage or large airborne releases of radioactive material.
- Estimate the seismically induced SCDF.
- Estimate the seismically induced LRF.

Seismic events are external events that are assumed to affect both Pickering NGS A units at the same time.

The methodology for the S-294 compliant at-power PSA based SMA was summarized in [R2]. The methodology is consistent with the current state of practice and was accepted by the CNSC.

The updated at-power PSA based SMA generally followed the same methodology used in the S-294 compliant at-power PSA based SMA. However:

- The methodology was revised to include deployment of the EME supply to the boilers. This included developing a methodology for estimating human error probabilities associated with EME deployment. The human error methodology was accepted by the CNSC.
- Only those elements of the methodology required to estimate the SCDF and the LRF were completed.

3.4.2 Summary of Changes

The following summarizes the changes that were incorporated into the updated Pickering NGS A at-power PSA based SMA:

1. Changes made in the Level 1 at-power PSA for internal events (Section 3.1.2) flowed through to the PSA based SMA through use of the FTs in the Level 1 seismic model.

2. In the S-294 compliant PSA based SMA, the units were assumed to be at full power for 100% of the operating cycle.

In the updated PSA based SMA, the IE frequencies were scaled by the average time fraction that a reactor is not in the Guaranteed Shutdown State (GSS).
is, the estimated IE frequencies were multiplied by a factor of 0.78.

IEs occurring while a reactor is in the GSS are covered in Section 3.6.

3. EME make-up to the boilers was incorporated into the Level 1 seismic model.

EME make-up to the moderator was not incorporated into the Level 1 seismic model; there is insufficient time to refill the calandria and prevent severe core damage following a seismic event.

EME make-up to the HTS was not incorporated into the Level 1 seismic model; the instrument air supplying valves in the EME flowpath is not seismically qualified and, therefore, the valves are assumed to fail closed following a seismic event.

4. The LRF was not explicitly estimated in the S-294 compliant PSA based SMA. Instead, the Pickering NGS A units were assumed to be perfectly correlated, i.e. the earthquake affects both units identically. If two units progress to severe core damage at the same time, containment will fail consequentially and there will be a large release of radioactive material to the environment. Therefore, the seismically induced SCDF was set equal to the seismically induced LRF.

However, in the S-294 compliant PSA based SMA, it was determined that the dominant contributor to seismically induced SCDF was random, independent failures of unitized equipment, not seismically induced failures of equipment. Therefore, assuming that the Pickering NGS A units are perfectly correlated is overly conservative.

In the updated PSA based SMA, the seismically induced LRF was estimated by:

- Distinguishing between single unit sequences and two unit sequences in the results of the Level 1 seismic model.

  Two-unit sequences were assumed to progress from severe core damage to a large release.

- For single unit sequences, the contribution to LRF was estimated by considering:
  
  i) Severe core damage on a single unit progressing to a large release as the result of early calandria vessel failure.
  
  ii) Severe core damage on a single unit coupled with random failures of the containment boundary.
  
  iii) Severe core damage on both units as the result of random, independent failures of heat sink components on both units.
### 3.4.3 Results Summary

Tables 5 and 6 summarize the results of the updated at-power PSA based SMA:

1. The plant level HCLPF increased from 0.22g to 0.23g. This reduced the contribution of seismically induced failures to both the SCDF and the LRF.

2. The updated at-power seismically induced SCDF, $0.18 \times 10^{-5}$ per reactor-year, is more than one order of magnitude below OPG's safety goal limit.

3. The updated seismically induced SCDF is approximately 70% of the estimate in the S-294 compliant PSA based SMA, $0.26 \times 10^{-5}$ per reactor-year.

4. The updated seismically induced LRF, $0.04 \times 10^{-5}$ per reactor-year, is more than one order of magnitude below OPG's safety goal limit.

5. The updated seismically induced LRF is almost one order of magnitude below the estimate in the S-294 compliant PSA based SMA.

### 3.5 High Wind At-Power

#### 3.5.1 Introduction

The goal of a PSA for high winds is to:

- Study how high winds may affect fuel cooling and lead to severe core damage or large airborne releases of radioactive material to the environment.

- Estimate the high wind-induced SCDF.

- Estimate the high wind-induced LRF.

The methodology for the S-294 compliant at-power PSA for high winds was summarized in [R2]. The methodology is consistent with the current state of practice and was accepted by the CNSC.

The updated at-power PSA for high winds generally followed the same methodology used in the S-294 compliant at-power PSA for high winds. However, only those elements of the methodology required to estimate the SCDF and LRF were completed.

#### 3.5.2 Summary of Changes

The following summarizes the changes that were incorporated into the updated Pickering NGS A at-power PSA for high winds:

1. Changes made in the Level 1 at-power PSA for internal events (Section 3.1.2) flowed through to the Level 1 high wind PSA through use of the forced shutdown event tree in the preparation of the Level 1 wind model.
2. In the S-294 compliant PSA, the units were assumed to be at full power for 100% of the operating cycle.

In the updated PSA, the IE frequencies were scaled by the average time fraction that a reactor is not in the Guaranteed Shutdown State (GSS). That is, the estimated IE frequencies were multiplied by a factor of 0.78.

IEs occurring while a reactor is in the GSS are covered in Section 3.6.

3. Some systems at Pickering NGS-B support accident mitigation at Pickering NGS A. For example, the Pickering NGS B High Pressure Water System supplies the Pickering NGS A EBWS. Wind-induced failure of the siding on the Pickering NGS B powerhouse can, therefore, affect systems that mitigate a loss of heat sinks in Pickering NGS A.

In the S-294 compliant Pickering NGS B high wind PSA, the wind fragility for the siding on the Pickering NGS B powerhouse was based on a simplified code based approach. In the updated Pickering NGS B high wind PSA (Section 4.4), a more detailed analysis of the fragility of the siding on the Pickering NGS B powerhouse was performed. This analysis matched the more detailed analysis completed in the Pickering NGS A S-294 compliant PSA [R2].

The fragility analysis completed for the updated Pickering NGS B high wind PSA was incorporated into the updated Pickering NGS A high wind PSA.

4. In the Pickering NGS A and Pickering NGS B S-294 compliant high wind PSAs, it was conservatively assumed that there was a 95% correlation between the high wind induced failure of external building siding and rain induced failure of equipment contained in the building.

A detailed assessment indicated that a more realistic value for the high wind / heavy rain correlation was 50%. The detailed assessment took account of the relatively short duration of a wind storm and the fact that the rain would have to “fall horizontally” if it were to penetrate through wind damaged siding to equipment inside the powerhouse.

3.5.3 Results Summary

Tables 5 and 6 summarize the results of the updated at-power PSA for high winds:

1. The updated at-power wind-induced SCDF, \(0.3 \times 10^{-5}\) per reactor-year, is more than one order of magnitude below OPG’s safety goal limit.

2. The updated wind-induced SCDF is approximately one order of magnitude less than the SCDF estimated in the S-294 compliant PSA, \(2.69 \times 10^{-5}\) per reactor-year.

3. The updated at-power wind-induced LRF, \(0.07 \times 10^{-5}\) per reactor-year, is more than one order of magnitude below OPG’s safety goal limit.
4. The updated at-power wind-induced LRF is more than one order of magnitude less than the estimate in the S-294 compliant PSA, $0.80 \times 10^{-5}$ per reactor-year.

### 3.6 Outage PSAs

In the S-294 compliant PSAs for internal floods, seismic events and high winds, it was shown that the risk for a shutdown unit was bounded by the risk for an at-power unit. The SCDF and LRF for internal floods, seismic events and high winds was conservatively reported on the basis that the reactor was at-power for 100% of the operating cycle.

In the updated at-power PSAs for internal floods, seismic events and high winds, the SCDF and LRF were scaled by the average amount of time that a reactor is not in the GSS. That is, the initiating event frequencies were multiplied by a factor of 0.78.

In order to account for the full operating cycle, the SCDF and LRF for an outage unit must be estimated and added to the reported risk data.

In the updated PSA, the contribution of the shutdown state to risk was estimated by:

1. Dividing the reported at-power risk estimate for the hazard by the time fraction that a unit is not in the GSS. This represents the risk if a reactor is at-power for 100% of the operating cycle.

2. Multiplying the risk calculated in 1, above by the time fraction that a unit is in the GSS, i.e. 0.22.

3. Multiplying the risk calculated in 2, above by the time fraction that a shutdown unit is not in Plant Operating State (POS) C, i.e. approximately 96%. It was shown in the Level 2 analysis for an outage unit (Section 5.2 in [R2]), that accidents initiated in POS C do not result in severe core damage or a large release of radioactive material to the environment.

Based on the above:

- The outage SCDF for internal floods is $0.15 \times 10^{-5}$ per reactor-year and the outage LRF for internal floods is $0.02 \times 10^{-5}$ per reactor-year.

- The outage SCDF for seismic events is $0.05 \times 10^{-5}$ per reactor-year and the outage LRF for seismic events is $0.01 \times 10^{-5}$ per reactor-year.

- The outage SCDF for high winds is $0.08 \times 10^{-5}$ per reactor-year and the outage LRF for high winds is $0.02 \times 10^{-5}$ per reactor-year.

It is likely that the estimates of outage risk remain conservative. It is likely that there is insufficient decay heat to result in severe core damage or large releases for much more of an outage than POS C, i.e. for much of POSs A and B.
3.7 Improved Assessment of LRF at Pickering NGS A

3.7.1 Introduction

In [R2], OPG estimated the LRF attributable to internal fires to be $0.84 \times 10^{-5}$ per reactor-year. This estimate accounted for both at-power operation and outage operation.

As the estimate in [R2] included the EME, the Pickering NGS A fire PRA was not updated to include other enhancements required under the FAP.

As explained earlier in this report:

- The outage risk for internal events was not updated.
- The outage risk for internal floods, seismic events and high winds was updated. In particular, the contribution from POS C was eliminated; accidents initiated in POS C do not progress to severe core damage.

The estimate of LRF due to internal fires and the estimates of outage LRF due to internal events, seismic events, internal floods and high winds are conservative. In this section, a more realistic estimate of risk is derived.

3.7.2 Improved LRF Estimates

In [R2], OPG estimated the LRF attributable to internal fires to be $0.84 \times 10^{-5}$ per reactor-year. This estimate accounted for both at-power operation and outage operation.

The total LRF attributable to internal fires can be distributed between at-power operation and outage operation by applying the time fraction that a unit is not in the GSS, i.e. 0.78. Therefore, the at-power LRF is $0.66 \times 10^{-5}$ per reactor-year and the outage LRF is $0.18 \times 10^{-5}$ per reactor-year.

The Level 2 thermal-hydraulic accident progression analysis for a shutdown unit at Pickering NGS A unit included:

- A Loss of Coolant Accident (LOCA) on the shutdown unit at the earliest possible time in each POS.
- A Total Loss of Heat Sinks (TLOHS) on the shutdown unit at the earliest possible time in each POS.
- A LOCA or a Main Steam Line Break on the adjacent at-power unit causing a LOCA in the shutdown unit in POSs A and B. The induced LOCA was assumed to be a double ended failure of a feeder ice plug; ice plugs are not possible in POS C.

The Level 2 analysis for a shutdown unit demonstrated that the only cases where a large release was possible were those in which there was early calandria vessel failure. Furthermore, the earliest time for calandria failure was estimated to be 12.5
hours after accident initiation. This provides more than sufficient time to deploy the EME, add water to the calandria and prevent calandria failure. Preventing calandria failure also prevents a large release.

The analysis described above assumed that the accident was initiated at the earliest possible time in each particular POS. As the time after shutdown increases, so the decay heat level falls, the likelihood of a large release falls, and the time at which a large release occurs, if at all, increases. For example, the time at which a large release occurs due to a TLOHS at the earliest possible entry into POS B is greater than 72 hours, the mission time in OPG’s PRAs.

Given the time available for EME deployment and the likelihood of a large release at any time other than the earliest part of an outage, it is reasonable to reduce the outage LRF by more than one order of magnitude. The outage LRF effectively becomes zero.

Table 7 shows the revised LRF estimates based upon the above.
4.0 UPDATE OF THE PICKERING NGS B S-294 COMPLIANT PSAs

4.1 Level 1 At-Power PSA for Internal Events

4.1.1 Introduction

The goal of a Level 1 at-power PSA for internal events is to identify the initiating events at a plant that can challenge fuel cooling, to identify the systems that can mitigate the initiating events, to determine if the initiating events result in fuel damage should the mitigating systems fail, to determine the total frequency of events that result in fuel damage, and to identify the major contributors to fuel damage.

Internal events are those that occur within the station. In the Pickering NGS B PSAs, IEs may affect either a single Pickering NGS B unit or combinations of Pickering NGS B units.

The methodology for the S-294 compliant Level 1 at-power PSA for internal events was summarized in [R3]. The methodology is consistent with the current state of practice and was accepted by the CNSC.

The updated Level 1 at-power PSA for internal events generally followed the same methodology used in the S-294 compliant Level 1 at-power PSA for internal events. However:

- The methodology was revised to incorporate the EME. This included developing a methodology for estimating human error probabilities associated with EME deployment. The human error methodology was accepted by the CNSC.
- Only those elements of the methodology required to estimate the SCDF were completed.

4.1.2 Summary of Changes

The following summarizes the changes that were incorporated into the updated Pickering NGS B Level 1 at-power PSA for internal events:

1. In the S-294 compliant PSA, the SCDF due to failure to shutdown (FDC1) was estimated to be less than $1 \times 10^{-9}$ per reactor-year.

   In the updated PSA, only the changes in IE frequency and component failure rates could affect the frequency of FDC1. The effect of these data changes was expected to be very small.

   In the updated PSA, the frequency of FDC1 was not updated.

2. In the S-294 compliant PSA, Pickering operating experience to the end of 2011 was used in the quantification of IE frequency.

   In the updated PSA, Pickering operating experience to the end of 2012 was used
in the quantification of IE frequency. Use of the most up to date data set provides a more reliable assessment of risk and ensures consistency between the updated Pickering NGS A PSAs and the updated Pickering NGS B PSAs. However, this change had little impact upon overall risk.

3. In the S-294 compliant PSA, the units were assumed to be at full power for 100% of the operating cycle. This simplification results in overlap and double counting with the Level 1 outage PSA for internal events.

In the updated PSA, the IE frequencies were scaled by the average time fraction that a reactor is not in the Guaranteed Shutdown State (GSS). That is, the at-power IE frequencies were multiplied by a factor of 0.895.

IEs occurring while a reactor is in the GSS are covered in the Level 1 outage PSA for internal events.

4. The EME was not credited in the S-294 compliant PSA.

The EME was incorporated into the updated PSA:

- The ETs were revised to include EME make-up to the boilers, the HTS and the calandria.

- The FTs for the boiler feedwater system, the ECIS and the Emergency Water System (EWS) were revised to include tie in points for the EME.

- A new FT for the EME was prepared. This FT included failures of the EME equipment and human errors during EME deployment.

- A methodology was developed to estimate human error probability for EME deployment. This methodology was accepted by the CNSC.

5. In the S-294 compliant PSA, the Auxiliary Power System (APS) was not credited for the full 72-hour mission assumed in OPG’s PSAs.

Following completion of the S-294 PSAs, changes to the procedures to allow online refuelling of the APS were initiated. These changes when implemented will allow the APS to fully support the 72-hour mission assumed in OPG’s PSAs.

In the updated PSA, the FT for the Class IV electrical power system was revised to credit online refuelling of the APS.

6. In the S-294 compliant PSA, the FT for the Emergency Power System (EPS) included only two Emergency Power Generators (EPG). The third EPG was not included as it was believed that the third EPG was about to be decommissioned.

The third EPG remains in operation and there are no plans to decommission it.

In the updated PSA, the EPS FT was revised to include all three EPGs.

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7. In the S-294 compliant PSA, it was assumed that the power to the ECIS recovery panels 056/078-63335-PL403 to PL406 was provided from the Class II electrical system only.

Power to the ECIS recovery panels can also be provided from the EPS.

In the updated PSA, the ECIS FT was revised to include the EPS back-up supply to the ECIS recovery panels.

8. The S-294 compliant PSA used a single IE to represent the simultaneous failure of both unit Class I 250 V dc busses 55100-BUA1 and BUB1. This simplification is conservative as the two busses are generally not connected and operate independently.

In the updated PSA, the Class I electrical power FT was revised to represent the separation of the two busses. This change is the equivalent of item 1 in Section 3.1.2.

9. In the S-294 compliant PSA, Pickering operating experience to the end of 2011 was used in the quantification of component failure rates used in the mitigating system FTs.

In the updated PSA, Pickering operating experience to the end of 2012 was used in the quantification of component failure rates. Use of the most up to date data set provides a more reliable assessment of risk and ensures consistency between the updated Pickering NGS A PSAs and the updated Pickering NGS B PSAs. However, this change had little impact upon overall risk.

4.1.3 Results Summary

Table 5 summarizes the results of the updated Level 1 at-power PSA for internal events:

1. The updated SCDF, $7.53 \times 10^{-7}$ per reactor-year, is more than two orders of magnitude below OPG’s safety goal limit.

2. The updated SCDF is approximately one fifth of the SCDF estimated in the S-294 compliant PSA.

3. The reduction in the SCDF mainly results from credit for the EME to mitigate a total loss of heat sinks.

4.2 Level 2 At-Power PSA for Internal Events

4.2.1 Introduction

The goal of a Level 2 at-power PSA for internal events is to study the events at a plant that result in fuel damage to determine:
How system failures and accident phenomena might result in an airborne release of radioactive material to the environment.

The characteristics of the release, e.g. its magnitude and timing.

The above information is combined with the Level 1 PSA for internal events to quantify the frequency of releases. The frequency estimate includes IEs that affect either a single Pickering NGS B unit or a combination of Pickering NGS B units.

The methodology for the S-294 compliant Level 2 at-power PSA for internal events was summarized in [R3]. The methodology is consistent with the current state of practice and was accepted by the CNSC.

The updated Level 2 at-power PSA for internal events generally followed the same methodology used in the S-294 compliant Level 2 at-power PSA for internal events. However:

- The methodology was revised to include EME deployment.
- Only those elements of the methodology required to estimate the LRF were completed.

### 4.2.2 Summary of Changes

The following summarizes the changes that were incorporated into the updated Pickering NGS B Level 2 at-power PSA for internal events:

1. Changes made in the Level 1 at-power PSA for internal events (Section 4.1.2) flowed through to the Level 2 at-power PSA for internal events during Level 1 / Level 2 integration.

2. The EME was not credited in the S-294 compliant PSA.

In the updated PSA, the EME was credited:

- Through integration with the updated Level 1 PSA, item 3 in Section 4.1.2.
- To arrest accident progression at in-vessel retention through the supply of EME to the calandria. Arresting accident progression at in-vessel retention precludes corium concrete interaction and so prevents the generation of large volumes of combustible gases.

This change required two revisions to the Containment Event Tree, Section 5.2 in [3]. The first change was the addition of a branch point for failure to arrest accident progression at in-vessel retention, the second change was the addition of a branch point for long-term over-pressure failure of containment due to sustained boil-off from the calandria.
3. In the S-294 PSA, the Filtered Air Discharge System (FADS) was credited as a mitigating system in the Containment Bridging Tree, Figure 13 in [3]. The credit for FADS was removed in the updated PSA. It was determined that FADS may be initiated many hours into a transient when command and control of the plant has been transferred to the Emergency Response Organization (ERO). OPG's current methodology for human reliability analysis does not include actions initiated by the ERO. This change aligns the updated Pickering NGS B PSA with the Pickering NGS A PSA, see Section 5.1.1 of [R2].

4. MAAP-CANDU is an Industry Standard Toolset code used to simulate the thermal-hydraulic aspects of severe accident progression, e.g. core melt, HTS failure, calandria vessel failure, shield tank failure and containment failure. It is also used to estimate the magnitude and timing of airborne releases of radioactive material to the environment.

Version 4.0.7C of MAAP-CANDU was used in the S-294 compliant PSA.

Version 4.0.7D of MAAP-CANDU was used in the updated PSA:

- The changes between versions 4.0.7C and 4.0.7D do not significantly affect the outcome of the thermal-hydraulic analysis.
- Version 4.0.7D was used in the Pickering NGS A Level 2 PSA; therefore, using version 4.0.7D in the Pickering NGS B analysis ensured alignment between the two stations.

The Pickering NGS B parameter file for MAAP-CANDU version 4.0.7D was revised to include an improved model of calandria vault pressure relief and the PARS.

5. In the S-294 compliant PSA, Pickering operating experience to the end of 2011 was used in the quantification of component failure rates used in the containment system fault trees.

In the updated PSA, Pickering operating experience to the end of 2012 was used in the quantification of component failure rates used in the containment system fault trees. This change is the equivalent of item 9 in Section 4.1.2.

4.2.3 Results Summary

Table 6 summarizes the results of the updated Level 2 at-power PSA for internal events:

1. The updated LRF, $3.4 \times 10^{-7}$ per reactor-year, is more than one order of magnitude below OPG’s safety goal limit.
2. The updated LRF is more than one order of magnitude less than the LRF estimated in the S-294 compliant PSA, $0.39 \times 10^{-5}$ per reactor-year.

3. The reduction in the LRF mainly results from credit for the EME to mitigate a total loss of heat sinks.

4.3 Internal Fire PSA

4.3.1 Introduction

The goal of a PSA for internal fires is to:

- Study how fires originating within the station may affect fuel cooling and lead to severe core damage or large airborne releases of radioactive material to the environment.
- Estimate the fire-induced SCDF.
- Estimate the fire-induced LRF.

Internal fires are those occurring within the station. In the Pickering NGS B PSA, internal fires may affect either a single Pickering NGS B unit or multiple Pickering NGS B units.

The methodology for the S-294 compliant at-power PSA for internal fires was summarized in [R3]. The methodology is consistent with the current state of practice and was accepted by the CNSC.

The updated at-power PSA for internal fires generally followed the same methodology used in the S-294 compliant at-power PSA for internal fires. However:

- The methodology was revised to include EME deployment.
- Only those elements of the methodology required to estimate the SCDF and LRF were completed.

4.3.2 Summary of Changes

The following summarizes the changes that were incorporated into the updated Pickering NGS B at-power PSA for internal fires:

1. Changes made in the Level 1 at-power PSA for internal events (Section 4.1.2) flowed through to the fire PSA through use of the forced shutdown event tree and associated fault trees in the preparation of the Level 1 fire model.

2. The EME was not credited in the S-294 compliant PSA.

In the updated PSA, the EME was credited:
Through use of the Level 1 forced shutdown event tree in the preparation of the Level 1 fire model.

Through a revision to the Level 2 fire model to take account of in-vessel retention, see item 2 in Section 4.2.2.

4.3.3 Results Summary

Tables 5 and 6 summarize the results of the updated at-power PSA for internal fires:

1. The updated SCDF, $5.62 \times 10^{-7}$ per reactor-year, is more than two orders of magnitude below OPG’s safety goal limit.

2. The updated SCDF is approximately one seventh of the SCDF estimated in the S-294 compliant PSA, $0.38 \times 10^{-5}$ per reactor-year.

3. The reduction in the SCDF mainly results from credit for the EME to mitigate a total loss of heat sinks.

4. The updated LRF, $4.1 \times 10^{-7}$ per reactor-year, is more than one order of magnitude below OPG’s safety goal limit.

5. The updated LRF is almost one order of magnitude below the LRF estimated in the S-294 compliant PSA, $0.34 \times 10^{-5}$ per reactor-year.

6. The reduction in the LRF mainly results from credit for the EME to mitigate a total loss of heat sinks.

4.4 High Wind PSA

4.4.1 Introduction

The goal of a PSA for high winds is to:

- Study how high winds may affect fuel cooling and lead to severe core damage or large airborne releases of radioactive material to the environment.

- Estimate the high wind-induced SCDF.

- Estimate the high wind-induced LRF.

The methodology for the S-294 compliant at-power PSA for high winds was summarized in [R3]. The methodology is consistent with the current state of practice and was accepted by the CNSC.

The updated at-power PSA for high winds generally followed the same methodology used in the S-294 compliant at-power PSA for high winds. However:

- The methodology was revised to include EME deployment.
Only those elements of the methodology required to estimate the SCDF and LRF were completed.

4.4.2 Summary of Changes

The following summarizes the changes that were incorporated into the updated Pickering NGS B PSA for high winds:

1. Changes made in the Level 1 at-power PSA for internal events (Section 4.1.2) flowed through to the high wind PSA through use of the forced shutdown event tree and associated fault trees in the preparation of the Level 1 high wind model.

2. In the S-294 compliant PSA, the units were assumed to be at full power for 100% of the operating cycle. This simplification results in overlap and double counting with the Level 1 outage PSA for internal events.

   In the updated PSA, the IE frequencies were scaled by the average time fraction that a reactor is not in the Guaranteed Shutdown State (GSS). That is, the at-power IE frequencies were multiplied by a factor of 0.895.

   IEs occurring while a reactor is in the GSS are covered in the Level 1 outage PSA for internal events.

3. A wind hazard analysis was completed for the S-294 compliant Pickering NGS B Level 1 at-power high wind PSA. The Pickering NGS B high wind hazard curve was enhanced for use in the S-294 compliant Pickering NGS A Level 1 at-power high wind PSA:

   - The tornado hazard was improved through the use of a more complete data set provided by Environment Canada.

   - The straight line wind hazard was improved by using all data available in the database rather than a single annual extreme. This provides more accurate extrapolations for rare events and a more accurate assessment of uncertainties.

   - The number of wind speed intervals used in the Level 1 quantification was increased to capture the rapid change in the wind hazard curve. This produced a more refined estimate of risk.

   The enhanced wind hazard curve developed for the S-294 compliant Pickering NGS A Level 1 at-power PSA for high winds was used in the updated Pickering NGS B high wind PSA.

4. In the S-294 compliant PSA, the fragility of the metal cladding on the Turbine Hall, Turbine Auxiliary Bay, and Class I and II structures inside the turbine building was calculated using a simplified code based approach.
In the updated PSA, a refined fragility analysis was prepared for the metal cladding on the Turbine Hall, Turbine Auxiliary Bay, and Class I and II structures inside the turbine building. This provided a more accurate assessment of the cladding fragility and an assessment of the portion of the cladding over the whole building that might fail.

5. In the Pickering NGS A and Pickering NGS B S-294 compliant high wind PSAs, it was conservatively assumed that there was a 95% correlation between the high wind induced failure of external building siding and rain induced failure of equipment contained in the building.

A detailed assessment indicated that a more realistic value for the high wind / heavy rain correlation was 50%. The detailed assessment took account of the relatively short duration of a wind storm and the fact that the rain would have to “fall horizontally” if it were to penetrate through wind damaged siding to equipment inside the powerhouse.

6. In the S-294 compliant PSA, make-up from the Emergency Water Storage Tank (EWST) to the calandria was credited as an interim source only.

In the updated PSA, the EWST was credited as a long-term make-up source to the calandria. Make-up to the EWST is provided from the Pickering NGS A service water systems. The ability of the Pickering NGS A service water systems to survive high winds was derived from the Pickering NGS high wind PSA.

7. The EME was not credited in the S-294 compliant PSA.

In the updated PSA, EME make-up to the boilers, HTS and calandria was credited. This included an assessment of the fragility of the EME with respect to straight line winds and missiles.

4.4.3 Results Summary

Tables 5 and 6 summarize the results of the updated at-power PSA for high winds:

1. The updated SCDF, $2.9 \times 10^{-7}$ per reactor-year, is more than two orders of magnitude below OPG’s safety goal limit.

2. The updated SCDF is more than one order of magnitude less than the SCDF estimated in the S-294 compliant PSA, $0.80 \times 10^{-5}$ per reactor-year.

3. The updated LRF, $2.9 \times 10^{-7}$ per reactor-year, is more than one order of magnitude below OPG’s safety goal limit.

4. The updated LRF is more than one order of magnitude less than the LRF estimated in the S-294 compliant PSA, $0.80 \times 10^{-5}$ per reactor-year.
5.0 CONCLUSIONS

The results of the updated Level 1 and Level 2 PSAs are presented in Tables 5 and 6, respectively.

For Pickering NGS A:

1. The total updated SCDF for each hazard, at-power plus shutdown, is at least one order of magnitude below OPG’s safety goal limit.

2. The total updated SCDF for each hazard, at-power plus shutdown, is less than the SCDF estimated in the S-294 compliant PSAs. The largest reduction in SCDF is 96% for high winds and the smallest reduction in SCDF is 12% for seismic events.

3. The updated estimates of SCDF for internal floods, seismic events and high winds for a shutdown unit are likely conservative.

4. The total updated LRF for each hazard, at-power plus shutdown, is well below OPG’s safety goal limit. The highest updated LRF is for internal events; the LRF for internal events is approximately 20% of OPG’s safety goal limit.

5. The total updated LRF for each hazard, at-power and shutdown, is less than the LRF estimated in the S-294 compliant PSAs. The largest reduction in LRF is 89% for high wind and the smallest reduction in LRF is 45% for internal floods.

For Pickering NGS B:

1. The updated SCDF for each hazard is at least two orders of magnitude below OPG’s safety goal limit.

2. The updated SCDF for each hazard is less than the SCDF estimated in the S-294 compliant PSAs. The largest reduction in SCDF is 96% for high winds and the smallest reduction in SCDF is 81% for internal events.

3. The updated LRF for each hazard is at least one order of magnitude below OPG’s safety goal limit.

4. The updated LRF for each hazard, is less than the LRF estimated in the S-294 compliant PSAs. The largest reduction in LRF is 96% for high winds and the smallest reduction in LRF is 88% for internal fires.
6.0 REFERENCES


Table 1: OPG's Risk Based Safety goals

<table>
<thead>
<tr>
<th>RISK METRIC</th>
<th>AVERAGE RISK</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Title</td>
<td>Definition</td>
<td>Target (per reactor-year)</td>
</tr>
<tr>
<td>------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Severe Core Damage Frequency</td>
<td>Loss of core structural integrity</td>
<td>$10^{-5}$</td>
<td>$10^{-4}$</td>
</tr>
<tr>
<td>Large Release Frequency</td>
<td>Airborne release &gt; $10^{14}$ Bq Cs-137</td>
<td>$10^{-6}$</td>
<td>$10^{-5}$</td>
</tr>
</tbody>
</table>

Table 2: Results of the Pickering NGS A Level 1 At-Power PSA for Internal Events

<table>
<thead>
<tr>
<th>Fuel Damage Category</th>
<th>Definition</th>
<th>Frequency (per reactor-year)</th>
<th>S-294 Compliant PSA</th>
<th>Updated PSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDC1</td>
<td>Severe core damage due to failure to shutdown.</td>
<td>$2.80 \times 10^{-7}$</td>
<td>$2.12 \times 10^{-7}$</td>
<td></td>
</tr>
<tr>
<td>FDC2</td>
<td>Severe core damage due to failure of all heat sinks.</td>
<td>$1.60 \times 10^{-5}$</td>
<td>$0.81 \times 10^{-5}$</td>
<td></td>
</tr>
<tr>
<td>Severe Core Damage</td>
<td>(FDC1 + FDC2)</td>
<td>$1.63 \times 10^{-5}$</td>
<td>$0.83 \times 10^{-5}$</td>
<td></td>
</tr>
</tbody>
</table>


Table 3: Results of the Pickering NGS A Level 2 At-Power PSA for Internal Events

<table>
<thead>
<tr>
<th>Release Category</th>
<th>Definition</th>
<th>Frequency (per reactor-year)</th>
<th>S-294 Compliant PSA</th>
<th>Updated PSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC1</td>
<td>Large early release with the potential for acute off-site radiation effects and/or widespread contamination (greater than 3% core inventory of I-131/Cs-137).</td>
<td>$4.69 \times 10^6$</td>
<td>$1.71 \times 10^6$</td>
<td></td>
</tr>
<tr>
<td>RC2</td>
<td>Release in excess of $10^{14}$ Bq of Cs-137 but less than RC1 occurring within 24 hours.</td>
<td>(Note 1)</td>
<td>(Note 1)</td>
<td></td>
</tr>
<tr>
<td>RC3</td>
<td>Release in excess of $10^{14}$ Bq of Cs-137 but less than RC1 occurring after 24 hours.</td>
<td>$3.45 \times 10^8$</td>
<td>$2.59 \times 10^8$</td>
<td></td>
</tr>
<tr>
<td>LRF</td>
<td>$(RC1 + RC2 + RC3)$</td>
<td>$4.72 \times 10^8$</td>
<td>$1.72 \times 10^6$</td>
<td></td>
</tr>
</tbody>
</table>

Notes:

1. No sequences were assigned to this RC.
### Table 4: Applicability of Actions in the Fukushima integrated action plan

<table>
<thead>
<tr>
<th>Action Item</th>
<th>Description</th>
<th>Application in Updated PSAs</th>
</tr>
</thead>
</table>
| A.1.2       | Licensees should re-examine the capability of the shield tank/calandria vault to discharge steam produced in a severe accident. The benefits of sustainability of shield tank heat sink during accident conditions should be re-examined. | OPG separately addressed this action as part of its response to the CNSC’s Integrated Action Plan.  
This action does not apply to Pickering NGS A; the Pickering NGS A calandria vault is air filled.  
An improved model of calandria vault pressure relief was developed for Pickering NGS B. This model was incorporated into the MAAP-CANDU analysis performed as part of the updated Pickering NGS B Level 2 PSA for internal events. |
| A.1.3       | Licensees should evaluate the means to prevent the failure of containment systems and, to the extent practicable, unfiltered releases of radioactive products in beyond-design-basis accidents including severe accidents. If unfiltered releases of radioactive products in beyond-design-basis accidents including severe accidents cannot be precluded, then additional mitigation should be provided. | OPG separately addressed this action as part of its response to the CNSC’s Integrated Action Plan.  
As no changes had been made to the operation and design of the Pickering containment system, the PSA was not updated in response to this action. |
| A.1.4       | Licensees should complete the installation of passive autocatalytic recombiners (PARs) as quickly as possible. | OPG separately addressed the installation of PARS as part of its response to the CNSC’s Integrated Action Plan.  
The Pickering NGS A S-294 compliant PSA did not include the PARS. As no additional thermal-hydraulic analysis was prepared as part of the PSA update, the PARS were not included in the updated Pickering NGS A PSA.  
The PARS were included in the thermal hydraulic analysis that was completed to support the updated Pickering NGS B PSA. |
<table>
<thead>
<tr>
<th>Action Item</th>
<th>Description</th>
<th>Application in Updated PSAs</th>
</tr>
</thead>
</table>
| A.1.7       | Licensees should evaluate means to provide coolant make-up to the primary heat transport system, moderator, shield tank/calandria vault, spent fuel pools and dousing tank where applicable. Means include:  
1. Coolant make-up to prevent severe core damage.  
2. If severe core damage cannot be precluded, then the make-up coolant should be used in severe accident management guidelines (SAMG) to mitigate the severe accident. | The updated Pickering PSAs incorporated the EME. The currently installed EME has the capability to make-up to the primary heat transport system, the moderator and the secondary side of the boilers.  
The updated Pickering PSAs did not include SAMG; recognized means of incorporating SAMG into PSAs, including estimating human error probabilities, have not yet been developed. |
| A.1.9       | Licensees should ensure the habitability of control facilities under conditions arising from beyond-design-basis and severe accidents. This assessment should consider elements of HOP under accident conditions. | As part of its response to this action, OPG assessed the habitability the MCR, the UECC and areas of the plant required to deploy the EME:  
- For accidents in which the containment boundary is intact prior to the IE, habitability is generally only an issue for events that already result in a large release. Therefore, habitability generally does not affect LRF.  
- For accidents in which the containment boundary has been breached prior to the IE, habitability may be an issue depending upon the location and size of the breach. However, as the likelihood of a prior breach of containment is very low, i.e. 10-4 or less, then these events are not a significant contributor to risk and were not included in the updated PSAs. |
<table>
<thead>
<tr>
<th>Action Item</th>
<th>Description</th>
<th>Application in Updated PSAs</th>
</tr>
</thead>
</table>
| A.3.1       | 1. Licensees should develop/finalize and fully implement severe accident management guidelines (SAMG) at each station.  
2. Licensees should expand the scope of SAMGs to include multi-unit events and IFB events.  
3. Licensees should demonstrate effectiveness of SAMGs. | OPG separately addressed the preparation of SAMG as part of its response to the CNSC’s Integrated Action Plan. The updated Pickering PSAs did not include SAMG; recognized means of incorporating SAMG into PSAs, including estimating human error probabilities, have not yet been developed. |
| A.3.2.1     | An evaluation of the adequacy of existing modelling of severe accidents in multi-unit stations. The evaluation should provide a functional specification of any necessary improved models. | OPG separately addressed the adequacy of severe accident modelling as part of its response to the CNSC’s Integrated Action Plan.  
MAAP-CANDU is an Industry Standard Toolset code that is the best available tool to model severe accident progression. OPG investigated two modes of using MAAP-CANDU to assess the timing of accident progression, containment response and the timing and magnitude of radioactive releases to the environment. Both were found to provide similar results. Both were considered to reasonably reflect severe accident progression within the uncertainties associated with this type of analysis.  
MAAP-CANDU was used in both the S-294 compliant PSAs and in the updated PSAs. |
### Pickering NGS PSA Update To Include Enhancements From The Fukushima Integrated Action Plan

#### Table 5: Results of the Updated Level 1 Pickering NGS PSAs

<table>
<thead>
<tr>
<th>STATION</th>
<th>PSA ELEMENT</th>
<th>SCDF ((x \times 10^{-5} \text{ per reactor year}))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>S-294</td>
</tr>
<tr>
<td>Pickering NGS A</td>
<td>Internal Events At-Power</td>
<td>1.63</td>
</tr>
<tr>
<td></td>
<td>Internal Floods At-Power</td>
<td>1.02</td>
</tr>
<tr>
<td></td>
<td>Internal Floods Shutdown</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Seismic Events At-Power</td>
<td>0.26</td>
</tr>
<tr>
<td></td>
<td>Seismic Events Shutdown</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>High Wind At-Power</td>
<td>2.69</td>
</tr>
<tr>
<td></td>
<td>High Wind Shutdown</td>
<td>-</td>
</tr>
<tr>
<td>Pickering NGS B</td>
<td>Internal Events At-Power</td>
<td>0.42</td>
</tr>
<tr>
<td></td>
<td>Internal Fires At-Power</td>
<td>0.38</td>
</tr>
<tr>
<td></td>
<td>High Wind At-Power</td>
<td>0.80</td>
</tr>
</tbody>
</table>

**Notes:**

1. The risk for a shutdown unit was shown to be bounded by the risk for an at-power unit. These results conservatively assume that all units are continuously at power.

2. The risk was estimated for seismic events/high winds with a return period up to and including 10,000 years.
Table 6: Results of the Updated Level 2 Pickering NGS PSAs

<table>
<thead>
<tr>
<th>STATION</th>
<th>PSA ELEMENT</th>
<th>LRF (x 10^-5 per reactor year)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>S-294</td>
</tr>
<tr>
<td>Pickering NGS A</td>
<td>Internal Events At-Power</td>
<td>0.47</td>
</tr>
<tr>
<td></td>
<td>Internal Floods At-Power</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>Internal Floods Shutdown</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Seismic Events At-Power</td>
<td>0.26</td>
</tr>
<tr>
<td></td>
<td>Seismic Events Shutdown</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>High Wind At-Power</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td>High Wind Shutdown</td>
<td>-</td>
</tr>
<tr>
<td>Pickering NGS B</td>
<td>Internal Events At-Power</td>
<td>0.39</td>
</tr>
<tr>
<td></td>
<td>Internal Fires At-Power</td>
<td>0.34</td>
</tr>
<tr>
<td></td>
<td>High Wind At-Power</td>
<td>&lt; 0.80</td>
</tr>
</tbody>
</table>

Notes:

1. The risk for a shutdown unit was shown to be bounded by the risk for an at-power unit. These results conservatively assume that all units are continuously at power.

2. The risk was estimated for seismic events/high winds with a return period up to and including 10,000 years.
Table 7: Improved Estimate of LRF at Pickering NGS A

<table>
<thead>
<tr>
<th>PSA Element</th>
<th>Large Release Frequency (x 10^-5 per reactor-year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Events At-Power</td>
<td>0.17</td>
</tr>
<tr>
<td>Internal Events Shutdown</td>
<td>0</td>
</tr>
<tr>
<td>Internal Fires At-Power</td>
<td>0.66</td>
</tr>
<tr>
<td>Internal Fires Shutdown</td>
<td>0</td>
</tr>
<tr>
<td>Internal Floods At-Power</td>
<td>0.09</td>
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<tr>
<td>Internal Floods Shutdown</td>
<td>0</td>
</tr>
<tr>
<td>Seismic Events At-Power</td>
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</tr>
<tr>
<td>Seismic Events Shutdown</td>
<td>0</td>
</tr>
<tr>
<td>High Wind At-Power</td>
<td>0.07</td>
</tr>
<tr>
<td>High Wind Shutdown</td>
<td>0</td>
</tr>
<tr>
<td>OPG’s Safety Goal Limit</td>
<td>1.00</td>
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</tbody>
</table>
Appendix A: Abbreviations and Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bq</td>
<td>Bequerels</td>
</tr>
<tr>
<td>CNSC</td>
<td>Canadian Nuclear Safety Commission</td>
</tr>
<tr>
<td>Cs-137</td>
<td>Cesium-137</td>
</tr>
<tr>
<td>EBWS</td>
<td>Emergency Boiler Water Supply System</td>
</tr>
<tr>
<td>ECIS</td>
<td>Emergency Coolant Injection System</td>
</tr>
<tr>
<td>EME</td>
<td>Emergency Mitigating Equipment</td>
</tr>
<tr>
<td>EPG</td>
<td>Emergency Power Generator</td>
</tr>
<tr>
<td>EPS</td>
<td>Emergency Power System</td>
</tr>
<tr>
<td>ERO</td>
<td>Emergency Response Organization</td>
</tr>
<tr>
<td>ET</td>
<td>Event Tree</td>
</tr>
<tr>
<td>EWS</td>
<td>Emergency Water System</td>
</tr>
<tr>
<td>EWST</td>
<td>Emergency Water Storage Tank</td>
</tr>
<tr>
<td>FADS</td>
<td>Filtered Air Discharge System</td>
</tr>
<tr>
<td>FT</td>
<td>Fault Tree</td>
</tr>
<tr>
<td>GSS</td>
<td>Guaranteed Shutdown State</td>
</tr>
<tr>
<td>HOP</td>
<td>Human and Organizational Performance</td>
</tr>
<tr>
<td>HTS</td>
<td>Heat Transport System</td>
</tr>
<tr>
<td>I-131</td>
<td>Iodine-131</td>
</tr>
<tr>
<td>IE</td>
<td>Initiating Event</td>
</tr>
<tr>
<td>IFB</td>
<td>Irradiated Fuel Bay</td>
</tr>
<tr>
<td>kg/s</td>
<td>Kilograms per second</td>
</tr>
<tr>
<td>LOCA</td>
<td>Loss of Coolant Accident</td>
</tr>
<tr>
<td>LRF</td>
<td>Large Release Frequency</td>
</tr>
<tr>
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<tr>
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</tr>
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<td>PARS</td>
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<td>PSA</td>
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<td>SAMG</td>
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<td>UECC</td>
<td>Unit Emergency Control Centre</td>
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<tr>
<td>V dc</td>
<td>Volts, direct current</td>
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</table>
Nuclear Program

TITLE
RISK AND RELIABILITY PROGRAM

AUTHORIZATION

DOCUMENT OWNER: C. Lorencez
Director, Nuclear Safety

APPROVAL FOR ISSUE: R. Manley
Vice President, Nuclear Regulatory Affairs and Stakeholder Relations

AUTHORIZATION AUTHORITY: Steve Woods
Senior Vice President, Nuclear Engineering and Chief Nuclear Engineer

DOCUMENT RELATIONSHIP

Applicability: All of Nuclear
Receives Authority from: N-CHAR-AS-0002, Nuclear Management System

Document is Related to Pressure Boundary ☐ Document Requires CNSC Notification ✓

PURPOSE AND SCOPE

The purpose of the program is to provide organizational accountabilities, interfaces, and key program elements to ensure that risks from nuclear accidents are identified, monitored and controlled across Ontario Power Generation, Nuclear (hereafter referred to as Nuclear) and that N-PROG-RA-0016 is consistent with OPG Nuclear Safety Policy, Nuclear Management System and best practice in the industry [B1] [B2] [B3] [B4] [B5] [B6] [B7]. Probabilistic Safety Assessment (PSA) shall be used to assess the magnitude and frequency of radiological risks to the public from accidents due to operation of nuclear reactors, and shall be applied in a consistent manner across Nuclear. Operational reliability monitoring and reporting should ensure that risks during operation are monitored and managed.

DATES (YYYY-MM-DD)

PDF Creation Date: 2016-05-27

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## RISK AND RELIABILITY PROGRAM

| Compliance Date: | Immediate  
|                 | Except for CSA N286-12 bases, which will come into effect when CSA N286-12 becomes part of each site’s respective operating license. |
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>DIRECTION</td>
<td>4</td>
</tr>
<tr>
<td>1.1</td>
<td>Safety Goals</td>
<td>5</td>
</tr>
<tr>
<td>1.2</td>
<td>Implementing Documents</td>
<td>7</td>
</tr>
<tr>
<td>1.3</td>
<td>Interfacing Documents</td>
<td>7</td>
</tr>
<tr>
<td>1.4</td>
<td>Training Qualifications</td>
<td>8</td>
</tr>
<tr>
<td>1.5</td>
<td>Performance Indicators and Review</td>
<td>8</td>
</tr>
<tr>
<td>2.0</td>
<td>ROLES AND ACCOUNTABILITIES</td>
<td>8</td>
</tr>
<tr>
<td>2.1</td>
<td>Senior Vice President, Nuclear Engineering and Chief Nuclear Engineer</td>
<td>8</td>
</tr>
<tr>
<td>2.2</td>
<td>Manager, Nuclear Safety and Technology</td>
<td>9</td>
</tr>
<tr>
<td>2.3</td>
<td>Site Senior Vice President</td>
<td>9</td>
</tr>
<tr>
<td>2.4</td>
<td>Director, Nuclear Safety</td>
<td>9</td>
</tr>
<tr>
<td>2.5</td>
<td>Director, Station Engineering</td>
<td>9</td>
</tr>
<tr>
<td>2.6</td>
<td>Director, Operations and Maintenance</td>
<td>9</td>
</tr>
<tr>
<td>2.7</td>
<td>Manager, Reactor Safety Engineering</td>
<td>10</td>
</tr>
<tr>
<td>3.0</td>
<td>DEFINITIONS AND ACRONYMS</td>
<td>10</td>
</tr>
<tr>
<td>3.1</td>
<td>Definitions</td>
<td>10</td>
</tr>
<tr>
<td>3.2</td>
<td>Abbreviations and Acronyms</td>
<td>11</td>
</tr>
<tr>
<td>4.0</td>
<td>BASES AND REFERENCES</td>
<td>12</td>
</tr>
<tr>
<td>4.1</td>
<td>Bases</td>
<td>12</td>
</tr>
<tr>
<td>4.2</td>
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<td>12</td>
</tr>
<tr>
<td>4.2.1</td>
<td>Performance References</td>
<td>12</td>
</tr>
<tr>
<td>4.2.2</td>
<td>Developmental References</td>
<td>13</td>
</tr>
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<td>5.0</td>
<td>REVISION SUMMARY</td>
<td>13</td>
</tr>
</tbody>
</table>
1.0 DIRECTION

The purpose of the program is to establish a framework for the development and use of PSA at Nuclear as a means to manage radiological risks from nuclear accidents and to contribute to safe operation of Nuclear reactors. Program elements have been developed to meet the intent of the applicable CNSC regulatory requirements in REGDOC-3.1.1, RD/GD-98, REGDOC-2.4.2 and S294. [B-1] [B-2] [B-3] [B-4] [B-6] [B-7]. Specifically, the program elements are:

- **PSA** be developed and maintained current for each operating station. **PSA** be updated at a frequency required to satisfy regulatory requirements, or when warranted, such as by a major design change.

- **PSA** be used to support conduct of engineering, **maintenance** and operations as follows:
  
  o Proposed changes to plant operation, configuration or procedures that may significantly increase **risks** be reviewed to quantify impact on **risk** and assess its acceptability.

  o Proposed changes to plant operation, configuration or procedures that may significantly decrease **risks** be reviewed to quantify the benefits in terms of impact on **risk** as an input to decision-making.

  o **Systems important to safety** be identified and their **performance measures** and targets established with PSA insights used in this process.

  o **PSA** assumptions important to safety regarding surveillance, testing, and **maintenance** activities be identified and incorporated into operating and **maintenance** procedures.

- The operational performance of **systems important to safety** be monitored, assessed and reported.

- Component **reliability** data be compiled, analyzed, and applied to maintain **risk** and **unavailability models**.

- **PSA** be used to identify accident scenarios with the potential for significant core degradation.

- Identify weaknesses in the design and operation of plants and those design improvements or modifications to operating procedures that could reduce the probability of severe accidents or mitigate their consequences.

- **PSA** be used to support in-plant and ex-plant consequence analyses for event sequences beyond the design basis for use in understanding severe accident progression and management, as allowed by the scope and limitations of the **PSA**.

- **Risk** information used in safety decision-making should be based to the extent practical on data and models that reflect the characteristics of the facility concerned.
RISK AND RELIABILITY PROGRAM

- An annual reliability report be prepared in accordance with guidelines specified in N-STD-RA-0033, Reliability Monitoring and Reporting of Systems Important to Safety.

N-PROG-RA-0016 involves Safety Goals, station-specific PSAs, associated risk models, unavailability models of systems important to safety and software applications, and Nuclear governing documents. Refer to Figure 1, Risk and Reliability Governing Document Framework.

Figure 1. Risk and Reliability Governing Document Framework

1.1 Safety Goals

1.1.1 Safety goals are numerical safety criteria to be used in association with PSA applications and against which the safety of nuclear reactors can be judged. The intent is to ensure the
radiological risks arising from nuclear accidents associated with operation of nuclear reactors should be low in comparison to risks to which the public is normally exposed. The safety goals outlined in Table 1 are comparable to industry best practice.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Average Risk (per year)</th>
<th>Instantaneous Risk (per year)</th>
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<tbody>
<tr>
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<td>Administrative Safety Goal</td>
<td>Safety Goal</td>
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<tr>
<td>Large Release (per unit)</td>
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<td>$10^{-5}$</td>
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<tr>
<td>Severe Core Damage (per unit)</td>
<td>$10^{-5}$</td>
<td>$10^{-4}$</td>
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1.1.2 Safety goals represent the tolerability of risk exposure above which action shall be taken to reduce risk. The administrative safety goal represents the desired objective towards which the facility should strive, provided that measures to further reduce risk are cost-effective, such as when benefits are comparable to, or greater than, the cost of implementing the measure. It is unlikely that risk reduction better than target would be cost effective, so further measures to reduce risk are not required.

1.1.3 The safety goals pertaining to Severe Core Damage are intended to help the station make routine decisions relating to changes in plant operation, configuration or procedures. For proposed changes significantly affecting the integrity of containment, either directly or through crosslink, a further assessment against the Large Release is required.

1.1.4 Risk based safety goals apply to estimated risk averaged for each hazard over time, typically one year. This implies that it is permissible for the risk to exceed the goal for a short period of time provided that the average risk remains below the goal. To ensure that reasonable bounds are placed on the allowable short-term risk, an instantaneous goal has been defined. As there is no strong international consensus for instantaneous risk goals, engineering judgment is integral to their application: where instantaneous risk goals are exceeded, the acceptability of the risk should be demonstrated using other considerations, such as whether the benefit of the activity is comparable to, or exceeds, the risk.

1.1.5 When any instantaneous risk safety goal is exceeded, continued operation of the plant shall be approved by the Chief Nuclear Engineer, the Director of Operations and Maintenance and/or the Site VP based on the guidance in N-PROC-RA-0132, Management of Incremental Risk from Abnormal Plant Configurations.

1.1.6 Where either the Severe Core Damage or Large Release average risk safety goals are exceeded, action shall be taken to reduce the risk. If the risk cannot be returned to an acceptable level, the Chief Nuclear Engineer (CNE) and the Director, Operations and Maintenance (DOM) may direct the immediate and orderly shutdown of the affected units or stations. Alternatively, the CNE and DOM will approve continued operations if the uncertainties and conservatisms in the risk results are assessed and justify that the risk is acceptably low.
1.2 Implementing Documents

N-PROG-RA-0016 and implementing procedures and standards provide guidance for the PSA functions and reliability monitoring as follows.

1.2.1 N-STD-RA-0034, Preparation, Maintenance and Application of Probabilistic Safety Assessment,

This standard provides requirements for the preparation, revision and maintenance of PSAs to reflect current design, operation basis and reliability data, and application of PSA insights in operation. This also includes facility feedback on radiological risk. [B-5] [B-6] [B-7]

1.2.2 N-STD-RA-0033, Reliability Monitoring and Reporting of Systems Important to Safety

This standard provides requirements for reliability monitoring and reporting of systems important to safety. The document is consistent with the applicable CNSC regulatory requirements in RD/GD-98, Reliability Programs for Nuclear Power Plants, and REGDOC-3.1.1, Reporting Requirements for Nuclear Power Plants. [B-1][B-2][B-6][B-7]

1.2.3 N-STD-RA-0030, Risk Management for Outage Planning and On-Line Maintenance

This standard describes the deterministic and PSA-based processes of assessing and managing nuclear safety risk that results from maintenance during planned outages (outage risk) and during reactor operation (on-line risk). [B-6] [B-7]

1.2.4 N-PROC-RA-0132, Management of Incremental Risk from Abnormal Plant Configurations

This procedure provides a systematic approach for managing incremental risk from abnormal plant configurations. [B-6] [B-7]

1.2.5 N-PROC-RA-0131, Probabilistic Risk Assessment Issues Database Management

This procedure provides guidance for the process and management of the Probabilistic Risk Assessment Issues Database (PRAID).

1.3 Interfacing Documents

N-PROG-RA-0016 interfaces with several nuclear programs to support that safety goals are met.

1.3.1 N-PROG-MP-0009, Design Management

This program ensures that PSA is used as design input.

1.3.2 N-PROG-MA-0026, Equipment Reliability

This program provides input to component reliability data for PSAs based on changes resulting from system reliability performance, and other reliability and maintainability assessments.

1.3.3 N-PROG-MP-0001, Engineering Change Control
This program ensures that the impact of modifications on PSA are assessed.

1.3.4 N-PROG-MA-0019, Production Work Management

This program provides input for evaluation of risk significance of outage and on-line maintenance risk assessment and provides input to outage and on-line maintenance planning.

1.3.5 N-PROG-MA-0017, Component and Equipment Surveillance

This program provides input to component reliability data for PSAs based on changes resulting from equipment reliability performance, and other reliability and maintainability assessments.

1.3.6 N-PROG-MP-0014, Reactor Safety Program

This program defines organizational responsibilities and key program elements for the management of issues related to Nuclear Safety Analysis (NSA). In Particular; Generic Action Items (GAIs), and major components of safe operation including the Safety Analysis Basis (SAB), Safe Operating Envelope (SOE) and Severe Accident Management (SAM).

1.3.7 N-PROG-MP-0008, Integrated Aging Management

This program ensures the condition of critical Nuclear Power Plant equipment is understood and that required activities are in place to ensure the health of these components and systems while the plant ages.

1.4 Training Qualifications

Staff preparing, applying or interpreting risk models and implementing the risk and reliability program shall be appropriately trained and qualified. Training requirements are prescribed in N-QG-403-00001, Nuclear Safety Division Qualification Guideline.

1.5 Performance Indicators and Review

1.5.1 Compliance with N-PROG-RA-0016 should be measured by timely updates of risk and reliability assessments as well as by monitoring performance against the safety goals described in Section 1.1, where applicable.

1.5.2 Program shall be reviewed and reported in accordance with N-PROC-RA-0023, Fleetview Program Health and Performance Reporting.

1.5.3 Self-assessments and audits shall be conducted periodically to monitor compliance in accordance with N-PROC-RA-0097, Self-assessment and Benchmarking.

2.0 ROLES AND ACCOUNTABILITIES

2.1 Senior Vice President, Nuclear Engineering and Chief Nuclear Engineer

2.1.1 Approves Public Safety Goals for use and application.
2.1.2 Approves continued operation of the facility where either the Severe Core Damage or Large Release safety goal is exceeded.

2.1.3 Concurs with the final lists of Systems Important to Safety.

2.1.4 Ensures resource needs for N-PROG-RA-0016 are integrated into the program oversight and execution organizations business planning, as appropriate.

2.2 Manager, Nuclear Safety and Technology

2.2.1 Prepares and maintains safety goals.

2.2.2 Communicates corporate and regulatory requirements for N-PROG-RA-0016 application across Nuclear.

2.2.3 Coordinates and maintains N-PROG-RA-0016. This includes standards, procedures, instructions and performance metrics.

2.2.4 Manages the updates of the PSA including the preparation and maintenance of PSA methodology and computer codes consistent with best industry practice.

2.2.5 Provides in-plant and ex-plant consequence analyses for event sequences beyond the design basis, for use in understanding severe accident progression and management.

2.2.6 Supports the Manager, Reactor Safety Engineering in the preparation of facility PSAs and the revision of risk models.

2.3 Site Senior Vice President

Ensures resource needs for N-PROG-RA-0016 are integrated into facility business planning.

2.4 Director, Nuclear Safety

2.4.1 Carries out roles and accountabilities of N-PROG-RA-0016 owner in accordance with OPG-PROC-0001, Process Administrative Governance Documents.

2.4.2 Accepts the final list of Systems Important to Safety.

2.5 Director, Station Engineering

2.5.1 Approves the final list of Systems Important to Safety.

2.5.2 Monitors effectiveness of the N-PROG-RA-0016 at facility.

2.6 Director, Operations and Maintenance

Reviews continued operation of the facility where any safety goal is exceeded and takes appropriate action if it is necessary.
2.7 Manager, Reactor Safety Engineering

2.7.1 Ensures resource requirements for N-PROG-RA-0016 are identified as part of facility business planning.

2.7.2 Uses PSA to support assessment of radiological risk impact and significance of on-line maintenance, outage maintenance, abnormal plant configurations, and operational events against the appropriate safety goals.

2.7.3 Uses PSA to support assessment of proposed changes to plant configuration, equipment or procedures that may significantly alter radiological risks against safety goals.

2.7.4 Assesses reactor safety issues using risk models and provides basis for risk-informed decisions, such as, risk input to Technical Operability Evaluations.

2.7.5 Identifies safety-related back-fit modifications that contribute significantly to overall radiological risk and assesses whether impact on radiological risk justifies the cost.

2.7.6 Compiles and assesses component reliability data.

2.7.7 Prepares the final list of Systems Important to Safety.

2.7.8 Evaluates and reports on reliability of systems important to safety consistent with regulatory requirements.

2.7.9 Prepares, revises, and maintains unavailability models.

2.7.10 Assumes responsibility for the review and acceptance of the PSA.

2.7.11 Assumes accountability for the PSA once completed.

2.7.12 Assesses performance of systems important to safety.

2.7.13 Updates site performance metrics for N-PROG-RA-0016.

3.0 DEFINITIONS AND ACRONYMS

3.1 Definitions

Large Release frequency is the sum of frequencies of events that can lead to the release of a mixture of fission products containing greater than $10^{14}$ Bq of CS-137 to the environment. Large Release Frequency (LRF) is applied on a per-unit, per-hazard basis.

Maintenance of the risk models refers to updates which capture current reliability data. Update of the risk models to capture design changes is referred to as revision.

Probabilistic Safety Assessment (PSA) is a systematic process of radiological hazard identification and risk estimation using quantitative methods. Implicit in the concept of risk, as applied in PSA, is an evaluation of a hazard both in terms of its frequency of occurrence and its consequence. PSA is a unique technology that combines knowledge about plant behaviour from a wide range of sources into a unified risk model based on data drawn from
observed plant performance. Note that PRA (Probabilistic Risk Assessment) and PSA are interchangeable terms.

**Reliability** is the probability that a system or component shall perform its specified function when called upon to do so.

**Revision** of *risk models* refers to structural changes of the model due to design and operational changes. Update of the *risk models* to capture current *reliability* data is referred to as *maintenance*.

*Risk* is broadly understood to mean the chance of injury, damage, or loss arising from a specific activity or source. In the nuclear industry, *risk* is quantified as the frequency of an undesired event multiplied by its consequences.

*Risk Model(s)* is an integrated set of plant system *reliability* models and consequence analyses representing the likelihood and consequences of all accidents within a defined scope, used to generate estimates of the overall *risk* from the operation of the plant concerned.

**Safety Goals** are a set of numerical values, expressed in terms of human health *risk*, frequency of core damage or frequency of large releases, which establish targets for station design and operation. The goals are intended to represent the high standards of safety and *reliability* necessary to maintain public and regulatory acceptance of nuclear power.

**Severe Core Damage Frequency** is the sum of the point estimate frequencies of events due to operation of a nuclear reactor that can lead to failure of both fuel and fuel channels when averaged over one year. Severe Core Damage Frequency (SCDF) is applied on a per-unit, per-hazard basis.

**Systems Important to Safety** are those structures, systems and components (SSC) of the power plant which contribute significantly to the initiation, prevention, detection or mitigation of any failure sequence which could lead to damage of fuel or associated release of radionuclide or both.

*Unavailability* is the fraction of time, usually integrated over a period of 1 year, that a system or component is not available to perform its specified function.

*Unavailability Model(s)* is/are generally derived from the risk model(s). The objective of the unavailability model(s) is to help identify major contributors, as equipment and system parameters that can contribute, to the unavailability of the system.

### 3.2 Abbreviations and Acronyms

<table>
<thead>
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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>CNE</td>
<td>Chief Nuclear Engineer</td>
</tr>
<tr>
<td>DOM</td>
<td>Director, Operations and Maintenance</td>
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<td>LRF</td>
<td>Large Release Frequency</td>
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<td>PRAID</td>
<td>Probabilistic Risk Assessment Issues Database</td>
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<td>Probabilistic Safety Assessment</td>
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</table>
RISK AND RELIABILITY PROGRAM

SSC  Structures, Systems and Components

4.0 BASES AND REFERENCES

4.1 Bases


4.2 References

4.2.1 Performance References

N-PROC-RA-0023, Fleetview Program Health and Performance Reporting

N-PROC-RA-0097, Self-assessment and Benchmarking

N-PROC-RA-0131, Probabilistic Risk Assessment Issues Database Management

N-PROC-RA-0132, Management of Incremental Risk from Abnormal Plant Configurations N-PROG-MA-0017, Component and Equipment Surveillance

N-PROC-MA-0019, Production Work Management

N-PROC-MA-0026, Equipment Reliability

N-PROG-MP-0001, Engineering Change Control

N-PROG-MP-0009, Design Management

N-PROG-MP-0014, Reactor Safety Program

N-QG-403-00001, Nuclear Safety Division Qualification Guide
RISK AND RELIABILITY PROGRAM

N-STD-RA-0030, Risk Management for Outage Planning and On-Line Maintenance

N-STD-RA-0033, Reliability Monitoring and Reporting of Systems Important to Safety

N-STD-RA-0034, Preparation, Maintenance and Application of Probabilistic Safety Assessment

OPG-PROC-0001, Process Administrative Governance Documents

4.2.2 Developmental References

Candu Owners Group, Development of a Whole-Site PSA Methodology, COG-13-9034-Rev 0, Feb 2014


5.0 REVISION SUMMARY

This is an intent revision.

- Changed all instances of Probabilistic Risk Assessment (PRA) to Probabilistic Safety Assessment (PSA) except for usage in some document titles. Added note to PSA definition to state interchangeability of PSA/PRA.

- Updated Figure 1 and sections 1.2 and 1.3 to add N-PROC-RA-0131 and N-PROG-MP-0014 as well as to replace N-GUID-03611-10000 with superseding document N-PROC-RA-0132 (DCR 128126)

- Updated section 1.5 to more clearly lay out compliance

- Updated section 2.2 to define the role of Nuclear Safety and Technology in the creation of PSA methodology and ownership of computer codes.

- Updated section 2.4 to outline the role of the Director of the Nuclear Safety Division with regards to Systems Important to Safety

- Updated section 2.7 to clarify the role of Reactor Safety Engineering in the preparation, revision and maintenance of facility PSA and unavailability models.

- Updated section 1.1.1 to identify responsibility of Site VP

- Updated section 1.4 to reference N-QG-403-00001
• Appendix A removed

• Updated developmental references to have current information regarding safety goals in Canada and to remove N-POL-0001.

• Updated Bases to include recent stipulations from license condition handbooks; Changed S-99 to REGDOC-3.1.1, removed S-98, added REGDOC-2.4.2. (DCR 134717, 134670)

• All instances of mean frequency changed to point estimate frequency

• Replaced N-PROC-AS-0001 with OPG-PROC-0001 (DCR 123330)

• Added N-PROG-MP-0008 as interfacing document (DCR 134682, 129930)

• Removed N-PROG-OP-0001 as interfacing document.

• Changed all instances of safety goal limit to safety goal and all instances of safety goal target to administrative safety goal to reflect new movement towards risk-informed decision making.

• Changed all instance of large off-site release to large release.

• Added flexibility regarding actions when safety goals are exceeded to 1.1.6
GEC Interrogatory #50

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Please provide a list of CNSC Action Items relevant to the Pickering nuclear station that are currently under review.

Response
OPG declines to provide the requested information on the basis of relevance. This interrogatory seeks information on matters that are within the CNSC’s regulatory jurisdiction (being technical information related to approval of the operation of Pickering) and that are not relevant to deciding any issue on the approved Issues List in OPG’s application to set payment amounts.
**Issue Number: 6.5**

**Issue:** Are the test period expenditures related to extended operations for Pickering appropriate?

**Interrogatory**

**Reference:**

The OPG cost benefit analysis presented in *P-REP-09013-0002, Pickering NGS – Beyond Design Basis Containment Integrity*, which dates from January 2014, recommended not installing a Containment Filtered Venting System (CFVS) in part due to the “the short remaining operating life of the station.” OPG, however, has committed to install a CFVS at Darlington.

a. Has the decision not to install a CFVS been revisited, and if so changed, in light of OPG’s decision to extend Pickering’s operational life again to 2024?

b. If not, how long would OPG need to continue operating Pickering for the CFVS to be viewed as a reasonable upgrade?

c. Has the CNSC accepted OPG’s decision not to install a CFVS in light of its request to operate the station until 2024?

d. Please provide a list of other safety enhancements or upgrades that OPG decided against installing prior to the 2013 relicensing hearings due to the plan to operate Pickering to only 2020.

**Response**

OPG declines to provide the requested information on the basis of relevance. This interrogatory seeks information on matters that are within the CNSC’s regulatory jurisdiction (being technical information related to approval of the operation of Pickering) and that are not relevant to deciding any issue on the approved Issues List in OPG’s application to set payment amounts.
GEC Interrogatory #52

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:

Please provide the latest version of copy of N-REP-31100-10055, Report on Technical Basis for Fuel Channels Life Cycle Management Plan, which dates from 2011.

Response

OPG declines to provide the requested information on the basis of relevance. This interrogatory seeks information on matters that are within the CNSC's regulatory jurisdiction (being technical information related to approval of the operation of Pickering) and that are not relevant to deciding any issue on the approved Issues List in OPG's application to set payment amounts.
GEC Interrogatory #53

Issue Number: 6.5
Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Please provide an updated table with information equivalent to Table 1-1, *Fuel Channel Life Limiting Mechanisms Units 5 – 8*, which is found in Attachment 1, OPG Letter, G. Jager to D.A. Desjardin and M. Santini, “Assurance of Structural Fuel Channel Fitness for Service for the Target Service Life of Pickering NGS, CD# P-CORR-00531-03724.

Response
OPG declines to provide the requested information on the basis of relevance. This interrogatory seeks information on matters that are not relevant to deciding any issue on the approved Issues List in OPG’s application to set payment amounts.
June 15, 2012

CD#: P-CORR-00531-03724

MR. D.A. DESJARDINS
Project Manager
Fuel Channel Life Management Program
Directorate of Regulatory Power Program Division

MR. M. SANTINI
Director
Pickering Regulatory Program Division

Canadian Nuclear Safety Commission
280 Slater Street
Ottawa, Ontario
K1P 5S9

Dear Messrs. Desjardins and Santini,

Assurance of Structural Fuel Channel Fitness for Service for the Target Service Life of Pickering NGS


The purpose of this letter is to seek CNSC agreement that all life limiting fuel channel structural issues have been addressed for the target service life of the Pickering Nuclear Generating Station (NGS) through the material contained in this submission. This letter also provides the CNSC with an update on the measures taken for continued assurance of structural fitness for service of fuel channels for the target service life of Pickering NGS.

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Safe operation is the top priority at OPG, and our confidence in continued safe operation of the Pickering fuel channels for the target service life is based on our operating experience, extensive R & D evidence, in-service inspection, as well as the use of predictive models and assessments. The assessments show that the fuel channel condition is predicted to be well within acceptance criteria, accounting for planned management activities, for the proposed period of operation for all Pickering Units.

A summary of R & D findings, in-service inspection results and assessments which support the fitness for service of fuel channels at Pickering NGS to 247,000 EFPH at a minimum is provided in Enclosure 1. Continuing in-service inspections, maintenance, and surveillance, as well as on-going R&D will allow OPG to model and monitor fuel channel condition to routinely assess and demonstrate fitness-for-service.

The first update on fuel channel structural fitness for service was provided in Reference 1. In Reference 2, the CNSC agreed with three main focus areas for degradation mechanisms at Pickering Units 5 to 8, and also that these mechanisms are expected to be addressed by the Fuel Channel Life Management Project (FCLMP) or planned maintenance activities. The main focus areas are:

- Zr-Nb-Cu spacer mobility
- Hydrogen ingress and fracture toughness
- Flaw assessments

The CNSC response in Reference 2 noted one exception, where additional information was requested on management of Calandria Tube and Liquid Injection Shutdown System (LISS) Nozzle contact. A strategy for demonstrating that the Calandria to LISS Nozzle contact issue will not be a concern for the target service life for Pickering Units 5-8 is included in Enclosure 1. Additionally, OPG will provide an update on this item in the 2012 update of the Continued Operations Plan (COP) under regulatory management action 28134684-07.

The continued assurance of structural fitness for service on an ongoing basis to 247,000 EFPH will be by means of ongoing inspections and tests. The Fuel Channel inspection and maintenance plan for the Pickering target service life is provided in Enclosure 2. The plan has been designed to routinely monitor fuel channel condition over the operating period and to focus on the key degradation areas to be monitored. The adjustments to inspection plans include:

- Increased Rolled Joint sampling for Hydrogen equivalent ingress, and
- Adjustment of Spacer Location and Repositioning (SLAR) campaigns to accommodate the longer period of operation

In other areas, where inspection results and projections demonstrate the degradation is well characterized and will not reach limits, inspections have been reduced but are still at levels that will allow effective monitoring.

Attachment 1 provides a tabulated summary of the fuel channel degradation mechanisms and highlights the areas requiring mitigation for fuel channel fitness for service for Pickering Units 5-8. Pickering Units 1 and 4 pressure tubes were replaced...
in the 1980’s and early 1990’s, and have significantly less operating hours than Unit 5-8 pressure tubes. Thus, the degradation of the pressure tubes in Units 1 and 4 is bounded by the operating experience of pressure tubes at Units 5-8. The degradation mechanisms presented in Attachment 1 are consistent with the areas of R & D work outlined in the administrative protocol for the Fuel Channel Life Management project (Reference 3). A thorough discussion of all fuel channel degradation mechanisms relevant to the Pickering target service life is also provided in Enclosure 1. This enclosure provides evidence that all of the fuel channel degradation mechanisms are expected to be well within acceptance criteria, accounting for planned management activities, for the proposed period of operation for Units 5-8.

A key focus of the planned management activities to assure pressure tube fitness for service is addressing the Fracture Toughness Transition Temperature issue. As pressure tubes age they accumulate hydrogen and deuterium. This impacts on the fracture toughness of the pressure tubes. Fracture Toughness Transition Temperature increases with increasing hydrogen content of pressure tubes, and must be managed to the targeted end of service life. OPG is confident the management plan presented in Attachment 2 will address the Fracture Toughness Transition Temperature issue during the operating period to the end of the target service life of Pickering NGS.

OPG undertakes Regulatory Management actions to provide the CNSC with written updates on the progress of the activities initiated to manage the effects of pressure tube fracture toughness behaviour at high hydrogen content as identified in Attachment 2 Table 2-1.

In summary, OPG is responsible for safe operation of Pickering and based on the work done to date, is confident of continued safe operation of the fuel channels to targeted end of service life. OPG has addressed the issues related to fuel channel degradation with high regard to nuclear safety and transparency with the CNSC. OPG will continue to confirm ongoing fitness for service of fuel channels through ongoing analysis, modelling and in-service inspections.

OPG requests CNSC agreement that the structural aspects of fuel channel fitness for service for Pickering NGS have been addressed for the 247,000 EFPH target service life of the fuel channels.

If you have questions or concerns about this submission, please contact Imtiaz Malek at (905) 839-6746 extension 5476.

Glenn Jäger
Senior Vice President
Pickering NGS

cc: CNSC Site Office – Pickering
Attachments:
1. "Summary of Life Limiting Degradation in Pickering Fuel Channels"
2. "Management of Fracture Toughness and Leak Before Break to End of Target Service Life of Pickering NGS"

Enclosures:
ATTACHMENT 1

Summary of Life Limiting Degradation in Pickering Fuel Channels

The Fuel Channels at Pickering Units 5-8 are expected to remain in operation beyond the assumed design life of 210,000 Equivalent Full Power Hours (EFPH). As a prudent measure, a Research and Development (R & D) program was undertaken in 2009 to demonstrate fuel channel fitness for service to end of target service life.

The focus of the Fuel Channel Life Management (FCLM) project to 2012 and the Protocol agreement with the CNSC (Reference 1-1) was to prioritise the essential R & D work for the most pressing needs and to address any concerns for Pickering licence renewal in 2013. The R&D completed as part of the FCLM project and assessments performed to date are used to show the fuel channels are fit for service for the target service life. Complementary planned in-service inspections will demonstrate ongoing fitness for service for the life of Pickering NGS fuel channels.

A summary of all degradation mechanisms for Pickering 5 - 8 Fuel Channels are presented in Table 1-1. The following three degradation mechanisms require ongoing inspection and maintenance for the target service life:

1. **Zirconium-Niobium-Copper Spacer Mobility** is applicable to loose-fitting spacers at Pickering Units 5 - 8 and can potentially lead to Pressure Tube (PT) to Calandria Tube (CT) contact. Spacer Location And Repositioning (SLAR) maintenance and SLAR revisits are used to manage PT-CT contact. SLAR maintenance and additional SLAR revisit inspections have been scheduled to preclude PT/CT contact (see Reference 1-2).

2. **Fracture Toughness and Rolled Joint Deuterium Ingress**
   Results from the fracture toughness testing program at high [Heq] has produced results below the Canadian Standards Association (CSA) N285.8 fracture toughness Lower Bound Curve (LBC). For the short term, it has been concluded that the CSA N285.8 LBC is still applicable and the existing fuel channel fitness for service assessments are still valid (Reference 1-3). A new engineering fracture toughness model will be defined for future operations as part of the Protocol (Reference 1-1). Also for the future, analytic and procedural improvements will be made to enable the continued demonstration of fuel channel fitness-for-service. Additionally, plant equipment improvements for Pickering Units 5-8 will be implemented. See Attachment 2 for details.

The Rolled Joint (RJ) scrape sampling program has been significantly increased to determine rate of RJ deuterium ingress at inlet and outlet Rolled Joints and assess variability in deuterium ingress (Reference 1-2). The new fracture toughness model (Reference 1-4) will be updated using data from the burst test program which is ongoing in the FCLM project to provide a family of fracture toughness curves which will include Hydrogen equivalent concentration ([Heq]) as a key predictive parameter. Thus, the RJ deuterium ingress models will be used to predict [Heq] levels over the next operating interval and the applicable fracture toughness curve (based on the [Heq] level at the end of the operating interval) that will be used for fitness for service assessments to demonstrate fuel channel integrity.
3. **In-service Flaws**

   Flaws in pressure tubes mainly occur early in the operating life of the units. The only active flaw formation mechanism, crevice corrosion, is continuing to be monitored (Reference 1-5). Improvements to flaw assessment methodologies are being developed as part of the FCLM project (Reference 1-6) and this will give further confidence in fuel channel fitness for service for the target service life. Additionally, OPG will continue to monitor the most significant known flaws as part of scheduled inspections.

Other degradation mechanisms in fuel channels are expected to be acceptable for the target service life of Pickering NGS. Specifically, diametral expansion and wall thinning are projected to be within limits over the target service life (Reference 1-7). Additional inspections for CT to Liquid Injection Shutdown System (LISS) Nozzle contact are scheduled for 2013-2014 and updated assessments resulting from these inspections are expected to show CT to LISS nozzle contact will not occur over the target service life. Tight fitting spacer degradation at Pickering is bounded by the operating experience with spacers at Darlington NGS. Tight-fitting spacers are not expected to move based on in-service inspections to date (References 1-8 and 1-9). Calculations of spacer deflection versus pinching time are forthcoming to demonstrate tight-fitting spacers in PNGS Units are not at risk of movement. Fuel Channel elongation in Pickering Units 1 and 4 and Units 5 - 8 is well characterized and routine monitoring is used to determine scheduling for reconfiguration or channel shifting to ensure on-bearing operation.

A summary of the degradation mechanisms is presented in Table 1-1 below and a detailed assessment for each degradation mechanism is provided in Reference 1-7.
Table 1-1: Fuel Channel Life Limiting Mechanisms for PNGS Units 5-8

<table>
<thead>
<tr>
<th>Aging Mechanism</th>
<th>Consequence &amp; When</th>
<th>Indicators</th>
<th>Condition at PNGS Units 5-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Tube Axial Elongation</td>
<td>Channel comes off bearing  &lt;br&gt; There is enough available bearing travel on both free and fixed ends, that shifting of channels will allow operation beyond 247 kEFPH.</td>
<td>Elongation measurements</td>
<td>Not a concern as time to reach bearing travel limit (includes free and fixed end bearing travel) for the leading channels are as follows:  &lt;br&gt; Unit 5 - 268 kEFPH  &lt;br&gt; Unit 6 - 268 kEFPH*  &lt;br&gt; Unit 7 - 262 kEFPH*  &lt;br&gt; Unit 8 - 296 kEFPH*  &lt;br&gt; *For Operation to 247k EFPH, channel shifting is recommended to ensure on-bearing operation by utilizing available fixed end bearing travel (as required). Shifting has been scheduled [1-2].</td>
</tr>
<tr>
<td>Pressure Tube Sag</td>
<td>PT/CT contact, CT/LISS contact, fuel passage issues  &lt;br&gt; Beyond 247 kEFPH</td>
<td>Sag Measurements, CT/LISS gap measurements</td>
<td>Ongoing PT/CT sag measurements are scheduled. Additional CT/LISS nozzle inspections are scheduled for 2013-2014 and assessment of the results are expected to show CT/LISS contact will not occur prior to 247 kEFPH. Fuel passage tests have shown that fuel passage is not expected to be an issue prior to 247 kEFPH.</td>
</tr>
<tr>
<td>Pressure Tube Wall Thinning</td>
<td>Design limit, higher stress at operating pressures  &lt;br&gt; Beyond 247 kEFPH</td>
<td>Wall thickness measurements</td>
<td>Not considered life limiting. Periodic inspection will provide confirmation limits will not be reached through monitoring.</td>
</tr>
<tr>
<td>Pressure Tube Diurnal Expansion</td>
<td>Design limit, Spacer nip-up, NOP penalty  &lt;br&gt; Beyond 247 kEFPH</td>
<td>Diameter measurements</td>
<td>Assessments show design limit and spacer nip up will not be reached prior to 247 kEFPH. Current safety analysis of HTS aging incorporates PT diametral creep on impact loss of flow, Neutron overpower and small break LOCA [1-10] and an updated analysis for the target service life is to be provided in 2013 (AP-201347992). This will not limit the life of fuel channels.</td>
</tr>
<tr>
<td>Change in Inconel X-750 spacer material properties</td>
<td>Reduced mechanical strength  &lt;br&gt; Beyond 247 kEFPH</td>
<td>Observations from X-750 spacer removal, material surveillance examinations, irradiated test program</td>
<td>Tight fitting spacers have been installed in Units 1&amp;4, and same channels in Units 5-8. Operating experience with Tight fitting spacers at DNGS bound PNGS for spacer degradation due to higher fluence &amp; temperatures at PNGS. Crush tests from DNGS spacers show adequate strength for tight-fitting spacers at PNGS.</td>
</tr>
<tr>
<td>Change in Zr-Nb-Cu spacer material properties</td>
<td>Reduced mechanical strength  &lt;br&gt; Beyond 247 kEFPH</td>
<td>Material surveillance examinations</td>
<td>Spacer crush tests show large margin on strength. Also spacers from surveillance pressure tubes have not shown damage upon receipt for post service examination.</td>
</tr>
<tr>
<td>Aging Mechanism</td>
<td>Consequence &amp; When</td>
<td>Indicators</td>
<td>Condition at PNGS</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------------------</td>
<td>------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Inconel X-750 spacer mobility (no observations)</td>
<td>PT/CT contact</td>
<td>Detected spacer locations</td>
<td>In-service inspections have not found any tight-fitting spacers out of position. There are an extremely limited number of tight-fitting spacers installed in Units 6-8. Therefore mobility of these spacers is not considered to be a concern. There is a need to demonstrate spacers at PNGS will be pinched before being de-tensioned.</td>
</tr>
<tr>
<td>Spacer wear</td>
<td>PT/CT Contact</td>
<td>Volumetric Inspection (indications of potential wear on outer diameter of pressure tube)</td>
<td>Volumetric inspection procedures include a supplementary requirement to review inspection data and report any indications of potential pressure tube spacer wear. Based on in-service inspections and examinations of ex-service spacers, spacer wear is an infrequent occurrence. Spacer wear can impact on PT/CT contact times. A sensitivity study [1-11] was conducted to assess the impact of spacer wear on ex-service PT/CT contact, and the results of this study have been incorporated into contact dispositions.</td>
</tr>
<tr>
<td>Zr-Nb-Cu spacer mobility</td>
<td>PT/CT Contact</td>
<td>Detected spacer locations</td>
<td>SLAR, Volumetric and Dimensional inspection. (See [1-2]) All units with loose fitting spacers have been SLARed to 210 kEFPH with most channels SLARed to 240 kEFPH (plus 35% margin). Channels requiring SLAR maintenance from 210 kEFPH to 247 kEFPH have been identified and scheduled. SLAR revisits have been scheduled to ensure spacers do not move from where they have been repositioned.</td>
</tr>
</tbody>
</table>
| Hydrogen ingress & Fracture Toughness | Challenge to demonstrate fitness-for-service at high [Heq] levels SUBJECT TO CONFIRMATION BY R & D (See Attachment 2) | Rolled Joint (RJ) Scrape sampling to determine [Heq] and R & D work Material surveillance examinations. | Show that projected [Heq] in RJ is known and a fracture toughness appropriate to the projected [Heq] is applied in assessments:  
- Show that LBB will still be maintained.  
- Show that fracture protection is maintained.  
- Incorporate revised fracture toughness model in other fitness for service assessments.  
To this aim, OPG will make analytic, procedural, and plant equipment changes to enable continued demonstration of fracture protection and LBB. See also Attachment 2. |
| Flaw assessments | Flaws must satisfy acceptance criteria in CSA N285.4-05 or be disposed in accordance with CSA N285.8-10. Flaw Disposition updated after each inspection | Volumetric inspection and replication | Currently conservatism in flaw assessments can only be reduced following R & D. Initial results have shown much greater resistance to crack initiation in pressure tubes. Crack initiation has never been observed from flaw inspection. No evidence of active cracking mechanisms. R&D program will show that probability of crack initiation from delayed hydride cracking, fatigue and hydride region overload is acceptably low. Monitoring of known flaws, as cycle limits are approached and re-assessment and dispositioning will assure fitness for service for flaws. |
Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Re Pickering SOP:

a. Please provide the latest version of the Pickering Sustainable Operations Plan (SOP), P-PLAN-09314-00001, which presents strategies and plans to support the operation of Pickering until end of commercial operation.

b. Please indicate whether the latest SOP also considers extended operations until 2024.

c. If an alternative plan has been produced to govern extended operations until 2024, please provide a copy of that document.

Response

OPG declines to provide the requested information on the basis of relevance. This interrogatory seeks information on matters that are within the CNSC’s regulatory jurisdiction (being technical information related to approval of the operation of Pickering) and that are not relevant to deciding any issue on the approved Issues List in OPG’s application to set payment amounts.
GEC Interrogatory #55

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Exhibit F2-2-3 Attachment 2

OPG states a partial release of 52M to cover the incremental Pickering work program costs in 2016 and 2017. Does this partial release include the costs of the Periodic Safety Review to support OPG’s licence application and the extending of the operation of Pickering until 2024?

Response

Yes. Ex. F2-2-3, Attachment 2, page 22 shows the forecast expenditures in 2016 and 2017 for the Periodic Safety Review Update as part of the $52M partial release.
**GEC Interrogatory #56**

**Issue Number: 6.5**

**Issue:** Are the test period expenditures related to extended operations for Pickering appropriate?

**Interrogatory**

**Reference:**
Exhibit F2-2-3 Attachment 1, page 36 (IESO’s presentation evaluating the economic case for extending Pickering’s operations until 2024.)

(Note: On page 48 of OEB staff’s interrogatories, OPG is asked to consult with the IESO as necessary to respond to interrogatories related to the IESO’s analysis of the Pickering Extended Operations. GEC makes the same request here.)

a. IESO states that Pickering’s closure would present challenges related to the deployment of replacement supply. However, the government’s 2013 Long Term Energy Directive directed OPG to plan for Pickering’s closure in 2020 and potentially as early as 2017. What planning and procurement did the IESO undertake in response to the 2013 LTEP directive in order to secure adequate replacement supply to replace Pickering in 2020?

b. What is the IESO’s current plan to secure replacement supply if OPG doesn’t gain approval from either the CNSC or the OEB to extend Pickering’s operational life until 2024?

c. In light of the province’s “Conservation First” policy, did the IESO’s cost analysis of Pickering’s extended operations consider the additional cost effective conservation potential outlined in its June 2016 “Achievable Potential Study: Short Term Analysis” and how cancellation of the continued operations could affect conservation potential? If so, please provide details.

**Response**

The following response has been prepared by the IESO:

a. The IESO has supported implementation of various aspects of the 2013 LTEP since its publication in 2013. Conservation, supply and transmission resources that were planned, acquired and/or brought online since then are identified in the IESO’s 2016 Ontario Planning Outlook, which is available at: [http://www.ieso.ca/Pages/Ontario’s-Power-System/Ontario-Planning-Outlook/default.aspx](http://www.ieso.ca/Pages/Ontario’s-Power-System/Ontario-Planning-Outlook/default.aspx).
b. Options for addressing resource requirements in the event that Pickering does not operate to 2024 include taking greater advantage of supply resources whose existing contracts expire in coming years, taking advantage of resource options via capacity auctions, and greater use of non-firm intertie transactions. The plan to address such needs should they arise is touched upon in the Ontario Planning Outlook at http://www.ieso.ca/Documents/OPO/MODULE-4-Supply-Outlook-20160901.pdf. Irrespective of the particular options to be selected, mitigating and managing risks in the years ahead will be supported by well understanding the risks and their drivers, assessing them systematically and in cooperation with others, identifying and communicating needs and having the appropriate mechanisms to address them.

c. No, the analysis of Pickering’s extended operation was completed in 2015 while the Achievable Potential studies were finished in June 2016. However, the most recently identified achievable potentials are consistent with the conservation forecast used in Pickering analysis. The cancellation of the continued operations would have minimal impact on conservation potential.
SEC Interrogatory #67

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
[F2/2/3,p.3]

With respect to Pickering Continued Operations:

a. Please provide a list of all the CNSC approvals required to operate Pickering units to 2022 and 2024 from the original planned shutdown in 2020. Please provide an update on each of the approvals and if they have not been received, when OPG expects each specific approval to be given.

b. Please explain what OPG will do if it does not receive CNSC approvals for continued operation of the Pickering Units till 2022 and 2024. Please detail all potential budget and financial impacts between 2017 and 2021.

Response

(a) OPG requires an operating licence from the CNSC to operate Pickering to 2022/2024. OPG expects to file a relicensing application by June 30, 2017 and receive a CNSC decision by August 31, 2018 (see L-6.5-5 CCC-33).

(b) Please see Ex. L-6.5-1 Staff-117 (b) – (d).
SEC Interrogatory #68

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
[F2/3/2/, p.2]

Please provide a breakdown, for each year between 2016 and 2020, of the $307M total "incremental work, above formal operation costs" of Pickering continued operations.

Response

Please see Ex. F2-2-3, Attachment 2, p. 22.
VECC Interrogatory #29

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:
Reference: F2/T2/S3/Attachment 1 - IESO Assessment/ Slides, 21 22

a) Please confirm that the Pickering extension to 2024 becomes uneconomic at natural gas prices lower than $4MMBtu.

b) What is the current natural gas price (Dawn Hub)?

c) Please confirm that the Pickering extension also become uneconomic if costs increase by more than 30% from the current estimate of $307.2 million.

d) What programs have been put in place to ensure that the program can be completed for $330million or less?

Response

The following response has been prepared by the IESO, except for part (d), which is provided by OPG.

a) Exhibit F2/T2/S3/Attachment 1, Page 63 of 116 indicates that economic benefits of extended Pickering operations are sensitive to natural gas prices. This is the case when gas-fired generation is considered as an alternative to the Pickering nuclear generating station; higher natural gas prices result in greater value from extended operations, lower prices result in lower value. In such circumstances and under the assumptions outlined in the referenced exhibit, the IESO estimated that extended Pickering operation would be more expensive than using natural gas-fired generation for capacity and energy if natural gas prices were lower than $4/MMbtu at the Henry Hub, all other considerations remaining equal. Other factors would also impact the economic merits of Pickering extended operations. These include Pickering costs, Pickering performance, Ontario's need for electricity resources and others.

For context, as shown on page 64 of 116, $4.00/MMBtu is equivalent to a natural gas price of about $3/MMBtu plus a carbon price of about $20/tonne. Similarly, $4.00/MMBtu is equivalent to a natural gas price of about $2/MMBtu plus a carbon price of about

Witness Panel: Nuclear Operations and Projects
$40/tonne. In short, carbon costs increase the effective cost of natural gas and can also impact the economic value of Pickering extended operations.

b) On the date of writing this interrogatory response (October 7, 2016), the weighted average natural gas price at the Dawn hub was $3.77/MMBtu. For longer-term context, distributions of natural gas prices between 1997 and 2014 are illustrated at Exhibit F2/T2/S3/Attachment 1, Page 114 of 116. It will be seen that the mean natural gas price at the Henry Hub between 1997 and 2014 was about $5.20 and the mean price between 2010 and 2014 was about $4.00.

c) Exhibit F2/T2/S3/Attachment 1, Page 62 of 116 indicates that the economic benefits of extended Pickering operations are sensitive to Pickering capital and operating costs. As observed in the question, the same page indicates that Pickering extended operation to 2022 or 2022/2024 becomes uneconomic if costs increase by more than 30%. For clarity, the costs referenced are the total annual capital and operating costs of Pickering (i.e. these include the cost of enabling the extension, as well as all other capital and operating costs).

d) Refer to Ex. L-6.5-1 Staff-129.
VECC Interrogatory #30

Issue Number: 6.5

Issue: Are the test period expenditures related to extended operations for Pickering appropriate?

Interrogatory

Reference:

a) The Technical Assessment of November 2015 recommends $52 million be released to complete a Periodic Safety Review, the Fuel Channel Life Assurance Project and to execute incremental outages and inspections. Was this amount released? Has any subsequent report been authored to confirm the viability of the project being completed within the current forecast budget? If yes please provide that report(s).

Response

Yes, $52M of funding was approved and released. The work programs required to execute incremental outages and inspections, complete the Periodic Safety Review and Fuel Channel Life Assurance project are progressing as planned. No additional reports have been produced to confirm the viability of the project being completed within the current forecast budget.
Board Staff Interrogatory #136

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: Exh A2-2-1 Attachment 1 page 15 Ref: F2-2-1 page 3
Ref: Exh A2-2-1 Attachment 2 page 15

Here are different presentations of information related to human resources related costs. Please provide clarification and definitions.

a) OPG’s Business Plan refers to headcount. Does headcount include part time staff and contract staff? Is headcount a year end determination?

b) The evidence at Exh F2-2-1 refers to full-time regular staff, non-regular staff and part time staff. Please provide definitions for these terms.

c) The evidence at Exh F2-2-1 defines augmented staff as “external personnel providing specialized expertise (e.g., engineering) to supplement internal capability and/or to fill temporary vacancies.” Are augmented staff considered in headcount or FTE determinations?

d) The business planning instructions state that a change is being introduced in the 2016-2018 business planning process: “FTE calculations for regular labour costing must use the half-year rule. That is, when a regular headcount is added or removed during the year, 0.5 of an FTE must be added or removed in that year for labour costing purposes.” Are the FTE calculations and costs related to FTE’s consistently represented in the application for the historical and forecast period?

e) Please explain how the FTE are calculated, including reference to the staff categories noted in (b) and (c) above. Is FTE a year end determination?

Response

a) The headcount captured in OPG’s Business Plan includes part-time staff and is depicted as of year end. Contract staff are not included in OPG’s Business Plan headcount.

b) Regular employees, including both full time and part time staff, are those employees for which there is the expectation of ongoing employment. Regular employees are paid
through OPG payroll.

- Full time regular staff are regular employees who typically work the base hours associated with their position, being either 35, 37.5 or 40 hours per week.

- Part time regular staff work less than the scheduled hours associated with a position.

Non-regular employees are hired for a fixed period of time with a start and end date. Non-regular employees include students and other employees hired directly by OPG or through a trade union hall for a limited duration. Non-regular employees are paid through OPG payroll.

c) Augmented staff are not normally considered in headcount or FTE determinations. Where augmented staff are included in these calculations, such as in the Goodnight benchmarking study (see Ex. F2-1-1, Attachment 2), this inclusion is explicitly noted. References to headcount and FTEs captured in Ex. F2-2-1 and Ex. F4-3-1 do not include augmented staff.

d) and e) The FTE calculations and associated costs are consistently represented in the application for the historical and forecast period in that FTEs represent the number of hours worked over the year converted to an equivalent number of full-time employees. The associated labour costs are determined on the basis of the number of hours worked.

Historical FTEs are calculated by dividing the total period of time an employee occupied a position during the year by the scheduled hours associated with the position. The same scheduled hours are utilized whether an employee is a regular full time, regular part time or a non-regular employee. The standard scheduled hours of work are either 35, 37.5 or 40 hours per week.

For example, a part time regular employee who works on average 20 hours per week in a position normally scheduled for 40 hours, would equate to 0.5 of an FTE, provided the employee worked the entire year. Similarly, a full time regular or non-regular employee in this same position working 40 hours a week for half of the year would also equate to 0.5 of an FTE.

Forecast FTEs are determined as part of the business planning process in a manner similar to that described above. Demand for labour resources are identified and hours assigned to different work programs by job family. There are standard scheduled hours of work for each job family, being 35, 37.5 or 40 hours per week. The hours assigned to the various work programs and the standard scheduled hours of work are used to derive the number of FTEs forecasted for each job family. In some cases forecasted FTEs may be entered directly. In these situations, the associated hours are determined using the scheduled hours of work for the job family. FTE is not a year end determination.
Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: Exh F4-3-1 page 5
Ref: EB-2013-0321 Exh A4-1-1 page 1
Ref: Exh F4-3-1 Attachment 1

Business Transformation was initiated in 2011 and finished in 2015 with “nearly 2,700 positions” reduced. The evidence states that efforts to continually improve and manage OPG’s resources are embedded in day-to-day operations and business plans.

a) Please specify those efforts and provide specific references to the 2016-2018 business plan.

b) As noted in Exh F4-3-1 Attachment 1, nuclear facility FTE increase in 2016 and for the period 2017-2021 are higher than 2015, when Business Transformation concluded. The evidence from the previous proceeding states that “Business Transformation supports the alignment of OPG’s costs with its declining generation capacity … OPG will use attrition to reduce its year-end 2015 staff level by 2,000 employees with the potential for further reductions in later years.” What was the timeframe of those “later years”?

Response

a) Under Business Transformation, OPG projected a total staff level reduction of 2000 employees from 2011-2015 (EB-2013-0321, Ex. A1-3-1, p. 6, lines 4-6). The downsizing efforts from OPG’s Business Transformation initiative were successful in achieving significant attrition-based headcount, with nearly 2,700 positions reduced across the organization since 2011 (Ex. F4-3-1, p. 5, line 11). However, attrition resulted in skill shortages in certain areas (see L-06.6-1 Staff 138), which necessitated hiring to fill key vacancies. After an initial planned increase in 2016 to fill those shortages identified, staffing levels from ongoing operations (excluding DRP) decline over the planning period below 2015 levels (see Ex. A2-2-1, p.8 and in further detail in Ex. A2-2-1 Attachment 1 page 27).

The 2016 – 2018 business plan builds on efficiencies achieved to date, with a focus on pursuing further opportunities for improvement, including: (i) the Workforce Planning &
Resourcing Initiative which focuses on developing and implementing the resourcing strategy to support the safe operation of the plants and successful completion of the Darlington refurbishment (see Ex. A2-2-1, Attachment 1, p. 31); (ii) the Outage Performance Initiative which focuses on delivering predictable outage performance through improved planning and execution of outage work to meet planned outage day targets including the implementation of a long-term purchased services agreement to optimize contracted work and improve quality of supplemental staff execution (see Ex. A2-2-1, Attachment 1, p. 31); (iii) streamlining nuclear warehouse operations by completing the consolidation of 12 warehouses down to 5 (see Ex. A2-2-1, Attachment 1, p. 37), and; (iv) implementing the Facility Services Optimization initiative (see Ex. A2-2-1, Attachment 1, page 37).

b) Please see response to (a) above. The statement in EB-2013-0321, Ex.A4-1-1, p. 1 referenced above was meant to reflect that the targeted 2000 headcount reduction for Business Transformation was from 2011 to 2015. The next sentence in the evidence (EB-2013-0321 Ex A4-1-1 page 1, lines 9-10) calculates the savings from headcount reductions from 2011 to 2015, indicating the proper timeframe for the target headcount reduction as noted. As well, the 2013-2015 OPG Business Plan (EB2013-0321, Ex A2-2-1, Attachment 1, pp 6) identifies the headcount reduction period as 2011-2015.

The “later years” referenced in EB-2013-0321 refers to the periods of time after 2015, reflecting the desire to continue to drive efficiency improvements after the formal completion of the Business Transformation initiative.
Board Staff Interrogatory #138

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: Exh F4-3-1 page 6 and Attachment 1
Ref: Exh F2-1-1 Table 3

At page 6 of Exh F4-3-1, it states that there were 300 retirements in 2015 in the nuclear business. “Over two thirds of the 2015 retirements were in the critical operations, maintenance and technical roles and will need to be replaced.”

a) Table 3 of Exh F2-1-1 is a nuclear staff summary. There were 5,430.4 nuclear operations regular FTE in 2015. That number increases to 5,788.6 FTE in 2016. Despite retirements, staffing grew by 358.2 FTE overall, and by an amount well in excess of “over two thirds” of the 2015 retirements related to critical positions where replacement staff was anticipated to be needed. Please explain the increase.

b) Attachment 1 of Exh F4-3-1 lines 10 to 15 summarizes the nuclear allocation FTE in the historical and forecast period. There were 1,628.9 nuclear allocated FTE in 2015. That number increases to 1,773.3 FTE in 2016. How many of the additional FTE are related to critical positions? Please explain the increase beyond the critical positions.

Response

a) Between 2015 and 2016, the number of Regular Nuclear Operations FTE increases by 358 FTEs.

As shown in Chart 1 below, an increase of 269 FTEs (75%) in 2016 is associated with filling critical positions largely due to 2015 attrition. The remaining 89 FTEs (25%) are civil maintainers, project technicians, inspection & maintenance technicians, security and emergency response. Of the 89 positions that are in other functions, 42 (12%) are associated with Capital Project Portfolio, 22 (6%) are associated with Provision work programs such as Used Fuel Storage and planning for Decommissioning, and 25 (7%) with on-going Nuclear Operations OM&A.

Witness Panel: Nuclear Operations and Projects
b) Between 2015 and 2016, the number of FTE allocated to OPG’s Nuclear facilities increases by 144 FTE.

As shown in Chart 2 below, an increase of 75 FTE (52%) is associated with critical positions supporting Nuclear Operations, such as Authorized Operations Trainers in the Learning and Development corporate function.

<table>
<thead>
<tr>
<th>Critical Job Families (Authorized, Engineers, Mechanical &amp; Control Maintainers, Operations Specialists)</th>
<th>2015 Actual (a)</th>
<th>2016 Budget (b)</th>
<th>Difference (c) = (b) - (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Job Families (Authorized, Engineers, Mechanical &amp; Control Maintainers, Operations Specialists)</td>
<td>3,791.0</td>
<td>4,059.9</td>
<td>268.9</td>
</tr>
<tr>
<td>Other Functions (Maintainers Service, Technical, Other)</td>
<td>1,639.4</td>
<td>1,728.7</td>
<td>89.3</td>
</tr>
<tr>
<td>Total</td>
<td>5,430.4</td>
<td>5,788.6</td>
<td>358.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Increase in Allocated FTE (2015 vs 2016)</th>
<th>Nuclear Ops</th>
<th>Darlington Refurb</th>
<th>Nuclear Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Job Families (Authorized, Engineers, Mechanical &amp; Control Maintainers, Operations Specialists)</td>
<td>66</td>
<td>8</td>
<td>75</td>
</tr>
<tr>
<td>Other Functions (Procurement, Warehousing, Information Management, Facilities &amp; Business Infrastructure)</td>
<td>37</td>
<td>32</td>
<td>70</td>
</tr>
<tr>
<td>Total</td>
<td>104</td>
<td>41</td>
<td>144</td>
</tr>
</tbody>
</table>

Note: numbers may not add due to rounding.

Of the remaining 70 positions that are in functions, 32 (22%) are associated with the Darlington Refurbishment project, and 37 (26%) with on-going Nuclear Operations. These increases are to fill support roles primarily in OPG’s supply chain, information technology and real estate services.
Board Staff Interrogatory #139

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: Exh F2-1-1 Table 3
Ref: Exh F4-3-1 Attachment 1
Ref: Exh 2013-0321 Undertaking J9.7

a) Please explain why FTE at line 7 in Table 3 at Exh F2-1-1 from 2015 to 2021 do not match the nuclear direct FTE on line 8 of Attachment 1 at Exh F4-3-1.

b) Please explain why the 2013 nuclear FTE at line 22 of Attachment 1 at Exh F4-3-1 do not match the 2013 nuclear FTE at line 4 of Undertaking J9.7 of the previous proceeding. Are the differences related to the banked overtime referred to in the footnote to Figure 3 of Exh F4-3-1?

c) Did the Goodnight study at Exh F2-1-2 Attachment 2 consider the adjusted number of FTE referred to in the footnote to Figure 3 of Exh F4-3-1?

Response

a) Exhibit F2-1-1 Table 3, line 7 should reflect the same values as Ex. F4-3-1 Attachment 1, line 8. As the annual difference is minor, at approximately 7 FTEs or about $1M in total compensation costs, OPG does not propose to update its evidence to address this disparity. OPG proposes to reduce the nuclear revenue requirements to account for this difference through the payment amounts order process.

b) Yes, the difference in FTEs reported in Ex. F4-3-1, Attachment 1 and EB-2013-0321, Undertaking J9.7 is related to the adjustment for the impact of banked overtime taken.

c) No. The Goodnight study (Ex. F2-1-1, Attachment 1) is an FTE calculation as of March 2014 based on Goodnight Consulting’s methodology. See L-6.2-1 Staff-109, part c)ii for an explanation of the FTE differences between the Goodnight study and Ex. F4-3-1.
Board Staff Interrogatory #140

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:

Ref: Exh F4-3-1 Attachment 1
Nuclear facility FTE increase in 2016 and for the period 2017-2021 are higher than 2015, when Business Transformation concluded.

a) Are any of the FTE added after 2015 former OPG employees?

b) If yes to (a), how many?

c) If yes to (a), was the process described at page 630 of the 2015 Auditor General of Ontario Report (below) followed?

Response

a) The FTEs captured in Ex. F4-3-1, Attachment 1 from 2016-2021 reflect forecast values from OPG’s business plan. OPG did not plan for the rehiring of former employees as part of its business planning process. Therefore, the extent to which former OPG employees may form a part of these numbers when the actual hiring takes place over the period is not known.

b) OPG has rehired 85 former employees to date in 2016 (as of Sept 20, 2016). 64 of these former employees report directly to the nuclear organization.

c) The process described in the 2015 Auditor General’s report is no longer followed by OPG as of June 2016, when OPG revised its rehiring procedure. The main changes to the rehiring procedure include a reduction to the waiting period and an extension to the waiting period of one year between the time an employee retires and when that employee can be rehired, and then only with a maximum contract length of one year. Any such hire must also receive senior management approval. Exceptions may be made to accommodate employees in the nuclear field because of the limited availability of highly skilled workers.
working period, both by six months. Please find below a chart summarizing the June 2016 changes to OPG’s rehiring procedure.

**Chart 1: Summary of Changes to OPG Rehiring Procedure**

<table>
<thead>
<tr>
<th>Provision</th>
<th>Past Re-hire Policy</th>
<th>June 2016 Re-hire Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligibility Criteria</td>
<td>Individuals who receive a regular pension payment form OPG, were retirement eligible at time of departure from OPG or received a severance package and are returning to work directly.</td>
<td>No Change.</td>
</tr>
<tr>
<td>Waiting Period</td>
<td>Must not be employed by OPG directly or indirectly.</td>
<td>Must not be employed by OPG directly or indirectly.</td>
</tr>
<tr>
<td></td>
<td>• 12 months continuous waiting period; or</td>
<td>• 6 months uninterrupted waiting period for all of OPG; and</td>
</tr>
<tr>
<td></td>
<td>• 6 months continuous waiting period for Darlington Refurbishment or Authorized in Learning &amp; Development; or</td>
<td>• No waiting period for previously certified individuals who are returning to a role where a certification or license is required.</td>
</tr>
<tr>
<td></td>
<td>• 6 months continuous waiting period for Managed Task contracts.</td>
<td></td>
</tr>
<tr>
<td>Working Period</td>
<td>Maximum cumulative time working directly for OPG:</td>
<td>Maximum continuous time working directly for OPG:</td>
</tr>
<tr>
<td></td>
<td>• 12 months maximum continuous working period; or</td>
<td>1. For retirees:</td>
</tr>
<tr>
<td></td>
<td>• 3 years for Darlington Refurbishment or Authorized in Learning &amp; Development.</td>
<td>• who took any commuted value pension:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 18 months maximum uninterrupted working period; or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• who are collecting a pension: 3 years maximum uninterrupted working period.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. For former employees:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• who received a severance package: 18 months maximum uninterrupted working period; or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• who resigned: working period is defined as per employment contract and provisions of respective collective agreement.</td>
</tr>
<tr>
<td>Approvals</td>
<td>Manager Recruitment</td>
<td>Hiring Manager</td>
</tr>
<tr>
<td></td>
<td>Hiring Manager</td>
<td>VP Human Resources Business Partners</td>
</tr>
<tr>
<td></td>
<td>Line OAR</td>
<td>R2 or Line VP</td>
</tr>
<tr>
<td></td>
<td>VP Human Resources</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ELT</td>
<td></td>
</tr>
<tr>
<td>Exceptions</td>
<td>President/CEO</td>
<td>ELT, SVP PC&amp;C and CEO</td>
</tr>
</tbody>
</table>
Board Staff Interrogatory #141

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: Exh A2-2-1 page 2 Attachment 1 page 15 Ref: Exh F2-1-1 Table 3

At page 15 of the business plan it states, “Staffing levels from ongoing operations are expected to continue to decrease after 2018...The decrease over the 2019-2021 period reflects reductions in staffing levels as the Pickering station begins to approach its end of life ...”

a) At page 2 of Exh A2-2-1, it states that the planning assumptions include Pickering 2022/2024. If so, why are there reductions in staffing levels in 2019-2021?

b) Does the business plan and the nuclear staff summary reflect the allocation of Darlington staff, from units undergoing refurbishment, to Pickering?

Response

a) OPG’s staffing plans are based on the assumption that the Pickering station will operate until 2022/2024. However, the company’s staffing strategy is to reduce headcount, where possible, in advance of the shut down. This applies to both direct and support organization and costs such as inspection, maintenance, engineering and corporate support services, which will start to ramp down staffing gradually in advance of the units closing.

b) There are no Darlington staff from units undergoing refurbishment allocated to Pickering in the 2016-2018 Business Plan or the nuclear staffing summary.
Board Staff Interrogatory #142

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: Exh F4-3-1 page 6, Figure 3

Figure 3 has a line showing total compensation per FTE.

a) Does the total compensation per FTE include the value of the lump sum payment and share performance plan discussed at Exh F4-3-1 page 17? If it does not, please update the table to include this remuneration.

b) Further to question (a), does the total compensation per FTE include all compensation in any form provided to OPG employees? If not, please elaborate.

c) In its Total Compensation Benchmarking Study, Towers compares OPG’s “Total Direct Compensation” (which is average salary + target bonus + nuclear and other allowances) with several comparator groups. How does Total Direct Compensation map to Figure 3? Is it the “base salaries and incentives” line?

d) Please prepare a chart showing the average total compensation per employee from 2010-2021 for the management, PWU and Society groups. Please include all compensation, including the lump sum payments and the share performance plan. OEB staff suggests that OPG use the format of EB-2013-0321 Undertaking J9.7 to present this data.

Response

a) Yes, the total compensation per FTE shown in Ex. F4-3-1, Figure 3 does include the value of the lump sum payment and share performance plan.

b) The total compensation per FTE shown in Ex. F4-3-1, Figure 3 includes all the compensation elements captured in Ex. F4-3-1, Attachment 1. This includes base salaries and incentives, overtime, current employee benefits and all current service costs (on an accrual basis) for pension and other post-employment benefits (OPEB). Base salaries and incentives include all wages and salaries, costs associated with OPG’s Stakeholder Return Program, as well as allowances such as bonuses paid to Nuclear Authorized staff and shift premiums paid to unionized workers. For clarity, amounts paid to employees to reimburse them for expenses incurred, such as relocation, are not included in Ex. F4-3-1, Attachment 1. Also excluded are the non-current service cost components of centrally-held pension and OPEB costs (Ex. F4-4-1

Witness Panel: Corporate Groups, Compensation
Table 3, line 1) and the offsetting adjustment that converts pension and OPEB costs from an accrual to a cash basis (Ex. F4-4-1 Table 3, line 2).

c) No, Total Direct Compensation in the Towers’ benchmarking study do not map to “base salaries and incentives” line in Ex. F4-3-1, Figure 3. The information in Ex. F4-3-1, Figure 3 is derived from “Appendix 2k” found at Ex. F4-3-1, Attachment 1. Figure 1 below shows the relationship between “Base Salaries & Incentives” line shown in Ex. F4-3-1, Figure 3 and the “Total Direct Compensation” captured in the Towers’ benchmarking study at Ex. F4-3-1, Attachment 2.

**Figure 1**

<table>
<thead>
<tr>
<th>&quot;Appendix 2k&quot; Exhibit F4-3-1 Attachment 1</th>
<th>Compensation Benchmarking Exhibit F4-3-1 Attachment 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual &amp; planned compensation costs associated with Nuclear Facilities presented over multiple years</td>
<td>Compensation elements associated with matched positions across all of OPG as of April 2015</td>
</tr>
<tr>
<td><strong>Base Salary &amp; Incentives</strong></td>
<td><strong>Total Direct Compensation</strong></td>
</tr>
<tr>
<td>Annual salaries paid or planned during the year</td>
<td>Annual salaries as of a point in time</td>
</tr>
<tr>
<td>Actual Stakeholder Return Program Costs</td>
<td>Target Stakeholder Return Program Costs</td>
</tr>
<tr>
<td>Actual Nuclear Authorization Allowances</td>
<td>Actual Nuclear Authorization Allowances for the prior year</td>
</tr>
<tr>
<td>Other Allowances (i.e. shift premiums, on call)</td>
<td>Not Benchmarked</td>
</tr>
</tbody>
</table>

d) Please see Attachment 1 for a depiction of the average total compensation per employee from 2010 -2021 for Management, PWU and Society. The lump sum payments and share performance plan have been included in the compensation amounts shown.
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>STAFF (Direct &amp; Allocated, Reg &amp; Temp)</td>
<td>FTEs</td>
<td>FTEs</td>
<td>FTEs</td>
<td>FTEs</td>
<td>FTEs</td>
<td>FTEs</td>
<td>FTEs</td>
<td>FTEs</td>
<td>FTEs</td>
<td>FTEs</td>
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<td>FTEs</td>
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<tr>
<td>2</td>
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<td>890.3</td>
<td>926.9</td>
<td>958.5</td>
<td>950.2</td>
<td>945.7</td>
<td>933.6</td>
<td>920.6</td>
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<td>3</td>
<td>Society</td>
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<td>2,939.6</td>
<td>2,782.7</td>
<td>2,615.5</td>
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<td>2,753.9</td>
<td>2,784.5</td>
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<td>2,708.1</td>
<td>2,633.3</td>
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<tr>
<td>4</td>
<td>PWU</td>
<td>5,426.4</td>
<td>5,242.3</td>
<td>5,094.8</td>
<td>4,957.1</td>
<td>4,885.2</td>
<td>4,904.3</td>
<td>4,871.4</td>
<td>4,853.2</td>
<td>4,853.2</td>
<td>4,681.9</td>
<td>4,551.5</td>
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<tr>
<td>5</td>
<td>Total</td>
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<td>9,132.6</td>
<td>8,829.6</td>
<td>8,533.5</td>
<td>8,362.2</td>
<td>8,007.5</td>
<td>8,585.1</td>
<td>8,614.5</td>
<td>8,573.3</td>
<td>8,509.1</td>
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<td>8,064.1</td>
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<td>6</td>
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<td>(122.5)</td>
<td>(121.2)</td>
<td>(116.9)</td>
<td>(128.9)</td>
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<td></td>
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<td>7</td>
<td>Add: EPSCA</td>
<td>97.2</td>
<td>79.8</td>
<td>86.3</td>
<td>60.2</td>
<td>106.2</td>
<td>135.6</td>
<td>186.7</td>
<td>189.1</td>
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<td>181.1</td>
<td>229.1</td>
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<tr>
<td>8</td>
<td>Totals as Reported in J9.7</td>
<td>9,320.4</td>
<td>9,091.2</td>
<td>8,799.0</td>
<td>8,464.8</td>
<td>8,431.8</td>
<td>8,113.7</td>
<td>8,720.7</td>
<td>8,801.2</td>
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<td>8,429.9</td>
<td>8,293.2</td>
</tr>
<tr>
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<td>Check</td>
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</tr>
<tr>
<td>10</td>
<td>TOTAL COMPENSATION</td>
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<td>$M</td>
<td>$M</td>
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<td>$M</td>
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<td>$M</td>
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</tr>
<tr>
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<td>Management</td>
<td>192.8</td>
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<td>192.4</td>
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<td>195.4</td>
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<tr>
<td>12</td>
<td>Society</td>
<td>477.3</td>
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<td>542.0</td>
<td>544.7</td>
<td>542.6</td>
<td>535.0</td>
<td>530.7</td>
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<tr>
<td>13</td>
<td>PWU</td>
<td>735.6</td>
<td>745.9</td>
<td>748.3</td>
<td>806.8</td>
<td>765.3</td>
<td>805.4</td>
<td>813.5</td>
<td>830.5</td>
<td>833.7</td>
<td>850.0</td>
<td>833.5</td>
<td>809.9</td>
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<tr>
<td>14</td>
<td>Total</td>
<td>1,405.7</td>
<td>1,435.6</td>
<td>1,429.6</td>
<td>1,523.0</td>
<td>1,424.7</td>
<td>1,484.7</td>
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<td>1,578.0</td>
<td>1,583.2</td>
<td>1,599.4</td>
<td>1,574.9</td>
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<tr>
<td>15</td>
<td>Remove: Banked Overtime Adj</td>
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<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>16</td>
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Board Staff Interrogatory #143

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: Exh F4-3-1 page 6

The evidence states that "In 2016, staffing levels for OPG’s Nuclear facilities are expected to increase by over 600 FTEs due largely to the DRP and, to a lesser extent, the workforce renewal required to sustain Pickering operations."

a) There will be approximately 1,700 external contractors working on DRP.
   i. Please provide more detail on the need for an additional 600 OPG FTEs for DRP.
   ii. If not provided in (i) above, please provide a functional summary for the DRP FTEs, e.g. engineers, business analysts, administrative assistants, etc.
   iii. Please provide the breakdown for the DRP FTEs by management, Society and PWU.

b) Please provide a breakdown on the number of additional FTEs that will be associated with the DRP, and the number of additional FTEs that will be associated with sustaining Pickering operations. Please provide the response as separate line items (i.e. lines for DRP regular and non-regular, and lines for Pickering extended operations regular and non-regular) in the format of Table 3 of Exh F2-1-1 and Attachment 1 to Exh F4-3-1.

c) Will the additional FTEs hired for sustaining Pickering operations be “term employees” as described at Exh F4-3-1 p. 7?

d) Why do the numbers of FTEs fall by approximately 500 from 2017-2021?

Response

a)  
   i. The OPG FTEs for the Darlington Refurbishment Program (DRP) are required to fulfill OPG’s role as program owner as described in section 3 of Ex. D2-2-2, p. 3.
   ii. See Figure 1 below:
## Figure 1 - DRP FTEs by year by Job Category by Representation

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1. Includes regular and temporary OPG Nuclear staff supporting DRP
2. Excludes: Augmented staff and support from non Nuclear OPG organizations
3. Numbers may not add due to rounding.

iii. See part a) ii. above.
b) See requested information in format of Ex. F2-1-1 Table 3, in Chart 1:

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See requested information in format of Ex. F4-3-1, Attachment 1, in Chart 2:
## Chart 2 - Nuclear Facilities Staff - Regular and Non-Regular (FTEs)
(form of Ex. F4-3-1 Attachment 1)

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c) Some of the additional FTEs hired for sustaining Pickering operations will be term employees; however, the number of term employees to be employed has not been determined. Currently, term employees represent less than 1% of the nuclear organization headcount.

d) The decline of approximately 500 FTEs (about 8%) between 2017 and 2021 involves decreases in both regular and non-regular FTE as shown in Ex. F4-3-1, Attachment 1. This decline reflects reduced staffing levels associated with the completion of work programs to enable Pickering continued operations and a decline in outage activity in 2021. While a station-wide Pickering VBO is planned in 2021, non-refurbishment outage work at Darlington is restricted as two units undergo refurbishment. Also embedded in the business plan are staffing reductions for corporate support headcounts associated with achieving a 5% reduction from 2015 planned levels by 2020. Monitoring and control of new hiring as staff numbers fall due to attrition will continue, as well as initiative development and implementation to streamline processes and find new efficiencies to help manage attrition as OPG prepares for the end of Pickering unit operations beyond the IR test period.
Board Staff Interrogatory #144

Issue Number: 6.6  
Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:  
Ref: Exh F4-3-1 page 8  
The evidence states that “OPG...negotiated agreements with both the PWU and Society in 2015 that will keep wage escalation below inflation. Both agreements provide for a one percent escalation increase each year…”

a) Please file a copy of the PWU and Society collective agreements.

b) Is the one percent escalation in addition to the cost of living adjustments discussed in the previous paragraph on page 8? How much escalation is associated with the cost of living adjustments?

Response

a) Attached to this response as Attachments 1-3 respectively, are copies of the following documents:

i. The most recent PWU collective agreement for April 1, 2015 – March 31, 2018.


b) There are no cost of living adjustments for the duration of both the Society (January 1, 2016 – December 31, 2018) and PWU (April 1, 2015 – March 31, 2018) collective agreements. The cost of living adjustments contained in the respective collective agreements are suspended for the term of the agreements.
COLLECTIVE AGREEMENT

between

ONTARIO POWER GENERATION

and

POWER WORKERS’ UNION

Canadian Union of Public Employees
C.L.C. Local 1000

April 1, 2015 - March 31, 2018
COLLECTIVE AGREEMENT

Between

ONTARIO POWER GENERATION INC.

and

POWER WORKERS’ UNION

CANADIAN UNION OF PUBLIC EMPLOYEES – C.L.C.

LOCAL 1000

April 1, 2015 – March 31, 2018
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Part</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Articles (Salmon)</td>
<td>1-65</td>
</tr>
<tr>
<td>A</td>
<td>General Items (Green)</td>
<td>66-148</td>
</tr>
<tr>
<td>B</td>
<td>Maintenance Trades (Yellow)</td>
<td>149-170</td>
</tr>
<tr>
<td>C</td>
<td>Electrical Operators (Blue)</td>
<td>171-185</td>
</tr>
<tr>
<td>D</td>
<td>Clerical/Technical (White)</td>
<td>186-211</td>
</tr>
<tr>
<td>E</td>
<td>Construction/Technical (Goldenrod)</td>
<td>212-223</td>
</tr>
<tr>
<td>F</td>
<td>Thermal Generating Stations (Grey)</td>
<td>224-243</td>
</tr>
<tr>
<td>G</td>
<td>Nuclear Generating Stations (Tan)</td>
<td>244-284</td>
</tr>
<tr>
<td></td>
<td>Appendix A – Nuclear ONLY (Ivory)</td>
<td>285-292</td>
</tr>
</tbody>
</table>

## NOTE

In order to readily identify changes in this Agreement from the previous one, new changes are printed in bold. Note that certain foreign words used within the text are, by convention, printed in italics, however these words are easily identifiable and should not cause confusion.
# TABLE OF CONTENTS

## ARTICLES

<table>
<thead>
<tr>
<th>Article</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RECOGNITION</td>
</tr>
<tr>
<td></td>
<td>COLLECTIVE BARGAINING UNIT</td>
</tr>
<tr>
<td>2</td>
<td>GRIEVANCE PROCEDURE</td>
</tr>
<tr>
<td>2A</td>
<td>DISCIPLINE AND DISCHARGE</td>
</tr>
<tr>
<td>3</td>
<td>ARBITRATION</td>
</tr>
<tr>
<td>4</td>
<td>WORKING CONDITIONS</td>
</tr>
<tr>
<td>5</td>
<td>UNION SECURITY</td>
</tr>
<tr>
<td>5A</td>
<td>SECURITY GUARDS - CONFLICT OF INTEREST AND WITHDRAWAL OF SERVICES</td>
</tr>
<tr>
<td>6</td>
<td>NO DISCRIMINATION</td>
</tr>
<tr>
<td>7</td>
<td>MANAGERIAL RIGHTS OF THE COMPANY</td>
</tr>
<tr>
<td>8</td>
<td>SKILL BROADENING AND WAGE STRUCTURE</td>
</tr>
<tr>
<td>9</td>
<td>SPECIFIC MATTERS OF AGREEMENT</td>
</tr>
<tr>
<td>10</td>
<td>SELECTION TO VACANCIES</td>
</tr>
<tr>
<td>11</td>
<td>SURPLUS STAFF PROCEDURE</td>
</tr>
<tr>
<td>12</td>
<td>PURCHASED SERVICES AGREEMENT</td>
</tr>
<tr>
<td>13</td>
<td>EMPLOYMENT SECURITY PLAN</td>
</tr>
<tr>
<td>14</td>
<td>EMPLOYMENT SECURITY AND WORK ASSIGNMENT</td>
</tr>
<tr>
<td>15</td>
<td>SUCCESSOR RIGHTS</td>
</tr>
<tr>
<td>16</td>
<td>DURATION OF THE AGREEMENT</td>
</tr>
<tr>
<td>17</td>
<td>DECONTROL</td>
</tr>
</tbody>
</table>

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1
COLLECTIVE AGREEMENT
BETWEEN

ONTARIO POWER GENERATION INC.  
(Hereinafter referred to as “The Company”)

and

POWER WORKERS’ UNION (PWU), CANADIAN UNION OF PUBLIC EMPLOYEES, Local 1000 - CLC, 
hereinafter referred to as the "Union" which executes this Agreement by B. Walker, B. Carnduff, M. 
Skopeleanos, A. Clunis, S. Walker, A. Sham, M. Quinn, T. Borg.

WHEREAS the Union has requested the Company to enter into a Collective Agreement and the Company has 
consented thereto:

NOW THIS AGREEMENT WITNESSETH

that there shall be seven parts, namely, Part A - General Items, Part B - Maintenance Trades, Part C - 
Stations, and Part G – Nuclear Generating Stations.  It is also witnessed that the Company and the Union 
agree each with the other as follows:

ARTICLE 1
RECOGNITION
COLLECTIVE BARGAINING UNIT

1.1 The Company recognizes the Union as the sole bargaining agent for all regular, part-time and 
temporary employees1, including technicians of the construction field forces and security 
employees but excluding:

(a) Employees now represented by other bargaining agents.
(b) Persons above the rank of working supervisor.
(c) Persons who exercise managerial functions in accordance with the Ontario Labour 
Relations Act.
(d) Persons employed in a confidential capacity in matters relating to labour relations in 
accordance with the Ontario Labour Relations Act.

1.2 The grievance/arbitration procedure may be used to challenge any unreasonable, arbitrary or bad 
faith action taken by the Company which results in the exclusion of any employee or position from 
the bargaining unit.  The parties will attempt to resolve disputes expeditiously.

---

1 "Employees" are employees pursuant to the Labour Relations Act for Ontario SO, 1995, c.1 Schedule A, as amended.
1.3 When an employee is removed from normal duties to act in a vacated position or relieve for an incumbent or perform a temporary assignment, the following shall apply:

(a) When the length of time involved is known to be three months or less, the employee will retain his/her present jurisdictional status.

(b) When it is expected that the length of time will be longer than three months, the employee will be excluded or included at the commencement of his/her new responsibilities. However, in the event the period is actually less than three months:

(1) in exclusion cases, the Union will be reimbursed the dues which would have been paid;

(2) in inclusion cases, the Union will reimburse the employee the dues which have been paid.

(c) When the length of time is unknown, the employee will retain his/her present jurisdictional status up to the three month period. If the period extends beyond three months, the employee will then be either included or excluded.

ARTICLE 2
GRIEVANCE PROCEDURE

2.1 Any allegation that an employee has been subjected to unfair treatment or any dispute arising out of the content of this Agreement shall be understood to be a fit matter for the following grievance procedure. All matters of grievance by any employee or group or class of employees for whom the Union is the bargaining agent and which the Union may desire to present shall be dealt with in accordance with the following procedure.

2.2 It is mutually agreed by the parties hereto that it is the spirit and intent of this Agreement to adjust grievances promptly. Therefore, any employee covered by this Agreement having a grievance may present such grievance to the representative of the Union appointed by the Union for that purpose. The Union representative may then proceed to have such grievance adjusted in accordance with the following steps established hereby for the purpose of adjusting grievances.

2.3 Grievances

Grievances are to be filed within thirty (30) days from the date that the grievor knew or should have known the facts giving rise to the grievance. The Company is to reply in writing within seven (7) days.

Steps in grievance process: Non-disciplinary matters:

Step 1 Within seven (7) days of reply or time limited for reply, a meeting with contact supervisor.

Step 2 If Step 1 meeting not held or if grievance not resolved at Step 1, grievances go to next scheduled meeting of Grievance Review Board.
2.4 Grievance Review Board

The Grievance Review Board shall consist of two Union representatives (Chief Stewards) and two Management representatives (at a high level), who will have the authority to agree unanimously to a final and binding settlement of any grievance or unanimously agree to the scheduling of any grievance, save and except the following types of grievances, which shall go directly to mediation or arbitration, as the parties may agree, or the Chief Arbitrator so determines:

i. Grievances requiring medical disclosure;
ii. Policy grievances;
iii. Terminations;
iv. Cases where the parties have agreed that facts should only be disclosed to those directly involved and the appropriate counsel acting on behalf of the parties for final resolution.

Grievance Review Board meetings are to be scheduled regularly as agreed to by the parties or ordered by the Chief Arbitrator in all work locations. The purpose of the Grievance Review Board will be to attempt to settle all cases, failing which the Grievance Review Board will agree to facts where possible and ensure that all documentary and other evidence is disclosed by the parties.

If not resolved at the Grievance Review Board, grievances move to arbitration. Unless the parties agree to regular arbitration, or the Arbitrator so orders, all grievances shall be submitted to Expedited Arbitration.

2.5 Disciplinary Matters

2.5.1 Prior to the imposition of any disciplinary penalty, the Company shall hold a Disciplinary Interview, which shall replace Step 1 of the grievance process.

2.5.2 The Company shall provide the Union and any employees who may be disciplined three (3) days’ notice of the Interview.

2.5.3 The Interview shall take place between the Company, the Union and the accused individual

2.5.4 The Company shall set out its allegations and except where the allegations could constitute a criminal offence, the Union or the individual(s) shall set out their version of the events. Minutes, but not a transcript, of the Interview setting out the substance of the discussion shall be taken.

2.5.5 The minutes of the meeting shall be provided to the Union and the accused individual(s) within seven (7) days of the Interview except where the accused individual or Union unreasonably fails to attend the interview and there is no agreement to re-schedule, in which case the Company will proceed with discipline under 2.5.7 below.

2.5.6 The Union and the accused individual(s) shall forward a written reply to the minutes, if any, within seven (7) days of receipt of the minutes.

2.5.7 Should the Company choose to impose discipline, the Union has ten (10) days to file a grievance commencing at Step 2.
2.5.8 Nothing in the disciplinary interview process is intended to interfere with the Company’s right to investigate matters.

2.6 Facilities and Costs

2.6.1 The Company shall provide the necessary facilities for all meetings in the grievance process.

2.6.2 Maintenance of normal earnings and payment of expenses shall be provided by the Company for all Union representatives on a grievance committee.

2.6.3 The fees of all arbitrators and costs associated with arbitration hearings shall be shared equally by the parties, subject to current practices.

ARTICLE 2A
DISCIPLINE AND DISCHARGE

2A.1 Any allegation that an employee has been demoted, suspended, discharged or otherwise disciplined without just cause shall be a fit matter for the grievance and arbitration procedures as provided for in this Collective Agreement.

2A.2 When disciplining or discharging probationary employees for just cause, it is recognized that the probationary period is an extension of the selection process and that they have short service. Therefore, the threshold for discipline and discharge may be less than that of a regular employee in similar circumstances.

2A.3 Disciplinary penalties resulting in a suspension without pay will not be imposed until a final decision, (agreement between Union and Management, or an arbitrator's judgment) has been reached.

2A.4 Unless otherwise agreed to, after a letter(s) of reprimand has been on an employee’s file for a maximum of two years, and there have been no further occurrences, then the letter(s) of reprimand will be removed from all files.

2A.5 DISCIPLINARY PENALTIES

A copy of all letters of employee reprimand shall be sent to the chief steward, except in cases where in the Company’s opinion the matter involved is of a confidential nature. In the latter instance, the letter will state that the Union has not received a copy of the letter.

This shall not prevent a supervisor from taking on-the-job disciplinary action including immediate suspension subject to later confirmation.
ARTICLE 3
ARBITRATION

3.0 THE REGULAR ARBITRATION PROCESS

The regular arbitration process will continue on the basis of the practice currently adhered to by the parties, but any disputes relating to such practice or any requests for changes in the practice may be referred to the Chief Arbitrator for a ruling.

3.1 This procedure shall not apply to Union allegations of unfair treatment.

3.2 Where a difference arises between the parties relating to the interpretation, application, or administration of this Agreement, including any question as to whether a matter is arbitrable, or where an allegation is made that this Agreement has been violated, either of the parties may, after exhausting any grievance procedure established by this Agreement, refer the grievance to arbitration pursuant to Article 2.4.

The Arbitrator shall hear and determine the difference or allegation and shall issue a decision and the decision shall be final and binding upon the parties and upon any employee affected by it. However, in no event shall the Arbitrator have the power to change, alter, modify or amend any provision of this Agreement.

3.3 Principles of Expedited Arbitration

(a) Arbitrators shall normally decide multiple cases each day of hearing. Cases shall be heard on an expedited basis after the parties have exchanged their written briefs. Oral evidence may be called only where the arbitrator deems necessary and only with leave of the arbitrator. Mediation prior to arbitration is normally an integral part of this arbitration process.

(b) The decisions are precedent setting and shall be accompanied by reasons on any non-factual issues.

(c) The parties may use the services of counsel.

3.3.1 Chief Arbitrator

The Chief Arbitrator will have exclusive, final and binding authority over all issues relating to the scheduling of cases, including decisions as to who hears which case and when it is heard and shall have the power to relieve against time limits, including those in the grievance process and the referral to arbitration in respect of all cases.

Powers of the Chief Arbitrator

(a) The Chief Arbitrator will have the power to:

(i) appoint arbitrators;
(ii) assign grievances for resolution;
(iii) schedule hearing dates in consultation with the parties.
(iv) determine the hours within which arbitrations are conducted.
(v) assist in reducing the cost and delay and increasing the efficiency of the regular arbitration process.

(vi) appoint a Deputy Chief Arbitrator and delegate such powers to that Deputy as the Chief Arbitrator may deem fit. The Deputy shall succeed the Chief Arbitrator should the Chief Arbitrator be no longer willing or capable of carrying out the duties of the Chief Arbitrator.

3.3.2 All Arbitrators

Where a difference arises between the parties relating to the interpretation, application, or administration of this Agreement, including any question as to whether a matter is arbitrable, or where an allegation is made that this Agreement has been violated, either of the parties may, after exhausting any grievance procedure established by this Agreement, refer the grievance to arbitration pursuant to Article 2.4.

The Arbitrator shall hear and determine the difference or allegation and shall issue a decision and the decision shall be final and binding upon the parties and upon any employee affected by it. However, in no event shall the Arbitrator have the power to change, alter, modify or amend any provision of this Agreement.

All arbitrators are to determine their own procedure, may admit evidence that would not be admissible in court and may rely on such evidence to render a decision. All arbitrators will have the power and authority to determine the real issues in dispute between the parties in any particular case and to relieve against time limits in the grievance process. All arbitrators’ decisions will be final and binding. All arbitrators shall have the power to make interim relief orders.

ARTICLE 4
WORKING CONDITIONS

4.1 Working conditions during the term of this Agreement shall be as outlined in this Agreement and in Negotiated Policies and Practices and Mid-Term Agreement\(^2\) except such Mid-Term Agreements as are agreed obsolete by the parties.

In addition, the general environmental privileges surrounding an employee shall also be considered as working conditions. These privileges would include such things as wash-up time, transportation facilities, safety appliances, general safety or health precautions.

4.2 Any modification within the confines of this Agreement shall be subject to agreement by the Company and the Union’s executive. Changes to the undernoted subjects, however, can be made with the written agreement of the PWU Sector Vice-President or delegate and may be cancelled by either party upon the giving of 30 days' notice:

(a) Changes in working hours between the hours of 7:00 am to 6:00 pm for an individual, work group or crew.

\(^2\) A Mid-Term Agreement is a modification of the Collective Agreement executed by the parties on the prescribed form (a specimen of which is shown below) during the term of the Collective Agreement.
(b) The extension of acting positions beyond 90 days as outlined in Part B, Item 14.0; Part D, Section 6.2 A; Part D, Item 6.2 B; Part G, Section 12.0; and Part F, Item 9.0.

(c) Modifications to hours of work (specific) at all locations for banked time arrangements.

(d) Local extensions to a maximum of three months beyond the normal 12 accumulated months (in which there have been no breaks in employment exceeding five months) on the use of temporary employees to meet short term staffing requirements without invoking regular-seasonal status.

(e) Arrangements allowing flexibility for employees assigned to temporary work headquarters subject to PWU Sector Vice-President or delegates approval.

4.3 Unless specifically referred to in a Mid-Term Agreement the pertinent provisions of the Collective Agreements shall apply.

MID-TERM AGREEMENT

TITLE

Number Date

It is jointly agreed that the following Mid-Term Agreement shall form part of the Collective Agreement between the parties:

SAMPLE

THE COMPANY UNION

ARTICLE 5

UNION SECURITY

5.1 All employees covered by this Agreement who are members of the Union on the date hereof shall, as a condition of employment, maintain such membership.

5.2 Employees who are not members on the date hereof but who become members of the Union subsequent to said date shall as a condition of employment, maintain their membership thereafter.

5.3 New employees shall, as a condition of employment, be or become members of the Union within 15 days of their engagement and shall, as a condition of employment, maintain their membership thereafter.

5.4 Membership as a condition of employment as specified in 5.1, 5.2 and 5.3 shall not apply while membership is withheld or suspended, or where a member is expelled by the Union.

5.5 In all cases for employees in the Collective Bargaining Unit as defined in Article 1, the Company shall be responsible for the signing of dues authorizations and shall deduct from the weekly wages
of each employee, an amount equal to the weekly union dues in effect at the time and shall transmit the monies so deducted to the Secretary-Treasurer of the Union at the times designated by the Union.

5.6 A Union representative will be given an opportunity to conduct an orientation session for new probationary/regular employee(s) or temporary employees with greater than 6 months’ service within regular working hours at a time and of a duration that is mutually agreeable between the Company and the Union. The purpose is to acquaint the new employee with the benefits and duties of union membership.

5.7 The Company will not oppose any action by the Union to discipline its members as identified in its constitution.

ARTICLE 5A
SECURITY GUARDS - CONFLICT OF INTEREST AND WITHDRAWAL OF SERVICES

5A.1 Conflict of Interest

The Union recognizes that the inclusion of security staff in this collective agreement may create the possibility of a conflict of interest between the responsibilities to their duties and their membership in the Union. The Union will not impede security staff from performing any of their job duties.

These provisions are intended to permit security staff to perform their duties unfettered and to preserve the confidentiality of their work. Security staff are sometimes required to take action with respect to other employees. It is the intent of these provisions that security guards will fulfill their duties irrespective of whether the other employees involved are or are not represented by PWU CUPE Local 1000. The Company agrees that all security staff represented by PWU CUPE Local 1000 will have normal access to Union representation.

The Union agrees not to pursue any internal disciplinary actions against security staff for performing their duties.

Any conflict of interest involving security staff will be subject to an expeditious internal confidential review/resolution process. If the internal resolution process is not capable of resolving the conflict of interest, then an expeditious external process will be activated.

The Executive Committee of the Union clearly recognizes the unique position of security staff regarding their relationship with other PWU CUPE Local 1000 represented employees and will strive to ensure that any conflict of interest, which may arise, is handled sensitively and expeditiously.

5A.2 Withdrawal of Services

Recognizing the need to protect the Company assets, employees, the public and in order to meet regulatory requirements, the parties agree to the following:
(a) The Union agrees to give the Company twenty-one (21) calendar days' formal notice in writing prior to any legal withdrawal of services by security staff;

(b) The Union agrees that the Company may use replacement workers from any non-PWU source to perform security functions withdrawn as a result of a legal strike. Replacement workers will only perform security functions during the duration of the legal work stoppage;

(c) PWU security staff will co-operate in the training of replacement workers and shall provide an orderly turnover to replacement workers before any withdrawal of services. Any training of replacement workers within twenty-one (21) calendar days prior to a legal work stoppage (i.e., during the notice period in (a) above) will not be subject to temporary instruction allowances provided for elsewhere in this agreement;

(d) Upon request, the Company will provide the Union with information on the number of replacement workers performing security functions;

(e) A minimum number of NRF qualified NSOs are required to work during a legal strike to satisfy the company's minimum complement requirements. Prior to the commencement of a legal strike, management and the PWU will jointly contact NRF qualified NSOs to advise them of the work schedules and the terms and conditions they will work to during a legal strike.

(f) This agreement exempts the parties from Subsections 73.2(4) to 73.2(11) of the Ontario Labour Relations Act R.S.O. 1990 and any amendments thereto of that statute.

5A.3 The Union agrees to communicate and educate its stewards and membership on the intent of this Article.

ARTICLE 6
NO DISCRIMINATION

6.1 The Company shall not discriminate against an employee because of membership or activity in the Union or the exercise of his/her lawful rights, and any employee covered by the Agreement who feels that he or she has suffered discrimination shall have the right to seek redress in accordance with Grievance and Arbitration Procedures.

6.2 An employee who has a complaint with respect to discrimination in the employment relationship, as envisioned under the Canadian Human Rights Act, will have access to the internal Human Rights resolution process if he/she so desires. The employee, if he/she so desires, may have a Union representative present. The complaint, the Human Rights resolution process and the results of same shall not be subject to the grievance/arbitration process.

6.3 The Company shall not discriminate against an employee on grounds prohibited by the Ontario Human Rights Code. An allegation that this clause has been violated shall be a fit matter for redress under the grievance and arbitration procedure.
ARTICLE 7
MANAGERIAL RIGHTS OF THE COMPANY

The Company has and shall retain the exclusive right and power to manage its business and direct its working forces including, but without restricting the generality of the foregoing, to right to hire, suspend, discharge, promote, demote, and discipline any employee. The Company shall exercise the said functions in accordance with the provisions of this Collective Agreement.

ARTICLE 8
SKILL BROADENING AND WAGE STRUCTURE

8.1 Introduction

In order for the Company to be competitive it is essential that work efficiency be maximized. The Company must change its current approach to performing work while continuing to improve safety and quality standards. In addition, the Company must invest in employee development. These changes can be achieved through the introduction of skill broadening programs and a simplified wage structure.

The wage structure consists of three (3) salary bands.

All employees on the wage structure will be expected to perform any assigned work (as described in 8.2 below) within the same band or a lower band without additional compensation.

8.2 Skill Broadening

Skill broadening is the development and use of employees to perform work outside of their traditional roles. Skill broadening is achieved by providing employees with the training and opportunities to perform additional work safely. The intent of skill broadening is to enrich job content and increase work efficiency by:

a) Removing the traditional boundaries in working roles; and
b) Developing employee capabilities to perform work beyond their traditional roles.

Skill Broadening can be achieved by taking advantage of existing and future technology and by development of employees who are highly trained with multiple capabilities and responsibilities.

Skill Broadening will include training and instruction of other employees. It also will include new responsibilities required to maximize the commercial performance of the Company while ensuring compliance with market rules and sound health and safety and environmental practices.

Skill broadening and the consolidation of occupation codes into new job groupings will not eliminate the distinctions between positions. For example, Mechanical Maintainers will not become Control Technicians. However, there may be an overlap of duties between job groupings.

3 ANO and U0CRO treatment will be outside of band 3.
The intent of skill broadening is not to fully qualify an employee in all other jobs but rather to maximize the capabilities of employees.

Employees can be required to work outside their job grouping with employees in other job groupings to jointly complete work assignments. All work assignments are dependent on employees having appropriate skill, knowledge and training.

Employees working independently will be expected, once trained, to perform basic skills of other job groupings at the same or lower band. There may be limited circumstances where employees receive specific training in another job grouping to fully complete a specialized task.

In addition to the responsibilities listed in their Job Documents, the work of employees will be expected to include additional tasks. This is further described in the Article 8 Intent Document, which forms part of this agreement.

8.3 Wage Structure

The wage structure will consist of three (3) bands comprised of a series of progression steps within each band. Progression through steps will be time based subject to satisfactory performance and successful completion of training.

The wage structure will eventually replace all existing wage schedules.

All new employees hired must participate in skill broadening.

8.4 Implementation Issues

8.4.1 Implementation Committee

A six (6) person committee will be established, comprised of three (3) Company representatives and three (3) PWU representatives, to identify and resolve any problems and make recommendations to the Oversight Committee for any changes to the collective agreement.

Any inconsistencies between the existing collective agreement and this article will be resolved in a manner consistent with the goals and principles of this Article.

Any unresolved matters and changes to the collective agreement will be referred to the Oversight Committee for resolution.

8.4.2 Oversight Committee

The Oversight Committee will resolve all issues arising out of the implementation of the wage structure and any unresolved issues arising out of the implementation committee review of the collective agreement and any other agreements between the parties. This committee will be comprised of two (2) senior level representatives from the Company and two (2) senior level representatives from the PWU. Should the Oversight Committee reach an impasse on an issue the matter may be remitted to mediation/arbitration using the same mediator/arbitrator as agreed to in Article 8.4.4.
8.4.3 Job Evaluation Plan

All occupation codes and associated job titles and job documents (job descriptions, occupational definitions and expectation documents) will be consolidated into new job groupings. Issues associated with the job groupings will be reviewed by the joint implementation committee.

The company will produce generic Job Documents to describe the job groupings within each band.

A gender neutral Job Evaluation Plan has been developed (see Article 8.13) to allow placement of any occupation code or job into one of the 3 bands. All new occupation codes will be evaluated under this new job evaluation process.

The Company shall notify the Union of the introduction of any new job classifications and their placement on a band (i.e. Band 1, 2 or 3). Where a difference arises between the parties, the Company may introduce the new job classification(s) or placement on a band (i.e. Band 1, 2 or 3). Either party may require that the differences between them be submitted directly to the arbitration process as detailed in Article 3 and the decision shall be binding on both parties.

When significant alterations in duties and/or technological changes occur, the Job Document will be modified by joint agreement or by the Job Challenge process outlined in Article 8 of the Collective Agreement.

Effective September 1st, 2012, job challenges disputing the placement on the band shall be filed within one (1) year from the date that the Union is notified of the placement of the new job classification on the band and the classification has been populated.

Effective September 1st, 2012 any existing job not currently challenged and in effect for a minimum of one (1) year can only be challenged when the Union can demonstrate that significant alterations in duties and/or technological changes have occurred. Evidence will be restricted to one year prior to the filing of the grievance.

Supervision is not reflected in the job evaluation plan, but is recognized with a premium. Supervising responsibilities which attract a supervisory premium can only be assigned and not assumed. The responsibilities for all supervisors are stated in Section 8.8 below.

Each employee shall have access to his/her job document, through their supervisor, and to documents covering other PWU represented employees through the Chief Steward or the Union Office.

Note: See also PWU Negotiated Policies and Practice 4-2: Nuclear Skill Broadened Job Descriptions – Revised Tuesday January 17th, 2006

8.4.4 Job Challenge Procedure

The Challenge Procedure is comprised of two distinct streams, one for employees who volunteered for skill broadening and another for those who did not.

Job Challenge Process:

1. The Union shall commence this dispute resolution process by filing a Job Challenge with the relevant contact supervisor. The parties shall meet within seven (7) days to attempt to resolve the matter.
Failing a resolution of the matter within fourteen (14) days of filing the grievance, the matter will be referred to the next meeting of the Joint Classification Committee (JCC) in the former Nuclear bargaining unit, or the Implementation Committee (IC) in the former Non-Nuclear bargaining unit. Failing resolution at that meeting, the matter shall be referred to expedited arbitration using a mutually agreed upon expert in job evaluation to act as Arbitrator.

2. The JCC, or IC shall sit monthly or as otherwise agreed to by the parties and consist of three (3) union and three (3) employer representatives. It shall have the power to resolve any dispute concerning the placement of a job on a particular Band by unanimous agreement. If the JCC, or IC cannot reach agreement the matter may be submitted to the expedited resolution process.

3. The Arbitrator’s jurisdiction in these matters is limited to a determination of the correct placement of a job on a particular Band. The Arbitrator cannot alter the rates of the Bands.

4. Briefs shall be prepared by each party for each claim including a statement of facts, brief argument and the relevant provisions of the Collective Agreement. The briefs shall be provided to the Arbitrator at least 7 days prior to any hearing date. The Arbitrator will advise which matters will require witnesses for credibility issues. The parties will also exchange these briefs.

5. The fees of the Arbitrator and costs associated with these hearings shall be shared equally by the parties.

6. Retroactivity will be restricted to 12 months prior to the filing date of the challenge.

8.4.5 Progression From Step to Step within a Band:

Each band will contain an Entry Rate, and a Terminal Rate. There will be 8 annual progression steps from the Entry Rate to Terminal Rate except Band 1 which will have 6 annual progression steps.

Progression through steps will be time based subject to satisfactory performance and successful completion of training.

Employees who are not offered developmental and/or training opportunities will progress annually to the next step in the Band up to the Terminal Rate subject to satisfactory performance.

New hires will have previous experience recognized and will be given credit for such experience and will be placed at the appropriate step within a band. The current practices for determining the appropriate hiring rate will continue to be used. Any disputes regarding such placements will be referred to the Oversight Committee for resolution.

Subject to satisfactory performance and the successful completion of training ANOITs will progress through an Authorized Nuclear Operator Schedule.

Employees on LTD or who have been approved for LTD prior to September 4th, 2001 are not eligible to volunteer for skill broadening. The Company will accept any request to volunteer from existing LTD employees when they return to regular employment.
Employees who are above the terminal rate of their band and are successful to a position in the same band will continue to maintain their above band rate. This does not include any premium paid for supervisory duties in accordance with Article 8, Item 8.8.1.

8.5 Temporary Employees

All temporary employees, excluding those hired pursuant to Appendix A, will be required to work to the skill broadening standards effective the ratification date of this agreement.

With the exception of temporary employees, hired pursuant to Appendix A, all temporary employees will receive the same wage treatment as regular employees according to the criteria outlined in Part A, Item 43.0, Wage Structure.

With the exception of temporary employees, hired pursuant to Appendix A, all temporary employees will be placed on the band appropriate to the classification hired into. Specific step placement will be assessed at the point of hire, or re-hire.

8.6 Article 11 as it relates to the wage structure

The existing Occupational Group Listings (OGLs) will continue in their current format until they are replaced.

Existing Occupational Group Listings (OGL) will be frozen and new OGLs for new job classifications will continue to be established pursuant to Article 11.4

When existing Occupational Codes are consolidated into job groupings as per section 8.4.4, then all OGLs will be updated at the same time.

New disputes arising over the grouping of a job or jobs into an Occupational Group Listing will be referred to the Oversight Committee. In the event that a dispute is not resolved at this level, then such disputes will be referred to the Chief Arbitrator for resolution.

8.7 Premiums

The following premiums are eliminated and the work assignments associated with them are considered to be part of normal job duties:

- Holding Work Protection for a Work Group
- Greenmanning
- Plastic Suits
- Confined Space Monitor
- Contract Monitor
- Entry Coordination/Access Control
- Procedure Writing
- Assessing tasks
- FME Monitors
- AA Rate
- Lead Hand
- Relief for any Position within Band
- Instructors rate
- Frontier Allowance
- Field Allowance
- Fossil Special Allowances (F6 “Dirt Pay”)
- Operator Agent Duties
- Carpenter Special

Subsequent to ratification of the Collective Agreement and upon mutual agreement any other premiums for the performance of specific tasks contained within the collective agreement and any other agreements between the parties will also be eliminated. Any unresolved issues will be referred to the Oversight Committee for resolution.

### 8.8 Supervision

Supervisory Responsibilities under the new wage structure are as stated below. Some supervision and/or coordination of work is included in the band rate of every job and will not attract extra premiums. Supervisory responsibilities which attract a supervisory premium can only be assigned and may not be assumed.

**BASIC RESPONSIBILITIES OF SUPERVISORS**

Supervisors are expected to demonstrate personal qualities such as leadership, reliability and good judgement.

Assist the Manager by performing the following duties:

1. Developing and maintaining a safe and healthy work environment. Upholding safety standards and ensuring all of OPG’s standards, rules and procedures are strictly adhered to.

2. Planning, organizing, scheduling, assigning, establishing parameters for, and checking work of staff/crews, including emergency work.


4. Ensuring all staff are qualified to perform the assigned work.

5. Scheduling and holding regular meetings (including safety meetings) to discuss context, plans, problems and suggestions. Identifying to the manager any emergencies/deviations to work.

6. Developing and improving skills and knowledge of staff to do their work and be capable of performing the full range of the processes and tasks that occur within the unit. Fostering a work environment that enhances employee performance and encourages employee engagement.

### 8.8.1 Full-Time Supervision

Full Time Supervisors will be paid at 10% above their individual wage rate, but in no case will their pay rate exceed 15% above the terminal rate of their band.
8.8.2 Temporary Supervision

Subject to the maximum permitted, employees who are assigned to act temporarily in a PWU represented supervisory position will be paid 10% above their individual wage rate except when reporting directly to another Union Supervisor in which case employees will be paid 5% above their individual wage rate. In no case will these temporary pay rates be more than 15% above the terminal rate of the band.

8.8.3 Temporary Relief in a Non-PWU Position

Employees who are assigned to act temporarily in a non-supervisory non-PWU position will be paid at 6% above their individual wage rate but in no case will their temporary pay rate exceed 6% above the terminal rate of their band.

Employees who are assigned to act temporarily in a non-PWU supervisory position will be paid at 15% above their individual wage rate but in no case will their temporary pay rate exceed 15% above the terminal rate of their band.

Note: above payments cannot be combined

8.8.4 Training Technician Supervisory Payment (Nuclear ONLY)

The Training Technician supervisory payments (5% above an individual wage rate) will apply to individuals who occupy a regular/temporary Training Technician posting/or when an individual is removed from his/her normal duties for greater than 30 days and performs the duties normally performed by a Training Technician i.e. training delivery and/or development.

8.9 Promotional Rule

Any employee who receives a promotion to a higher band will receive the next highest step above his/her current rate in the higher band, which provides at least a 6% increase.

8.10 Relief Rule

Any employee relieving in a higher band will receive the first step on the higher band that provides at least a 6% increase over the employees’ current rate.

8.11 Apprentices

Apprentices will be provided with the opportunity to work the hours necessary for Provincial Certification.

8.12 HOURS OF WORK

Employees who participate in the Wage Structure and Skill Broadening and who are regularly scheduled to work 35 or 37.5 hours per week may request a permanent change to 40 hours per week. Approval to increase regularly scheduled hours of work is at the discretion of the Company. The increased hours of regularly scheduled work will be at straight time.
8.13 Job Evaluation Plan

All new occupation codes will be evaluated under this job evaluation process. This plan uses the levels of work approach to job evaluation. Jobs are rated as a whole to consider which level is most appropriately applied to the job. Benchmarking plays an important role in administering this type of job evaluation plan. Several benchmarks will be selected from the agreed to list of jobs in each band.

<table>
<thead>
<tr>
<th>Level</th>
<th>FACTOR STRUCTURE/GUIDELINES</th>
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<tbody>
<tr>
<td></td>
<td>Knowledge</td>
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<td></td>
<td>Results</td>
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<td>Problem Solving</td>
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<td></td>
<td>Customer Service</td>
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<td></td>
<td>&quot;PERFORMS SKILLED INDUSTRY-SPECIFIC OPERATIONS&quot;</td>
</tr>
<tr>
<td></td>
<td>Requires knowledge of a technical specialty and requires an understanding of technical/trade processes.</td>
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<td></td>
<td>Completes complex procedures and/or provides assistance and support in the performance of technical/operational assignments.</td>
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<td></td>
<td>Resolves issues/problems by referring to established guidelines and exercising judgement within the defined framework and/or requires selecting the most appropriate choice from known alternatives.</td>
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<td></td>
<td>Completes work for internal/external customers according to technical/operational standards or specific instructions.</td>
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<td></td>
<td>Interactions may be internally and/or externally focused to exchange information or ideas that require explanation. Interactions require tact to handle problems or complaints.</td>
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<tr>
<td></td>
<td>Accountability for the health, safety &amp; well being of self and others is linked to compliance with technical/operating procedures and standards and includes the development of technical/operational solutions to problems.</td>
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<tr>
<td></td>
<td>May be fatiguing as a result of regular physical activity; and/or may require concentrated periods of mental/sensory attention. Often situated in an environment with exposure to disagreeable and/or hazardous conditions.</td>
</tr>
<tr>
<td>3</td>
<td>&quot;PERFORMS SKILLED OPERATIONS&quot;</td>
</tr>
<tr>
<td></td>
<td>Requires an understanding of clerical, technical or trades work processes.</td>
</tr>
<tr>
<td></td>
<td>Completes routine procedures and provides assistance in the performance of technical/administrative assignments.</td>
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<tr>
<td></td>
<td>Exercises some judgement to determine appropriate choice among established procedures</td>
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<tr>
<td></td>
<td>Completes work for internal/external customers according to specific instructions.</td>
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<tr>
<td></td>
<td>Interactions require courtesy to maintain effective working relationships.</td>
</tr>
<tr>
<td></td>
<td>Accountability for the health, safety &amp; well being of self and others is linked to compliance with technical/operating procedures and standards.</td>
</tr>
<tr>
<td></td>
<td>May be fatiguing as a result of regular periods of physical effort; and/or may require short periods of mental / sensory attention. Often situated in an environment with exposure to disagreeable and/or hazardous conditions.</td>
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<tr>
<td>Level</td>
<td>FACTOR STRUCTURE/GUIDELINES</td>
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</tr>
<tr>
<td>1</td>
<td>♦ Knowledge ⇒ Interpersonal</td>
</tr>
<tr>
<td></td>
<td>○ Results Δ Health &amp; Safety</td>
</tr>
<tr>
<td></td>
<td>※ Problem Solving ❖ Environment</td>
</tr>
<tr>
<td></td>
<td>☐ Customer Service</td>
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</tbody>
</table>

“PERFORMS BASIC OPERATIONS”
- ♦ Requires an understanding of clerical, technical or trade established procedures.
- ○ Completes routine procedures.
- ※ Activities are covered by defined rules and instructions.
- ☐ Completes work according to basic standards.
- ⇒ Interactions are internally focused to receive instruction and give basic information.
- Δ Accountability for the health, safety & well-being of self and others is linked to compliance with procedures and standards.
- ❖ May be fatiguing as a result of regular periods of physical effort; and/or may require short periods of mental / sensory attention. Often situated in an environment with exposure to disagreeable and/or hazardous conditions.

### ARTICLE 9
**SPECIFIC MATTERS OF AGREEMENT**

9.1 These matters are to be dealt with in accordance with Parts A, B, C, D, E, F, G and Article 8.

9.2 Where a new field of endeavour is undertaken by the Company and the employees concerned fall within the jurisdiction of the Union by virtue of Article 1, the question of whether such employees will be covered by an existing part of the Collective Agreement, an existing part of the Collective Agreement with special provisions or modifications, or a new part of the Collective Agreement will be one for joint agreement.

### ARTICLE 10
**SELECTION TO VACANCIES**

10.1 Vacancies

10.1.1 No person shall be appointed to a vacancy in the PWU - CUPE Local 1000 jurisdiction until all qualified PWU - CUPE Local 1000 represented applicants have been selected. Non-represented employees may be appointed to positions within the PWU’s jurisdiction but will only be able to use that portion of their service which was acquired while a member of the PWU.

10.1.2 If an employee is appointed to a vacancy within the PWU - CUPE Local 1000 jurisdiction from a bargaining unit which restricts seniority in the Company to its own membership, his/her seniority will be limited to service within the PWU - CUPE Local 1000 bargaining unit. A non-represented employee appointed to a vacancy within the PWU bargaining unit after April 1st, 2009 shall have his/her seniority limited to seniority earned in the PWU bargaining unit.
10.1.3 In filling vacancies within the PWU - CUPE Local 1000 bargaining unit, the Company will take into consideration whether the vacant position is supervisory or non-supervisory.

The following will apply:

(a) Supervisory Positions

1. In considering applicants for supervisory positions, primary consideration should not be given to seniority but to personal qualities such as leadership, reliability, judgment, ability to organize and instruct and an understanding and a display of the practice of good human relations. For supervisory positions, an endeavour will be made to select the most promising candidate.

2. Only those individuals satisfactorily possessing the above characteristics, as assessed by the Company, should be considered. Where practicable, applicants for supervisory positions should be interviewed by the supervisor responsible for the selection. Seniority will govern only in cases where there does not appear, in the Company's opinion, to be much difference in qualifications.

3. For the purpose of this article, supervisory positions are full time supervisors as defined in Article 8 and for Nuclear will include:

   (a) FLMa(s) (for example control, mechanical, clerical, civil, Supervising Nuclear Operator (SNO), etc.)

   (b) Authorized Nuclear Operator

4. The provisions of Article 10.1.3 A-3 above will not affect the status of incumbents for Union representation or the future posting of vacancies as they may occur.

5. Appointments to positions above the jurisdiction of the Union shall not be subject to the Grievance Procedure. However, the Company will give due consideration to representations of the Union where there is evidence of obvious irregularities or discrepancies.

(b) Non-Supervisory Positions

1. The Company will use all available information and determine those applicants who are qualified to fill the vacancy.

   One of the requisites is the minimum years of experience as set out in the job specification. Before any consideration is given to seniority the supervisor responsible for making the selection must determine, from the list of applicants, those employees who have the qualifications to do the job satisfactorily.

   A recommendation by the supervisor should then be made from the qualified employees, overall seniority being the governing factor.
An employee's experience with another company will be taken into consideration in determining his/her qualifications for a position.

2. The senior qualified candidate will be selected to the vacancy with the following exceptions:

The Company may request a waiver of Posting and/or Selection from PWU - CUPE Local 1000 when there are medical reasons related to the employee or his/her immediate family, as verified by the Chief Physician/Manager of the Health Services Department. If the waiver request is agreed to by the Union, the employee will be appointed to the position.

Management reserves the right to restrict the transfer of successful applicants to a vacancy that represents a lateral or demotion. Prior to imposing this restriction, management will consider a delayed transfer, taking into account the availability of suitable replacements to allow for the delay. In the event that there are no reasonable alternatives to permit the transfer or delay, management reserves the right to restrict the transfer of the candidate to a lateral or demotion, where the transfer would reduce the capability in a given classification below a level necessary for the effective continued operation of the sending department.

Employees will receive written notice from his/her supervisor if their transfer is delayed or voided because they cannot be released. A copy of this written notice is to be given to the Chief Steward.

(c) General

1. If the candidate selected has already been appointed to another position, but has not yet reported to the new job, he/she shall be given the opportunity of choosing the one he/she prefers unless it is in the Company's interest that he/she accept the first appointment.

2. On request, the Company will explain, in writing, to any unsuccessful applicant for an advertised vacancy, the reason why he/she was not selected for the position.

3. Details of requirements for notification of applicants are found in Part A, Item 17.0.

10.1.4 The following definitions shall be used to determine an employee's entitlement to be considered for a non-supervisory vacancy:

(a) Seniority

Except as provided in Section 10.1 of this Article:

1. An employee's seniority, for purposes of selection to vacancies, shall be the service credit as defined in Part A, Item 5.0.

2. Service with an acquired company will be added to the employee's seniority.
3. The total service credit with the Company will be used for comparing seniority of applicants rather than service in a position, trade, or occupation.

**Note**

After April 1st, 2009, non-represented employee appointed to a vacancy within the PWU bargaining unit shall have his/her seniority limited to seniority earned in the PWU bargaining unit.

(b) Base Hourly Rate

1. The maximum base rate per Part A, Item 43.

(c) Promotion Application

1. A promotion is defined as an advertised position that is in a higher Band than the applicant’s current position, regardless of the weekly hours of work.

(d) Lateral Application

A lateral is defined as an advertised position that is in the same Band as the applicant’s current position, regardless of the weekly hours of work.

(e) Demotion Application

A demotion is defined as an advertised position that is in a lower Band than the applicant’s current position regardless of the weekly hours of work.

10.2 **Transportation and Moving Expenses**

Candidates selected to vacancies which represent a lateral or demotion in accordance with Article 10.1 and employed for a minimum of three years in their current work headquarters shall be entitled to moving expenses in accordance with the provisions of Part A, Item 23.0.

Candidates selected to trainee operator positions who have two years' service shall be entitled to moving expenses in accordance with the provisions of Part A, Item 23.0.

Employees appointed to positions which are filled due to an agreed to waiver of posting and/or selection, as provided in 10.1.3 (b) (2), will be entitled to moving expenses in accordance with the provisions of Part A, Item 23.0.
ARTICLE 11
SURPLUS STAFF PROCEDURE

No employee will be involuntarily laid off during the term of the Collective Agreement. Article 11 with the exception of Article 11.0 will be suspended for the term of the Collective Agreement.

During the term of the Collective Agreement there will be no involuntary lay-offs. Any surplus of staff will be handled through either worksite/location re-deployment in accordance with Article 11.0, or the offer of severance under the applicable VSP mid-term agreements.

During the term of this agreement if a surplus cannot be accommodated through re-deployment, or a VSP under the applicable mid-term agreements, the treatment of employees who are adversely affected by such an event will be subject for discussion between the parties. These discussions will occur in the context of a commitment by the Company to employment security. If an agreement cannot be reached all unresolved issues may be referred to the Chief Arbitrator for resolution.

The suspension of Article 11 will expire on March 31, 2018 and will not be automatically renewed in any subsequent Collective Agreement.

Table of Contents

11.0 Worksite/Location Redeployment
11.1 Surplus Staff Procedure - Sequence Of Events
11.2 Application
11.3 Definitions
11.4 Occupational Group Listings (OGLs)
11.5 Notice Of Termination/Layoff
11.6 Employee Elections
11.7 Failure To Identify Elections
11.8 Voluntary Terminations
11.9 General
11.10 Placement To Vacancies And Positions Created Through Acceptance Of Voluntary Termination
11.11 Displacements
11.12 Displacement Rights - Operators (Nuclear ONLY)
11.13 Displacement And Recall Rights – Probationary, Regular Seasonal-A
11.14 Permanent Location Closings
11.15 Severance Pay
11.16 Failure To Report To Assigned Positions
11.17 Selection To Vacancies
11.18 Recall
11.19 Limitations To Turnover
11.20 Wage Maintenance
11.21 Moving Expenses

Management will determine whether they implement Article 11.0 and/or Article 11.1.

Note: Appendix A of Article 11 forms part of this Collective Agreement. Any changes to the list, including the addition or deletion of locations, worksites and work centres shall require joint agreement.

Note (Non-Nuclear ONLY):

In the event that an employee who did not volunteer for skills broadening is affected by an Article 11.1 implementation he/she will be asked if they wish to choose skills broadening. If they so choose they will be placed in the appropriate occupational group listing (OGL) but will only be able to displace into positions within lower bands. There will be no skills broadening bonus paid. If they do not choose skills broadening they will be covered by the Non-Nuclear Collective Agreement which expired March 31st, 2002. They can only displace employees who have not elected to skills broaden. For the purposes of worksite/location redeployment those who did not volunteer for skills broadening will be treated in the same manner as all other employees and should they be force transferred their election not to skills broaden will be honoured.

11.0 WORKSITE/LOCATION REDEPLOYMENT

This provision may be implemented and completed without activating Article 11 in total.

1. Within a worksite\(^4\) or between worksites in close proximity to each other, management may deploy employees within equal Job Groupings.

2. (i) Within a Location\(^5\) that has multiple worksites management may deploy employees within equal Job Groupings\(^6\) from an over-complement worksite to an under-complement worksite, on a senior choice/junior force basis until either the over-complement or under-complement ceases to exist, whichever occurs first.

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\(^4\) As defined by Article 11
\(^5\) As defined by Article 11
\(^6\) As defined by Article 11
Management has the right to determine the Job Grouping(s), number of over-complement positions, number of under-complement positions and the worksite(s) that will be dealt with under each operation of this provision.

(ii) Where management has identified an over-complement in a Job Grouping within a Location(s) and an under-complement within another Location(s) in an equal Job Grouping, the following will occur. An employee may choose an equal or lower under-complement position within their OGL at their location on a senior choice basis. If this option is not chosen or available, management may deploy employees from an over-complement Location(s) to an under-complement Location(s) on a senior choice/junior force basis until either the over-complement or under-complement ceases to exist, whichever occurs first.

Management has the right to determine the Job Groupings, number of over-complement positions, number of under-complement positions and the Location(s) that will be dealt with under each operation of this provision.

(a) A junior employee who refuses to be transferred will be subject to discipline up to and including termination. All disputes regarding the discipline and termination of an employee who refuses a transfer will be referred to Martin Teplitsky for resolution on an expedited basis. An employee who is terminated for refusing a transfer under the terms of this agreement shall be eligible to receive reduced severance pay pursuant to Article 11.15(c) (iii) as well as Article 11.15.1 (Benefit Continuance/Tuition/Outplacement Services), if the proposed transfer is to a location that is not within a reasonable commuting distance from his/her residence.

Where an employee is terminated for refusing to transfer to a location which is within reasonable commuting distance from his/her residence, there is no severance or other provisions payable to such employees.

(b) Management will provide at least four (4) weeks’ notice to employees in the over-complement Job Grouping(s) and Location/worksite of the intended date of transfer by posting in the over-complement Location(s)/worksite(s) a notice which sets out:

- the affected Job Grouping(s);
- number of positions to be filled;
- under-complement Location(s)/worksite(s); and
- proposed transfer date.

Subsequent to this four (4) week posting employees designated for transfer will be provided with at least two (2) weeks’ notice of their actual transfer date. In determining an employee’s transfer date the company will consider the personal circumstances of the employee and the business needs of the company.

(c) Employees transferring will be entitled to moving expenses and housing assistance as set out in Part A, Item 23.
3. Under-complement positions that remain vacant after the operation of 1 and 2 will be posted in accordance with the Collective Agreement.

4. If the transfer results in a move to an equal Job Grouping, the employee shall maintain his/her current rate. In situations involving a move to an “Equal” Job Grouping requiring fewer weekly hours of work, the employee shall have his/her rate frozen in accordance with Article 11.20. If the employee chooses a “lower” under-complement position (including positions requiring fewer weekly hours of work) in the same location as per 11.0.2(ii) he/she shall have their rate frozen for a period of three months at which time a three percent (3%) reduction in rate will take place. Subsequent reductions of three percent (3%) will take place annually thereafter until the maximum rate for the lower rated job is reached.

5. There will be no permanent transfers under this Article into a worksite/centre which has been identified as a worksite/centre to be closed permanently during the 18 month period following intended transfer date.

11.1 Surplus Staff Procedure – Sequence of Events

1. The Company will give initial notice of termination/layoff in accordance with Article 11.5.

2. All vacancies, job challenges, OGLs and any other relevant proceedings before the Skills Broadening Implementation Committee will be frozen until the end of this process.

3. Employees will be required to make irrevocable elections within 7 (seven) days from the date of last posting of the initial notice of termination/layoff in accordance with Article 11.5. The Company will confirm to the Union the date of last posting.

4. Employee displacement rights will be determined and those employees who will be accepted for voluntary termination, placed, displaced, laid off and/or terminated shall be identified. All displacements and the names of employees to be laid off, terminated will be identified “on paper” at the outset prior to implementation of any changes resulting from the announced reduction of complement.

5. In situations where the operation of the displacement rights would result in multiple chain displacements to the point of causing an inappropriate level of dislocation for the employer, the employer may refer the issue of amending the displacement operation of Article 11 for the particular run in question to Martin Teplitsky for expedited arbitration.

6. The names of the employees who will be accepted for voluntary termination, placed, displaced, laid off and terminated shall be announced.

7. The "freeze" on filling vacancies ends at the time of the announcement. During the period after the announcement and prior to the date of termination set out in the initial notice of termination/layoff, the Company, pursuant to Article 10, will post vacancies which remain unfilled after the displacement process and new vacancies as they arise. If vacancies remain unfilled after the Article 10 process, during the period prior to the layoff, fair and objective consideration for such vacancies will be given to applications from employees to be laid off.
8. The implementation of voluntary terminations, placements, displacements, layoffs and terminations pursuant to the Article 11 process will commence on the date of termination/layoff identified in the initial notices unless extended by the Company in accordance with the Employment Standards Act and regulations and subject to any “reversals” which may have occurred as a result of employee terminations.

11.2 Application

(a) There will be no displacements between Nuclear and Non-Nuclear positions.

(b) This procedure applies to regular full-time and regular part-time employees. The displacement and recall rights of probationary employees and regular-seasonal-A employees are limited to those contained in 11.13.

(c) The Company will supply the PWU with an accurate computerized seniority list (see note below) separated by Occupational Group Listings (OGL’s) and sorted by province and locations on February 1st and August 1st and at the time the Company gives initial notice of termination/layoff under this Article.

The Company will also post a seniority list in each worksite on February 1 and August 1 and at the time that the Company gives initial notice of termination/layoff. The seniority list will be a single list of employees, which will include the following information (subject to revision after consultation with the Company and the PWU):

- Name/employee number
- PWU Seniority
- Band
- Base OGL
- Level
- OCC code
- Job Grouping/Job Title
- Building code
- Geographic location
- Status
- Business

In the absence of a challenge in writing by the union within thirty (30) calendar days of posting, or within seven (7) days of initial notice of termination layoff, whichever comes first, the seniority list, will be deemed to be accurate and the union will not subsequently be able to challenge the accuracy of the list. In the event of a challenge, the parties will try to resolve any differences. If there is no agreement, either party may refer the challenge to Arbitrator Teplitsky for expedited dispute resolution.

NOTE

The computerized seniority list provided to the PWU will contain the following data:
Last Name, Initials, PWU Seniority, Occupational Code, Job Grouping/Job Title, Base Occupational Group Number, Band, Location, Building Code, Payroll Number, Business Unit, Division, Department, Hours of Work, Date of Notice of Termination/Layoff, Date of Expiry of Recall, and End Rate of the Job Grouping.

(d) Medically Restricted at Work (MRAW) employees who have had a special position created for them cannot be displaced. In the event that there is a closure of a worksite or the special position is redundant, the MRAW employee will displace in accordance with this Article and where necessary be accommodated in accordance with applicable legislation. For purposes of Article 11 the MRAW employee will be deemed to be in the Job Grouping held immediately prior to being placed in the special position.

(e) Performance Limitations: When an individual has a verifiable physical or medical limitation and is not required to be accommodated under the Human Rights legislation and which prevents him/her from performing the essential functions of a job in his/her Occupational Group Listing (OGL) into which he/she may be displaced, and which is voluntarily identified in advance of determination of displacement rights following notice of layoff, the Company and the Union will meet to discuss this individual. It is understood that if there is no mutual agreement the Company may proceed to implement the layoff. Nothing in this Article is intended to require any employee to self-identify or to modify in any way the rights or obligations of the Company, Union or employee under the human rights legislation.

(f) Employees on pregnancy/parental leave, or assignment outside Ontario or approved leaves of absence, vacation, sick leave will be subject to this process and be required to participate as if they were in their regular position. Such employees will assume their new positions upon return and until such time the positions will be filled on a temporary basis if required by the Company.

The company will make reasonable efforts to contact personally employees on such leave but in any event such employees will be provided with written notification that the Company has initiated lay-off procedures and that their employment status may be affected. The Company can rely on the last address and telephone number provided by the employee.

(g) Employees on LTD including those in a LTD funded Rehabilitation and Re-Employment Program may not displace nor are they subject to displacement.

(h) Notwithstanding the provisions of this Article an employee who is within five years of normal retirement or within five years of eligibility for undiscounted pension when faced with displacement or layoff, with joint agreement may be given special consideration for worksite protection/preference.

(i) Notwithstanding the provisions of this Article, the parties may make special arrangements for employees who are disabled to the extent that alternative employment would be difficult to find.
11.3 Definitions

1. “Job Grouping” shall mean an employee’s job title as referenced in Article 8.4.3.

2. “Equal”: Means the employee’s current Job Grouping and other Job Groupings as identified in he employee’s OGL at the same level.

3. “Lower”: Job Groupings identified in an employee’s OGL at a lower level.

4. “Equal Vacancy”: A vacancy in the employee’s current Job Grouping or another Job Grouping as identified in the employee’s OGL at the same level.

5. "Worksite" is a place of operations as identified by building code(s) and identified in Appendix A. An employee’s worksite will be their regular work headquarters as defined in Part A, Item 18.2.

6. "Work Centre" as identified in Appendix A.

7. "Location" means a geographic area which includes worksite(s) and/or work centres. Locations are identified in Appendix A.

8. "Occupational Group List (OGL)" means a jointly agreed to list of "Equal" and "Lower" Job Groupings into which an employee can exercise displacement rights. OGLs are equals and lowers within the appropriate job family which an employee can satisfactorily perform within a reasonable period of familiarization and orientation.

9. "Surplus Employee" is an employee who has been given notice of termination/layoff by the Company or an employee who may be displaced or who is displaced from his/her position.

10. (a) "Seniority" means the service credit as defined in Part A Item 5.0, except for the restrictions contained in Article 10.1.2.

(b) Where employees have the same seniority the employee with the highest employee number is deemed to be the more senior employee.

For purposes of determining displacements, layoffs and terminations, seniority will be calculated as of the date of the initial notice of termination/layoff. For all other purposes including subsequent layoffs, seniority will continue to accrue.

11. Nuclear ONLY

"Job Family" is a collection of jobs or job classifications involved in the same general nature of work.

It is recognized that some jobs straddle two (2) job families, e.g., technical-clerical. For these exceptions, jobs from both families may be included in the OGL.

The family for those jobs which do not neatly fall into one of the below will be jointly determined as required.
There are five families as listed below:

**Clerical:** Involving gathering, analysing, processing, recording, disseminating information or data, and/or the operation of miscellaneous office machines or equipment.

**Technical:** Involving the choice, application and/or manipulation of formulae, principles, techniques or natural laws in practical, mechanical or industrial arts or applied sciences.

**Drafting:** Involving the drawing up or preparation of plans, drawings, bills of materials, etc.

**Trades/Operators:** Involving skilled labour in areas such as electrician, mechanic, labourer, operators, etc.

**Security:** Involving the protection of the Company assets, employees and the public. Security classifications will not be included in the Occupational Group Listing (OGL) of non-security classifications and vice versa.

### 11.4 Occupational Group Listings (OGLs)

1. For a job to be included in an OGL, it must be a job which can be satisfactorily performed by the average employee in the surplus Job Grouping within a reasonable period of familiarization and orientation. This period will vary depending on the complexity of the job.

2. All existing jobs are placed in OGLs. OGLs shall be part of this agreement but shall be published in a separate publication.

3. New OGLs shall be jointly developed for new jobs or for existing jobs which have materially changed or for jobs that have the wage rate adjusted. If the parties cannot agree on an OGL, the dispute will be resolved in accordance with Article 8.4.

4. For Stations/Sites in non-nuclear which have been Decontrolled under Article 17, the OGLS for the Security job groupings will be expanded to include other job groupings as agreed to by the parties.

#### 11.4.1 Failure to Demonstrate Qualifications

Once an employee displaces into a different Job Grouping within an OGL, the employee must be able to demonstrate an acceptable level of performance within a reasonable period of training, familiarization and orientation. Failure to achieve an acceptable level of performance in this time will result in layoff with severance as per 11.15 and recall rights to their pre-displacement Job Grouping.
11.5 Notice of Termination/Layoff

1. The Company will give initial notice of termination/layoff to the most junior employees in a Job Grouping in a "worksite". Notices listing those employees receiving initial notice of termination will be posted at all Company worksites/centres. Pursuant to the terms of this article, employees receiving such notice will be permitted to take another position in the Company as a result of which some other person either loses his/her position and is permitted to take another position or loses his/her employment. Such notice shall be deemed to be notice of termination to all affected employees including to those employees who may be displaced and to those employees whose employment is terminated or who are laid off.

2. Employees receiving initial notice of termination/layoff will be provided with two (2) months' notice of termination/layoff. An employee who has been given notice of termination/layoff may be given temporary work following the date of termination in accordance with the Employment Standards Act and regulations.

3. When an employee is given notice of termination/layoff the Company will notify the Union office and Chief Stewards within three working days from the date the employee is notified. The Union will be responsible for keeping the Company advised of the names of all Chief Stewards.

11.6 Employee Elections*

1. All employees whose Job Groupings are in the OGL of the overcomplement position(s), will be required to supply the Company, by a date determined by the Company, information necessary to enable the Company to make decisions relating to employee displacements in Locations, and the Province. The information required is:
   a) Does the employee wish to voluntarily terminate if given the opportunity
   b) Is the employee willing to move
   c) Is the employee willing to change from Regular Full Time to Regular Part Time or vice versa.

2. The Company will be entitled to rely on this information for purposes of applying the provisions of Article 11.

3. Employees will have seven (7) days to provide their elections to his/her Human Resources Office.

11.7 Failure to Identify Elections

Any employee failing to supply the information requested on the forms (within the stipulated time), who receives initial notice of termination/layoff or is displaced, will be deemed to have chosen NO to each of the three questions outlined in 11.6.1, and therefore will be deemed to have selected only a position in their location. If there is no position in the location into which he/she can be placed/displaced, the employee will be laid off with recall or severance rights as per 11.15.

* The parties will consult on a bi-lateral information package to be provided to employees at the time they are asked to make elections
11.8 Voluntary Termination

Voluntary Terminations are accepted on the basis of seniority.

Employees within two (2) years of normal retirement or un-discounted pension will be provided with relevant pension and benefit information to enable him/her to make an informed decision on or prior to the notice date.

Employees who are accepted for Voluntary Termination must resign and will receive severance pay as per article 11.15;

All acceptances to Voluntary Termination will be subject to Limitations to Turnover as outlined in this article and are contingent upon the overcomplement being reduced.

11.9 General

1. All employees work at a worksite or work centre in a Location.

2. Each employee shall have the responsibility to notify the Company of his/her current address and telephone number and any subsequent change. The Company shall be entitled to rely on the last address and telephone number furnished by the employee for all purposes.

3. Grievances under this agreement or a predecessor agreement which have not been resolved before the commencement of the freeze period, do not affect the Company's right to layoff pursuant to Article 11.

4. All vacancies, job challenges, OGL’s and other relevant proceedings before the Skills Broadening Implementation Committee will be frozen from notice date until the end of this process. The freeze on filling vacancies shall end when the results of the application of Article 11 are announced.

11.10 Placement to Vacancies and Positions Created through the Acceptance of Voluntary Termination.

11.10.1 Equal Within the Location

(a) An Employee will be placed into an equal vacancy in his/her location within his/her occupational group list. If no such vacancy is available then;

(b) Employee elections will be reviewed to determine if an employee in the location in an “Equal”, including the overcomplement employee, has elected to voluntarily terminate. If there is more than one employee who has so elected, the senior will be accepted. If the employee accepted for cashout is not the overcomplement employee, then the overcomplement employee will be placed into the spot left by the employee accepted for cashout. If no voluntary terminations are accepted then;

(c) Employees who have elected a willingness to move will go to Equal Within the Province (11.10.2), employees who have not elected a willingness to move will go to Displacements (11.11).
11.10.2 Equal Within the Province

(a) An employee will be placed into an equal vacancy within his/her occupational group list. If no vacancy is available then;

(b) Employee elections will be reviewed to determine if an employee in an “equal” Job Grouping, has elected to voluntarily terminate. If there is more than one employee who has so elected, the senior will be accepted. The employee will be placed into the spot left by the employee accepted for cashout. If no voluntary terminations are accepted then the employee will go to Displacements (11.11).

11.11 Displacements

(a) An employee can only displace another employee of less seniority in Job Groupings within his/her occupational group list, unless a more senior employee has elected to voluntarily terminate if given the opportunity. Voluntary terminations will be accepted on the basis of seniority.

Regular-Seasonal-A and Temporary positions and Agency employees are also displacement opportunities for regular employees in the absence of any regular positions.

(b) A regular full time employee may elect in advance to decline all available regular part time positions. A regular part time employee may elect in advance to decline all available full time regular positions.

(c) When an occupational group has more than one Equal Job Grouping, the least senior employee shall be the most junior among all of the Equal Job Groupings.

(d) A vacancy within an employee’s OGL is deemed to be the junior equal (see process in 11.11.1 below) or lower, (see process in 11.11.2 below) in all applications of the displacement process.

(e) Apprentices or Trainees are granted displacement rights into the Job Groupings listed in their OGL. An Apprentice or Trainee can displace a junior employee within his/her OGL including a Journeyperson. If an Apprentice or Trainee displaces a Journeyperson in the same Job Grouping, the Apprentice or Trainee will continue in the apprenticeship program and will be paid as per their progression schedule.

(f) A job share position where both job share partners are junior to the displacing employee will be deemed to be a regular full time opportunity.

(g) Seniority rights outside the Location are only exercisable in the Province by employees with seniority of two (2) years or more.
11.11.1 Equal Stream

1. At the location an employee must displace the least senior employee in an equal Job Grouping. Refusal to accept results in termination of employment. If no position is available, then;

2. Employees who have not elected a willingness to move, or who are not eligible for provincial displacements will move to the Lower Stream (11.11.2), otherwise;

3. The surplus employee who has elected a willingness to move must displace the most junior employee with less seniority in the Province. Refusal to accept results in termination of employment. If no position is available, then;

4. The employee will move to the "Lower Stream" (11.11.2).

11.11.2 Lower Stream

1. An employee who has elected to displace in the Lower Stream must displace:

   a) the most senior employee who has elected to voluntarily terminate if given the opportunity; or
   b) the least senior employee in an equal Job Grouping in the Location.

   Refusal to accept results in termination of employment. If no position is available, then;

2. An employee who has elected to displace into a lower Job Grouping and an employee not placed in the Equal Stream must displace:

   a) the most senior employee who has elected to voluntarily terminate if given the opportunity; or
   b) the most junior employee with less seniority in next lower Job Grouping in his/her Location.

   If no position is available, then the employee will go to lower Job Groupings in descending order in his/her Location until placed. Refusal to accept results in termination of employment. If no position is available, then;

3. An employee who has elected a willingness to move must displace the most junior employee with less seniority in next lower Job Grouping in the Province. If no position available then the employee will go to lower Job Groupings in the Province in descending order until placed. Refusal to accept results in termination of employment. If no position is available, then;

4. The employee is laid-off with recall rights.
11.12 Displacement Rights

Placement/Displacement Flowchart
(This chart shall be read in conjunction with the text of the Collective Agreement)

All Employees Elect:
1) Cashout if Available?
2) Willing to move?

Equal Vacancy or Cashout in Location

N

Equal Vacancy or Cashout in Province
(Offered IF employee Willing to Move)

N

Displace Equal in Location

N

Displace Equal in Province
(Only Offered IF employee Willing to Move)

N

Displace Lower in Location

N

Displace Lower in Province
(Only Offered IF Employee Willing to Move)

N

Employee Terminated, Out of Options

Y

Placed

Y

Placed

Y

Placed

Y

Placed

Y

Placed

Note that employees who are unwilling to move will skip steps where a provincial placement is sought and fall through to the next step.

Where there is a discrepancy between the chart and the language, the language will be deemed to be correct.
11.12.1 Displacement Rights for Nuclear Operator Family

For the purposes of Article 11, “Nuclear Operator Family” shall include the following:

- Authorized Nuclear Operators (ANOs)
- Supervising Nuclear Operators (SNOs)
- Nuclear Operators (NOs)
- Control Room Operators (CROs)

11.12.2

The displacement rights for Nuclear Operators will be as per Article 11, with limitations to turnover as indicated below and in 11.19(d).

For all purposes other than 11.12.2(1) (Surplus ANOs displacing ANOITs) Stations and Streams are as follows:

<table>
<thead>
<tr>
<th>Station</th>
<th>Streams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pickering</td>
<td>Units A, Units B, Common Services, Fuel Handling A, Fuel Handling B, Dry Fuel Storage</td>
</tr>
<tr>
<td>Darlington</td>
<td>Units, Common Services, Fuel Handling, Tritium Removal Facility, Dry Fuel Storage</td>
</tr>
</tbody>
</table>

**NOTE**

Operators displaced from the ANOIT position will return to their former stream and position.

In addition to the displacement rights identified below, these classifications will have the remainder of the OGL for the Nuclear Operator Family. Before a person in one of those classifications is forced to leave the location, he/she may elect to opt for the normal Article 11 rights with respect to the remainder of that OGL. Total closure as referenced throughout 11.12 shall mean where electricity production has ceased on a permanent basis.

11.12.3 Surplus ANOs

1. Surplus ANO(s) may elect to displace any junior operator(s) in the Authorized Nuclear Operator in Training (ANOIT) position(s) and the Control Room Operator in Training (CROIT) position(s). Such displacement(s) will be on a senior choice basis. Any ANO who elects to displace an operator in an ANOIT position and does not obtain a CNSC authorization for that station (after being treated as any existing ANOIT would be) will be declared surplus under Article 11 with no further entitlement to displace operators in ANOIT position(s). Throughout a displacing ANO’s tenure in an ANOIT position the ANO’s base wages will be maintained. As set out in Mid-Term R-169 an Authorization Bonus will be paid each time they become Authorized as ANOs at a different Nuclear Station. This bonus will be equal to $5000. A one time bonus will be paid for successful completion of CNSC “Generals” pursuant to Mid-Term R-169.
For the above purposes the stations are:

- Pickering A
- Pickering B
- Darlington

2. Limitations to Turnover - Authorized Nuclear Operator (ANO)

A. Station

If in stream displace 100% of SNO(s). If not in stream displace 15% of SNO(s).

Exception: If at Pickering displace 30% of SNO(s) in opposite Unit stream and Common Services.

Displace 100% of NO(s)

B. Location

Displace 15% of SNO(s)
Displace 30% of NO(s) at a station (less than total closure) providing no more than 35% of NO(s) displaced in any stream per station.
Displace 35% of NO(s) at a station (total closure) providing no more than 40% of NO(s) displaced in any stream per station.

C. Province

Displace 15% of SNO(s)
Displace 30% of NO(s) at a station (less than total closure) providing no more than 35% of NO(s) displaced in any stream per station.
Displace 35% of NO(s) at a station (total closure) providing no more than 40% of NO(s) displaced in any stream per station.

NOTE

For the purpose of determining turnover limitation upon plant closure Pickering will be deemed to be two (2) stations.

3. Displacement

(A) If 1. is not available or selected surplus ANO(s) must displace the junior Supervising Nuclear Operators (SNOs) at the station if available.

(B) If (A) above is not available, surplus ANO(s) must displace the junior SNO(s) in the Location (Appendix A).

(C) If (B) above is not available, surplus ANO(s) must displace the junior SNOs in the Province

(D) If (C) above is not available, surplus ANOs must displace the junior Nuclear Operator(s) (NOs) at the station.
(E) If (D) above is not available, surplus ANOs must displace the junior NOs in the location (Appendix A)

(F) If (E) above is not available, surplus ANOs must displace the junior NOs in the Province.

Surplus ANO's

A 100% of SNOs in Stream

B 15% of SNOs at Location

C 15% of SNOs in Province

D 100% of NOs at Location

E 30% of NOs per station
   But not more than 35% per Stream per Station - Province Wide

F OGLs
   Severance or Recall

Note: For a total station closure ANOs may displace 35% of total number of NOs per station, providing no more than 40% of NOs are displaced in any given stream.

Note: OGLs can go to OGL before having to displace outside of Location
11.12.4 Surplus SNOs/CROs

1. Surplus SNOs / CROs will be identified, not withstanding the provisions of Article 11, by stream within a station.

2. Limitation to Turnover - Supervising Nuclear Operator – SNO / Control Room Operator -CRO

(a) Station

If not in stream displace 15% of SNO(s) / CRO(s)
Displace 100% of NO(s)

Exception: If at Pickering displace 30% of SNO(s) / CRO(s) across the following streams:
- Unit A to Unit B and vice versa
- Unit A/B to Common Services and vice versa
- FHA to FHB and vice versa
- FHA/B to Common Services

(b) Location

Displace 15% of SNO(s) / CRO(s)

Displace 30% of NO(s) at a station (less than total closure) providing no more than 35% of NO(s) displaced in any stream per station.
Displace 35% of NO(s) at a station (total closure) providing no more than 40% of NO(s) displaced in any stream per station

(c) Province

Displace 15% of SNO(s) / CRO(s)

Displace 30% of NO(s) at a station (less than total closure) providing no more than 35% of NO(s) displaced in any stream per station.
Displace 35% of NO(s) at a station (total closure) providing no more than 40% of NO(s) displaced in any stream per station

NOTE

For the purpose of determining turnover limitation upon plant closure Pickering will be deemed to be two (2) stations.

3. Displacement

(A) Surplus SNO(s) / CRO(s) must displace the junior SNO / CRO at the station if available.

(B) If (A) above is not available, SNO(s) / CRO(s) must displace the junior SNO(s) / CRO(s) in the Location (Appendix A).
(C) If (B) above is not available, surplus SNO(s) / CRO(s) must displace the junior SNO(s) / CRO(s) in the Province.

(D) If (C) above is not available, surplus SNO(s) / CRO(s) must displace the junior NO(s) at the station.

(E) If (D) above is not available, surplus SNO(s) / CRO(s) must displace the junior NO(s) at the Location (Appendix A).

(F) If (E) above is not available, surplus SNO(s) / CRO(s) must displace the junior NO(s) in the Province.
Surplus SNOs/ CROs

A
15% of SNOs/ CRO's at Station

B
15% of SNOs/ CROs at Location

Note: For a total station closure ANOs may displace 35% of total number of NOs per station, providing no more than 40% of NOs are displaced in any given stream.

C
15% of SNOs/ CROs in Province

D
100% of NOs at Station

E
30% of NOs at Location

Note - OGLs Can go to OGL before having to displace outside of Location

F
30% of NOs per Station but no more than 35% per Stream per Station - Province Wide

G
OGLs

Severance or Recall
11.2.5 Surplus NOs

1. Surplus NOs will be identified, notwithstanding the provisions of Article 11, by stream within a station.

2. Limitation to Turnover - Nuclear Operator (NO)

   (A) Station
   Displace junior NO(s)

   (B) Location
   Displace 30% of NO(s) at a station (less than total closure) providing no more than 35% of NO(s) displaced in any stream per station.
   Displace 35% of NO(s) at a station (total closure) providing no more than 40% of NO(s) displaced in any stream per station.

   (C) Province
   Displace 30% of NO(s) at a station (less than total closure) providing no more than 35% of NO(s) displaced in any stream per station.
   Displace 35% of NO(s) at a station (total closure) providing no more than 40% of NO’s displaced in any stream per station.

   NOTE
   For the purpose of determining turnover limitation upon plant closure Pickering will be deemed to be two (2) stations.

3. Displacements

   (A) Surplus NO(s) must displace the junior NO(s) at the station if available.

   (B) If (A) above is not available NO(s) must displace the junior NO(s) in the Location (Appendix A).

   (C) If (B) above is not available surplus NO(s) must displace the junior NO(s) in the Province.
Surplus NO's

Junior NO's at Station

30% of NO's - But not MORE THAN 35% of NO's per Stream per Station at Location

30% of NOs per Station But not more than 35% per Stream per Station - Province Wide

OGLs

Severance or Recall

Note: For a total station closure ANOs may displace 35% of total number of NOs per station, providing no more than 40% of NOs are displaced in any given stream

Note - OGLs Can go to OGL before having to displace outside of Location
11.13 **Displacement and Recall Rights**

The following sets out in full, the displacement, recall and severance rights, if any, for Probationary, Regular-Seasonal-A and Regular-Seasonal-B.

11.13.1 **Probationary Employees**

1. A probationary employee will displace the junior employee of lesser seniority in the next lower Job Grouping in their OGL in descending order within his/her worksite/centre.

2. If 1. is not available, a probationary employee can displace a temporary employee in an equal or lower Job Grouping in his/her occupational group within his/her worksite/centre.

3. If 2. is not available, a probationary employee can displace an agency employee in an equal or lower Job Grouping in his/her occupational group within his/her line of business in head office or within his/her worksite/centre outside of head office.

4. If 3. is not possible, employment is terminated.

5. Probationary employees shall not be entitled to recall rights or severance pay.

11.13.2 **Regular Seasonal-A**

1. A Regular Seasonal-A employee can displace a temporary employee in an equal or lower Job Grouping in his/her occupational group within his/her worksite/centre.

2. If 1. above is not available, a regular seasonal-A employee can displace an agency employee in an equal or lower Job Grouping in his/her occupational group within his/her worksite/centre.

3. If 2. above is not available, employment is terminated.

4. Regular seasonal-A employees shall be entitled to recall to temporary positions for a period of three years from the date of last termination.

5. A regular seasonal-A employee shall be entitled to recall to their Location, provided they have at least 24 months accumulated service.

6. To be recalled the employee must have filed a written request with the Company prior to March 1 of each year.

7. A person who is recalled by the Company shall be personally contacted when possible. Failing this contact a recall notice shall be forwarded by registered mail addressed to the last known address that he/she has recorded with his/her human resources manager. They shall be obliged to advise his/her supervisor of his/her intention to return to work within three working days and shall be available for work within five working days after receipt of recall notice.

(a) Except in case of sickness, failure to be available for work within five days of issuance of the recall notice shall make him/her ineligible for any further recall.
(b) It shall be the person's sole responsibility to inform the Union and the personnel manager in writing of any change of address. The Union will be notified in writing when persons are recalled to vacancies.

8. The Company shall notify the employee in writing at time of termination of the recall procedure. If the employee is not considered suitable for recall they shall be notified in writing and a copy of this letter shall be given to the employee's Chief Steward. Upon request the Company will provide the employee with the reasons why they are not considered suitable for recall.

9. The Company may hire a temporary employee for a period not exceeding one month without using this recall procedure.

10. Summer students both secondary and post secondary levels have no rights to this recall procedure.

11. A Recall List from each work Location for regular-seasonal-A employees shall be provided to the Chief Steward concerned.

12. Regular seasonal-A employees shall not be entitled to severance pay except in the case of permanent layoff. When permanently laid off severance pay will be calculated on actual time worked.

11.13.3 Regular-Seasonal-B

1. A Regular Seasonal-B employee can displace a temporary employee in an equal or lower Job Grouping in his/her occupational group within his/her worksite/centre.

2. If 1. above is not available, a regular seasonal-B employee can displace an agency employee in an equal or lower Job Grouping in his/her occupational group within his/her worksite/centre.

3. If 2. above is not available, employment is terminated.

11.14 Permanent Location Closings

There will be no permanent displacements or moves into a worksite/centre which has been identified as a worksite/centre to be closed permanently during the 18 month period following notice of layoff/termination.

11.15 Severance Pay

Severance payments satisfy all employer obligations for notice and severance pay under the provision of the Employment Standards Act and the regulations including those applicable to mass termination.

(a) An employee receiving severance pay waives any other rights under Article 11.

(b) An employee may direct all or a portion of his/her payment into an RRSP up to the amount permitted by law. The employee shall provide the Company with the TD2 Form directing the payment into his/her RRSP.
An employee entitled to severance pay under 11.15 may elect to take a lump sum severance payment, or severance may be divided into two (2) equal instalments, the first on the date of termination and the second on or about January 15 of the following year. Severance will be calculated in accordance with the following:

(i) For Employees who have elected to voluntarily terminate if given the opportunity, subject to statutory deductions:
   - five months base pay, plus;
   - 4 weeks base pay per year of service, (payments for incomplete years of service will be pro-rated)
The combined total of the above not to exceed 104 weeks.

(ii) For Employee’s who have not elected to voluntarily terminate if given the opportunity, and who have not refused a position offered under 11.10 or 11.11, subject to statutory deductions an amount which is equal to:
   - 3 weeks’ base pay per year of service up to a maximum of 78 weeks’ base pay (payments for incomplete years of service will be pro-rated).

(iii) Reduced severance on refusing a position. An employee who refuses to accept a position under Article 11.10 or 11.11 where the new Job Grouping is in the same band the employee will be terminated and shall have no recall rights under Article 11.18 and will not be eligible to delay their termination per 11.15(f). Severance, subject to statutory deductions, will be an amount which is equal to:
   - Two weeks’ base pay per year of service up to a maximum of 52 weeks’ base pay (payments for incomplete years of service will be pro-rated).

(iv) In cases where an employee refuses to accept a position in a lower band the employee will receive severance pay pursuant to 11.15(c) (ii).

(d) For purposes of clarification at any time during the three (3) year recall period, a laid off employee may opt for his/her full severance entitlement, once this election is made all recall rights will cease.

(e) For regular part-time employees severance payments shall be pro-rated.

(f) Employees who are accepted for severance will be terminated on the date of termination/layoff identified in the initial notice. The only exception to this are employees who will be allowed to delay their termination date for a period not to exceed five (5) months in order to achieve one of the following pension milestones:

   - Twenty-Five (25) years service
   - Rule of 82
   - Or Age 65

Employees who avail themselves of this option will have their severance reduced by the amount of time elapsed between the date of termination/layoff identified in the initial notice and their actual termination date.
11.15.1 Benefit Continuance/Tuition/Outplacement Services

A surplus employee who takes severance pay and terminates his/her employment is entitled to:

i) coverage under the Company's Health and Dental Plan for a period of six (6) months from the date of termination of employment or until the commencement of alternate employment whichever occurs first;

ii) reimbursement for tuition fees and other associated expenses up to a maximum of $5000.00 upon production of receipts from an approved educational program within 12 months of his/her termination;

iii) outplacement services; the Company will determine the level of service and the service provider.

11.16 Failure to Report to Assigned Positions

In the event that an employee declines an assigned position and is terminated, or does not displace into a job occupied by another employee, or terminates after displacing another employee, the Company may reverse the displacement and leave the employee who would have been displaced in his/her job or return the displaced employee to his/her job. In all instances as described above the terminating employee will be entitled to severance pay in accordance with the appropriate sections of this Article.

Any vacancy which results from such a reversal will be filled by moving the previous incumbent back to his/her job. In other words, the chain of bumps (i.e., the displacement thread) caused by the initial reversal will be reversed except in circumstances set out below.

Where an employee has relied to his/her detriment on the announced relocation, and would be prejudiced by revocation of the displacement, the employee will not revert to his/her original position. Where the Company would be prejudiced, the employee will not revert to his/her original position even if the employee does not object.

The declining of an assignment will not require the Company to re-do the Article 11 process.

11.17 Selection to Vacancies

After the end of this freeze period all positions which remain unfilled and any new vacancies which arise shall be posted under Article 10. Applications from employees who are to be laid off shall be given fair and objective consideration for vacancies during the period before the layoff occurs in the event that the vacancy is not filled pursuant to the Article 10 process. Employees who, prior to being laid off, applied for vacancies continue to be entitled to fair and objective consideration for those vacancies after lay-off. If selected to a vacancy posted prior to the date of layoff, the employee is eligible for moving expenses under Article 11. Among successful applicants seniority shall govern selection where all other factors are relatively equal.

11.17.1 No person outside the Union's jurisdiction will be selected to a vacancy commencing with the issuance of the notice of termination/layoff pursuant to 11.5 until:

(i) All qualified PWU members are selected, includes persons on the recall list, and,

(ii) All PWU applicants entitled to fair and objective consideration are selected pursuant to 11.17.
11.18 Recall

1. Laid off employees who do not receive severance payments shall have recall rights.

2. Employees who are laid off will be entitled to recall to Job Groupings in their OGL for a period of three (3) years from the date of his/her layoff. Recall lists will be maintained province wide. This provision includes employees who are laid off from either of the former bargaining units.

If a person is recalled within one year of the date he/she was laid off, entitlement to vacation credit, seniority, and sick leave credits shall be the same entitlement as on the day of termination less any vacation allowance received at termination.

If a person is recalled during the second or third year after layoff, he/she shall be treated as a new employee for all purposes. Service credit will be restored in accordance with Part A, Item 5.3.

Reinstatement in the pension plan shall be in accordance with the pension regulations.

3. A person who is recalled shall be personally contacted by the Company where possible. Failing this contact, a recall notice shall be forwarded by registered mail addressed to the last known address that he/she has recorded with his/her Human Resources Manager. They shall be obliged to advise his/her supervisor of the intention to return to work within five (5) working days and shall be available for work within ten (10) working days after receipt of the recall notice.

NOTE

(i) It shall be the employee's sole responsibility to inform the Union and the Human Resources Manager in writing of any change of address. The Union will be notified in writing when employees are recalled to vacancies.

(ii) Except in the case of sickness, failure to be available for work within ten (10) days after the receipt of recall notice shall make him/her ineligible for any further recall.

4. If an employee refuses recall to a regular full time “Equal” Job Grouping at the location he/she will be removed from the recall list and be entitled to reduced severance pay in accordance with 11.15(c) (iii). In cases where an employee refuses to accept recall to a position where the new Job Grouping is at a lower band or at a different location the employee will remain on the recall list.

5. At any time during the three (3) year recall period, a laid off employee may opt for his/her full severance pay entitlement. Once this election is made all recall rights will cease.

6. If at the end of the three (3) year recall period an employee has not been recalled or has not elected to receive severance pay, he/she will automatically receive the full severance pay entitlement.

7. An employee who is laid off and does not elect to accept severance payment shall be entitled to receive:
i) coverage under the Company's Health and Dental Plan for a period of six (6) months from the date of commencement of layoff or until the commencement of alternate employment whichever occurs first; and

ii) reimbursement for tuition fees and other associated expenses up to a maximum of $5000.00 upon production of receipts from an approved educational programme within 12 months of his/her layoff; and

iii) outplacement services; the Company will determine the level of service and the service provider.

8. Persons on the recall list will be recalled for vacancies contained in their OGL's which are posted as per Article 10 and 11.17 prior to the selection of candidates to whom they are senior.

9. People on recall will have the first priority on a seniority basis for temporary positions in their OGL arising at their location which were not filled by any displacements. Where such a temporary position also represents a recall opportunity for a regular seasonal-A, the position will be offered on seniority.

11.19 Limitations to Turnover

(a) A maximum of 51 percent (51%) of employees in a Job Grouping in a worksite/centre may be displaced during any 12-month period. Where there is only one employee in the site/centre he/she may be displaced.

(b) The limitation to turnover (51%) will apply to all personnel within a Job Grouping within a worksite/centre regardless of assignment to day work or shift work.

(c) Notwithstanding the above, where the Job Grouping is found in more than one line of business in a work centre, not more than 75% in the Job Grouping in a line of business in a work centre may be displaced during any 12 month period.

(d) Where employees displace to vacant positions such vacancies will not be counted as part of the percentages applied to limitation to turnover.

(e) In the case of Nuclear Operators limitations to turnover will be as set out in 11.12.

NOTE

This section does not apply to security staff.
11.20 Wage Maintenance

When an employee displaces another employee and is reclassified to a lower position, or when an employee is selected to a “lower” vacancy pursuant to 11.17, or in situations in which the employee moves from a 40 hour position to one with less weekly hours, they will receive wage maintenance. His/her wage rate will be adjusted downward in accordance with the following:

**Employees Whose Current Rate Exceeds the Top Step of the Lower Rated Position;**

(i) Employees with two or more years’ service will have their rate frozen for a period of three months at which time a two percent reduction in rate will take place. Subsequent reductions of two percent (2%) will take place annually thereafter until the maximum rate for the lower rated job is reached.

(ii) Employees with less than two years’ service will have their rate frozen for a period of three months, after which time their rate will be adjusted to the maximum rate for the new job.

**Employees Whose Current Rate Does Not Exceed the Top Step of the Lower Rated Position;**

These employees will have their rates frozen until their next scheduled progression date (no new progression date established). At this time they will be moved to the closest step on the lower band that results in a wage increase.

11.21 Moving Expenses

Where an employee is entitled to receive moving expenses as a result of being placed in a position through the operation of this article, the amount of expenses will be in accordance with Part A, Item 23. Such moves will be treated as Company-initiated moves.

Except as is provided for in 11.17, the Company will not be required to pay moving costs of an employee who is recalled from layoff.

**ARTICLE 12**

**PURCHASED SERVICES AGREEMENT**

12.0 SCOPE

This Article has been developed jointly in a spirit of co-operation and trust. It is intended to provide a joint approach to making good business decisions, which involve the use of purchased services. Its application calls for these decisions to be made in the same spirit of co-operation and trust.

What follows is based upon the belief that there is a value and benefit to the employee, the co-operation and the customer if:

- There is a greater involvement by employees in the decision-making process.
• There is an improved understanding as to why purchased services are used.
• Employment security is enhanced by a productive, healthy, and cost effective organization.
• Union and Management work together and act responsibility, balancing the interests of the
customer, the company and the employee in decisions relating to the use of purchased services.

This is a way of deciding how work gets done. It is not intended to hinder getting work done.

12.1 ASSIGNMENT OF WORK

12.1.1 Philosophy

It is the Company’s intent to use regular staff to perform most of its work of a continuing nature. Furthermore, the Company will strive to provide regular staff with stability of employment.

The parties agree that a consistent, managed and joint approach to the assignment of work within the Company is necessary to provide security for employees, a more effective, productive organization and an excellent product for the customer.

12.1.2 Principles

The following principles apply to the relationship between the Company and the Union and the work performed by Union members.

(a) We will within the Company have all work conducted as effectively as possible.
(b) We will measure the effectiveness of all work by its impact on staff, on the business and by its ultimate impact on our customers.
(c) We will do most work of a continuing nature with Company employees.
(d) We will determine when work is to be done by non-PWU members through a joint decision making process and the results of these decisions will be a joint responsibility.
(e) We will ensure that the impact of these decisions on continuous employment is minimized.
(f) We will use a team and consensus approach when making decisions and any issues arising will be resolved internally where possible.
(g) We will consult and make timely decisions consistent with the need to get work done.
(h) We will develop, implement and continue a joint process of communications and education.
(i) We will achieve consistency through the use of these principles versus policy and procedure.
12.2 DECISION PROCESS

12.2.1 Responsibility for Decisions

The persons who are responsible for applying the decision process are the Company representative with the appropriate decision authority and the Union representative designated by the Union Executive. It is recognized that a given decision may require the involvement of more than these two persons.

Subject to 12.2.6 and 12.3.2(c) below, decisions to use purchased services will be made on a consensus basis. Both parties must consider all relevant criteria with the mutual goal of selecting the most effective option.

The decision makers are responsible for making timely decisions and for the decision itself.

12.2.2 Opportunity

The parties recognize that work may be done more effectively internally or externally. Opportunities for the application of this Article to new or existing work can be initiated by Management and/or the Union. It is intended that joint discussion should commence as soon as possible and before detailed definition of the need to have new or existing work done by purchased services.

12.2.3 Definition of Need

The parties will consider what work must be done and why and include such dimensions as when it must commence and the duration of the work; the quantity of resources required; the quality of the results; the skills required and their availability internally and externally; and safety requirements.

12.2.4 Alternatives

The parties will consider such alternatives as, do the work internally; do part of the work internally and part externally; do the work externally and agree to acquire capability to do the work internally in future; or do the work externally.

Compliance with Article 12.2.4 during an outage does not require the company to reassign, redeploy, step-up and/or upgrade employees actively employed in core maintenance work.

12.2.5 Evaluation

The parties will evaluate the alternatives considering the impact on the customer, employees and the business. Such criteria as reliability of service to the customer, customer responsiveness, community impact, Company relations impact, job continuity, ability to perform work, degree of overtime required for the work, availability of resources, cost, timeliness, quality, need for control over results, safety and impact on environment will be assessed.

The total effectiveness of the alternatives will be evaluated considering both the short and long-term impacts. In given situations, certain criteria may be given a greater or lesser degree of importance.
12.2.6 Establishment of Thresholds

The establishment of the threshold is designed to remove from the process on a case by case basis certain issues relating to purchased services. The threshold will operate in such a way as to allow flexibility in local decision making. Any decisions regarding what is below the threshold will be non-precedent setting.

If there is a dispute with the union on whether the proposed purchased service is permitted by the threshold and there is no consensus, and if it makes sense in the circumstances the dispute will be resolved before the purchased service occurs. Lack of agreement on obtaining an advance resolution will not preclude the work from being performed, neither will it preclude the matter from being resolved under the 12.2.7 process.

The guidelines to determine whether a purchased service is below the threshold are as follows:

- subject matter lacking in substance; or
- any consequences are relatively insignificant; or
- where the nature or consequences of the work which represents a purchased service is remote from work currently performed by the PWU on a continuing basis. For purposes of clarity, this does not mean geographically remote; or
- emergencies; or
- any work performed under a manufacturer’s warranty, except where the manufacturer authorized the Company to do the work; or
- Work being done for OPG by Hydro One, AMEC NSS, Kinectrics and NHSS at the point each company is spun off from OPG and work of the same nature done by these companies in the future, so long as the Union continues to represent the employees of these companies; or
- where a distinct work program or work package at a worksite identified in a PSA request(s) is 250 hours or less annually. The addition of the 250 hour threshold will expire on March 31st, 2018 and will not be automatically renewed in any subsequent Collective Agreement.

Except in the case of an emergency, failure by the Company to supply the Union with the following information by fax or as otherwise agreed will result in the work in question being deemed to be above threshold. (In the case of emergency such decisions to use purchased services will be subject to the same information requirements, review and dispute resolution as non-emergency cases).

The Company will notify the Union of the:

- Value of Work as reflected in Tender/Contract/Bid or Estimate Documents
- Scope of the Work
- Location of Work
- Estimated Date of Commencement and Duration of the Work

Except in the case of emergency, after receipt of the above information regarding the work the union shall have three (3) working days to request an opportunity to discuss the proposed purchased service, failing which the proposed purchased service will be deemed to be below threshold.

The parties will make themselves available for discussion within three (3) working days of the request for a discussion.
Upon request, once the work has been performed the Company will provide the Union with the details of the final contract costs.

(a) Threshold grievances will be completed by the Chief Steward responsible for the PSA and presented to the line management person responsible for the work in question.

(b) Line management must respond in writing to the grievance citing its position within 48 hours (as is required with all other grievances). Both parties should endeavour locally to complete a Record of Discussion form or an agreed statement of fact sheet.

(c) The PWU office will assign a grievance number. Copies of the completed grievance and associated fact sheets or Records of Discussion forms should be sent to the PWU office and Labour Relations - Corporate Human Resources.

(d) Grievances will be referred to Arbitration and scheduled through joint agreement between Labour Relations - Corporate Human Resources and the PWU office.

(e) If it makes sense to do so, local discussions may take place with a view to resolving the threshold grievance up to the arbitration date.

12.2.7 Dispute Resolution Process

(a) Mr. Teplitsky shall be appointed as Facilitator to assist the parties to resolve all issues of application and interpretation of this Article with the power and authority of an arbitrator under the Ontario Labour Relations Act but not subject to the Arbitrators’ Act.

(b) Any dispute between the parties relating to whether this Article applies to any decision to use purchased services or if a purchased service falls within the categories set out in 12.2.6 will be determined in an expedited manner by the facilitator whose decision shall be final and binding.

(c) The Union will not be prejudiced in any subsequent case by a particular purchase of services. Similarly, the Company will not be prejudiced by any decision not to purchase services. This applies to all cases including threshold cases.

12.3 JOINT RESOLUTION COMMITTEE

12.3.1 Purpose

The purpose of this Joint Committee is to resolve disagreements, on a consensus basis in a timely and expeditious manner, as to whether proposed purchased services which are above threshold above may proceed. In its deliberations, the committee will consider the factors in items 12.0, 12.1 and 12.2.

Prior to a meeting of the Joint Committee, the Company will provide the Union with the following information related to the proposed PSA:

- copies of the Tender or Request for Proposal documents, if there are any;
- an accurate description of the work which is the subject of the proposed PSA;
• accurate details on bids e.g., price, scope of the work as set forth in the bid;
• a full cost benefit analysis including incremental costs but excluding overhead costs which would be incurred.

12.3.2 Membership

The membership of the Joint Committee shall be as follows:

(a) The facilitator Mr. Teplitsky who shall act as Chairperson;

(b) One management and one union representative plus additional resources as required.

(c) In the event of the parties not being able to reach a consensus decision the facilitator will have the power to make decisions. Mr. Teplitsky will have the authority to make such orders as he deems appropriate to give full affect to his decision(s) and to deal with any consequences his decision(s) might have in the workplace.

(d) Where either party wishes to proceed with a Purchased Services discussion which is above threshold, the parties will endeavour to complete discussion within 10 days of notice to the union in the prescribed form and that full resolution, including review by the JRC, will occur within 30 days of notification.

12.4 APPLICATION OF THIS ARTICLE

12.4.1 The parties will jointly develop and maintain an operating plan consistent with the provisions of this Article. Such plans will be approved by the appropriate Company official and the Power Workers’ Union Vice President. Failure to jointly develop an operating plan will not adversely affect either party’s rights under the provisions of this Article.

These operational plans will include:

• An approach for the development and delivery of joint training of decision makers
• An identification of the type of contracts that are not subject to an in-depth review.
• A guideline for a time table on how often contracts of a recurring nature must be reviewed under this Article.
• A process for joint review of potential contracts, which involve work normally performed by PWU represented employees and other stakeholders.
• A process and a time frame for decision making.
• An internal process for dispute resolution.

12.4.2 Management and Union representatives may choose to jointly review the application of their operating plan and determine the need for changes at any time over the life of this agreement.

12.4.3 Until March 31st, 2018, Article 13 and Article 14 are suspended. Item 12.1 of this Article will apply to decisions regarding the use of agency employees.
ARTICLE 12 – APPENDIX A

The provisions in this Appendix and Article 12.3.2 (c) are to be applied to those situations where employees are given surplus status as a result of a joint or arbitrated decision to use purchased services to do the work normally performed by the affected employees. The definitions contained in Articles 10 and 11 will also apply to this Appendix.

1.0 JOINT EMPLOYMENT SECURITY COMMITTEE

The function of the Joint Employment Security Committee is to resolve disputes regarding the appropriate application of this Appendix.

The committee will consist of six regular members, three representing the Union and three representing the Company. Two additional members from each party may be added from a work unit affected by the surplus situation under consideration. Meetings may be called by either party.

In all disputes referred to the committee for settlement, the committee’s decision will be final and binding on both parties.

In the event that the Joint Employment Security Committee is unable to resolve a dispute, it will be referred to Mr. Teplitsky. The intention of both parties is to have a speedy resolution of the dispute. Verbal decisions, which will be confirmed by a written decision will be acceptable and all decisions are final and binding on both parties.

2.0 EMPLOYMENT SECURITY

The provisions of this Appendix will apply to a regular employee with two (2) or more years’ seniority who becomes surplus from his/her position as a result of contracting out the work normally performed by that employee. The effect of decisions to use purchased services on PWU members will be minimized by accommodating required staff reductions wherever possible by attrition, transfer to other jobs or retraining. Redeployment/career counselling will be made available to affected staff when they are notified of their surplus status. Training and career options will be discussed and incorporated into the redeployment plan. Reasonable training and educational leave will be applied as appropriate. The provisions of this Article will not apply to regular-seasonal employees.

The definitions contained in Articles 10 and 11 will also apply to this Appendix.

For the purposes of determining if the employee has sufficient seniority to qualify for this Appendix, his/her seniority will be counted up to the surplus date.

2.1 Surplus Identification

When a decision to contract out results in a surplus in a classification in any work site the least senior employee in that classification in the work site shall be identified as surplus. Such employees will be able to apply for vacancies as per Article 10.
2.1.2 If an employee with five (5) or more years seniority has not been selected to a vacancy within one (1) year after the surplus date, or an employee with two (2) years but less than five (5) years’ seniority has not been selected to a vacancy within sixteen (16) weeks after the surplus date, he/she will be given displacement rights as contained in Article 11 and all other terms and conditions of Article 11 will apply. At this time all other provisions of Appendix A will cease to apply.

2.1.3 The one (1) year period for employees with five or more years’ seniority and the sixteen week period for employees with two or more but less than five years’ seniority is designed to allow employees not selected to vacancies to avail themselves of the retraining and reskilling opportunities outlined in 2.0 prior to any displacement as per Article 11.

2.2 Wage and Salary Treatment

2.2.1 Seniority - Five Years or More

The employee’s grade and progression step shall be maintained and negotiated increases shall apply for one (1) year from the surplus date regardless of placement. If the employee accepts a vacancy in a lower-rated classification his/her dollar rate shall be frozen at the end of the one (1) year until the rate for the classification equals the employee’s dollar rate, at which time the normal wage and salary treatment shall apply.

2.2.2 Seniority - Two Years - Less than Five Years

The employee’s grade and progression step shall be maintained and negotiated increases shall apply for sixteen (16) weeks from the surplus date regardless of placement. If the employee accepts a vacancy in a lower-rated classification his/her dollar rate shall be frozen at the end of sixteen (16) weeks for a period of three (3) months at which time a four percent (4%) reduction in rate will take place. Subsequent reductions of four percent (4%) will take place annually thereafter until the maximum rate for the lower-rated job is reached.

2.3 General Conditions

2.3.1 Notwithstanding the provisions of this Article an employee who is within five years of normal retirement or within five years of eligibility for undiscounted pension when faced with displacement or layoff, with joint agreement may be given special consideration for work site protection/preference.

Notwithstanding the provisions of this Article, the parties may make special arrangements for employees who are disabled to the extent that alternative employment would be difficult to find.

2.4 Moving Expenses

Prior to Article 11 applying, an employee who is identified as surplus as per this Appendix and is required to relocate his/her residence shall receive moving expenses in accordance with the provisions of Part A, Item 23. Such moves will be treated as Company-initiated moves.
ARTICLE 13
EMPLOYMENT SECURITY PLAN

Table of Contents

13.0 - Purchased Services
13.1 - Employment Security
13.2 - Joint Employment Security Committee
13.3 - Application
13.4 - Selection
13.5 - Wage and Salary Treatment
13.6 - Displacements
13.7 - General Conditions

13.0 PURCHASED SERVICES

During the term of this Collective Agreement, no regular employee will be declared surplus in his/her position as a result of the use of purchased services to perform the work normally performed by that employee.

13.1 Employment Security

Numerous factors may affect the nature and methods of accomplishing work. Changes in work patterns cannot be prevented but the effect of such changes on regular employees should be minimized as much as possible. The effect of such changes on PWU members will be minimized by accommodating required staff reductions wherever possible by attrition, transfer to other jobs or retraining rather than layoff.

The provisions of this Article will apply to a regular employee with five or more years’ seniority who becomes surplus from his/her position as a result of contracting out the work normally performed by that employee. The provisions of this Article will not apply to regular-seasonal employees.

Employees who become surplus for reasons other than contracting out will be entitled to Article 11 as applicable.

The definitions contained in Articles 10 and 11 will also apply to this Article.

For the purpose of determining if the employee has sufficient seniority to qualify for Article 13, his/her seniority will be counted up to the surplus date.

13.2 Joint Employment Security Committee

The function of the Joint Employment Security Committee is to resolve disputes regarding the appropriate application of Article 13 versus Article 11.

The committee will consist of six regular members, three representing the Union and three representing the Company. Two additional members from each party may be added from a work unit affected by the surplus situation under consideration. Meetings may be called by either party.

7 This Article is suspended for the term of this agreement.
In all disputes referred to the committee for settlement, the committee's decision will be final and binding on both parties.

In the event that the Joint Employment Security Committee is unable to resolve a dispute, it will be referred to an expedited arbitration process. The intention of both parties is to have a speedy resolution of the dispute. A list of arbitrators will be agreed upon who are prepared to meet on short notice (within seven days) and to render a decision within 14 days. Verbal decisions will be acceptable and all decisions are final and binding on both parties.

13.3 Application

When a surplus is identified in a classification in any location, the least senior employee in the surplus classification in the location shall be declared surplus.

Employees will be notified, in writing, a minimum of three months in advance of their surplus date. A copy of the notice shall be sent to the PWU office and the Chief Steward.

13.4 Selection

The criteria for selection of qualified applicants will be in accordance with Article 11.4 (2) and are repeated here for ease of application.

The following selection criteria apply to vacancies in equal- and lower-rated classifications:

1. For non-supervisory vacancies, the senior qualified surplus regular employee applicant will be selected.

2. Selections to supervisory positions will continue to be governed by Article 10.1.3A except when the vacancy is in the same classification as the surplus employee in which case the senior surplus applicant shall be selected.

3. If a surplus applicant is selected to a vacancy he/she must render his/her decision within three working days of the offer being made. Failure to do so will be considered a rejection of the offer and will not affect his/her further treatment under this article.

When there are no qualified surplus applicants, management will assess the capability of the surplus applicants to become qualified in a reasonable period of time. Management will select from among those assessed to be qualifiable in a reasonable period of time.

Employees covered by this plan will be given surplus priority consideration from the date of notification until eleven months after the surplus date. The selection priority will be the same as detailed in Article 11.4.3, which are repeated here for ease of application.

The following applies for equal and lower rated vacancies.

Each category will be considered independently and in the order indicated.
1. Surplus employees represented by the PWU and surplus managerial services employees.

2. Employees who were required to displace someone in a lower classification as a result of being surplus and who were previously in the classification that is now vacant.

3. Persons on the recall list whose occupational group contains the vacant classification.

4. As per Article 10.

13.5 Wage and Salary Treatment

The employee's grade and progression step shall be maintained and negotiated increases shall apply for one year from the surplus date or until the date the employee accepts a vacancy whichever comes first.

If the employee accepts a vacancy in a lower-rated classification, his/her dollar rate shall be frozen until the rate for the classification equals the employee's dollar rate, at which time the normal wage and salary treatment shall apply.

13.6 Displacement

If the employee has not been selected to a vacancy/placement opportunity within one year after the surplus date he/she will be given displacement opportunities available in Article 11 and all other terms and conditions of Article 11 will apply, except for Article 11.4.

All other provisions of Article 13 will cease to apply.

13.7 General Conditions

An employee who is within five years of normal retirement or within five years of eligibility for undiscounted pension or an employee who is disabled to the extent that alternate employment will be difficult to obtain, may by agreement between the Company and the Union, be given special consideration when faced with displacement.

One year's additional seniority shall be allowed stewards and chief stewards for the determination of which employees are surplus within the electoral unit of the chief steward.

An employee who is assigned temporary duties or who accepts a vacancy will assume the working conditions of the position.

A surplus employee who is required to relocate his residence, shall receive moving expenses in accordance with the provisions of Part A, Item 23.0. Such moves will be treated as the Company initiated moves.

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Managerial services employees in this context means employees paid from salary schedule 16 with the following exceptions: security guards, fire and safety inspectors, first aid attendants, and project medical attendants.
ARTICLE 14
EMPLOYMENT SECURITY AND WORK ASSIGNMENT

14.0 It is the Company's intent to use regular staff to perform most of its work of a continuing nature. Furthermore, the Company will strive to provide regular staff with stability of employment.

The Working Paper on Staffing and Employment dated March 15th, 1985 states Management's intentions with regard to continuity of employment for regular staff and proportions of work expected to be undertaken by regular staff. For at least the term of this Collective Agreement, the Company will not reduce the stated proportions of work to be done by regular staff.

At the end of each six-month period commencing January 1987, the Company will prepare a statement showing the proportions of work done by regular staff and make this information available to the PWU.

It is understood that the Working Paper on Staffing and Employment, as distinct from the terms of the above provisions, does not form part of the Collective Agreement and is not subject to the grievance and arbitration process.

14.1 Work Assignment

1. It is understood that the assignment of work to purchased services does not convey a right to such work in the future, nor does it create any precedent with respect to future assignment of such work to purchased service employees by the employer.

2. It is agreed between the parties that no more than 450 the Company tradespersons will be assigned by the Company at any one time under the EPSCA Maintenance Assist agreement to perform work for the Company. The Company agrees to inform the Union of the number of Company tradespersons assigned under the EPSCA Maintenance Assist agreement on a monthly basis.

ARTICLE 15
SUCCESSOR RIGHTS

The Company agrees that it will not directly or indirectly request government to exempt the Company or the Union from the successor rights provisions of the applicable labour relations legislation.

The successor rights provisions of the applicable labour relations statute shall be incorporated by reference into this collective agreement. No board of arbitration established pursuant to the grievance and arbitration provisions of this contract has jurisdiction to make any decision within the jurisdiction of the Labour Relations Board and nothing herein is intended to affect the jurisdiction of the Labour Board to resolve disputes related to the application of the provisions of the statute. For purposes of s.48 of the Ontario Labour Relations Act and s.57 of the Canada Labour Code, the Ontario Labour Relations Board or the Canada Labour Relations Board shall be deemed to be a Board of Arbitration for the resolution of disputes related to the interpretation,

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9 This Article is suspended for the term of this agreement.
application, administration or alleged violation of this provision of the collective agreement. The remedial powers of the Labour Board shall be as set out in the relevant statutory provisions governing successor rights.

Should the Company sell, lease, or otherwise transfer property to another entity for the purposes of establishing a new generating facility, it undertakes to discuss voluntary recognition of the PWU as the exclusive bargaining agent with the prospective owner. Where possible the Company will establish a meeting between the prospective owner and the PWU for this purpose.

ARTICLE 16
DURATION OF THE AGREEMENT

This agreement shall come into effect as of the 1st day of April 2015, and shall remain in effect until the 31st day of March 2018, and thereafter from year to year unless terminated by written notice given by one of the parties to the other within a period of not more than two months, but not less than one month prior to the anniversary date.

In the event that either party desires to amend the Agreement but not to terminate the same, either party may, by notice in writing not more than 90 days and not less than 30 days before the anniversary date, serve notice of the proposed amendments and both parties shall thereupon commence to negotiate in good faith with a view to arriving at an agreement on the proposed amendments and all provisions of the Agreement, other than those proposed to be amended, shall continue in full force and effect.

ARTICLE 17
Decontrol

1. In this Article, decontrol shall mean any sale, lease, transfer or any other transaction between the Company and any other entity, by virtue of which the control over any part of the Company’s business or assets becomes held by such other entity and the Company’s employees become employees of a new employer.

2. The Company recognizes the importance of securing for employees opportunity for continuing employment with successful bidders and are committed to securing such opportunity for employees in a facility to be decontrolled.

The PWU and the Company will, prior to a new employer commencing operations, ask employees employed at the station to state their intention to continue employment with the new employer.

The Company and the Union agree that issues may arise with respect to employees who refuse on-going employment opportunity with the new employer.

Therefore, the parties agree as follows:

1. At a time selected by the employer, in consultation with the Union, but not later than 60 days before the new employer commences operating the business, employees at the station will be asked to state in writing their intention to accept continuing employment with the new employer.
2. The Union and the Company will attempt to resolve all issues, which arise upon the refusal of any employee to accept continuity of work with the new employer.

3. If there is no agreement on issues relating to employees who decline continuing employment with the new employer, the issues will be submitted to an expedited mediation/arbitration process. Martin Teplitsky Q.C. will be the mediator/arbitrator. The mediator/arbitrator will have complete and unfettered discretion to make any award, which he considers fair and reasonable in all of the circumstances.

3. The Company agrees that it shall provide in writing to the Union at the earliest possible time after selection of the successful bidder but in any event prior to the time period in paragraph one (1) above, all available information relating to the new employer that is relevant to employees and that is not confidential.

4. Effective on the date the Company officially announced that a station is to be decontrolled (hereinafter called “the station”) or the date of any agreement with a successful bidder to decontrol, whichever occurs first, the following will apply:

   i. OPGI employees located outside of the station shall not be entitled to displace any employee in the station.

   ii. Subject to (iii), an employee who successfully applies for a vacancy at the station shall thereafter exercise seniority rights within the station and will have no seniority rights enforceable outside the station notwithstanding any other provision of the collective agreement.

   iii. Employees at the station may apply for vacancies outside the station in accordance with the applicable provisions of the collective agreement up to 60 days prior to scheduled date for closing of transaction but not thereafter.

   iv. An employee in the station who is declared overcomplement by the Company prior to the date of closing shall have full rights under Article 11.

   v. An employee at the station who is eligible for retirement under the Rule of 82 on or before the date of closing of the transaction to decontrol may make an irrevocable election within 60 days prior to the closing date that they wish to retire effective on the closing date. Should an employee make a decision to retire they will retire effective on the date of the closing and receive a lump sum payment equal to one year's base salary. This amount will be paid as a retirement allowance. The employee may direct all or a portion of this payment into an RRSP up to the amount permitted by law. The employee shall provide the Company with the TD2 form directing the payment into his/her RRSP.

Note: This section applies to those employees at the station who are on either extended sick leave, Long Term Disability or WSIB and who are not allocated to be transferred to the new employer solely because they are on sick leave, LTD or WSIB and are not expected to return to work within two years. Part A, Item 15.2
“Retirement While ill” limits the ability of employees on sick leave to retire. This provision is waived for employees covered by Article 17.4(v).

vi. If, within twenty four months of the closing, the successful bidder reduces the total complement of employees at the station which results in the permanent layoff of former OPGI employee(s) who had continued employment, the employee(s) permanently laid off will be entitled to a one time lump sum payment of one week per year of service with OPGI and the successful bidder. The obligation to pay the laid off employee is contingent upon the employee being severed from employment without recall rights with the successful bidder.

The additional payment of one week per year of service will not apply where the permanent layoff is due to:

- Strike
- Lockout
- Accident or catastrophic event
- Force Majeure/natural disaster
- Temporary Plant shutdown

The obligation to make the payment of one week per year of service will not apply if any employee has successfully challenged the layoff for any reason and has filed a grievance successfully seeking reinstatement.

vii. An employee who is not afforded the opportunity for continuing employment by the new employer shall have full rights under Article 11.
Signed
Ontario Power Generation Inc.

Dave Miller
Vice President
Health, Safety, Employee & Labour Relations

Barb Keenan
Senior Vice President
People & Culture

Signed
Power Workers' Union
Canadian Union of Public Employees – Local 1000

Bob Walker
Vice President – Sector 1

Brad Camduff
Vice President – Sector 2

Duly appointed to execute this Agreement on behalf of the Union
PART A

GENERAL ITEMS

(Note:
Items Related to Construction Technical
are as Specified in Part E)
TABLE OF CONTENTS

PART A

GENERAL ITEMS

1.0 EMPLOYEE CATEGORIES
2.0 REGULAR STATUS
3.0 ANNIVERSARY PROGRESSION
4.0 RETROGRESSION POLICY
5.0 SERVICE CREDIT
6.0 VACATIONS
7.0 STATUTORY HOLIDAYS
8.0 FLOATING HOLIDAYS
9.0 SPECIAL TIME OFF
10.0 LEAVE OF ABSENCE
11.0 PREGNANCY/ADOPTION/PARENTAL LEAVES
12.0 DISABILITY BENEFITS AND INCOME PROTECTION
13.0 HEALTH INSURANCE PLANS
14.0 PENSION AND INSURANCE
15.0 RETIREMENT
16.0 TEMPORARY EMPLOYEES (BENEFITS)
17.0 POSTING OF VACANCIES AND TRANSFER UPON APPOINTMENT
18.0 HEADQUARTERS
19.0 TRAVELLING TIME OUTSIDE NORMAL WORKING HOURS
20.0 COMPENSATION FOR TRAVELLING EXPENSE
| 21.0 | TRANSPORTATION TO OUTLYING STATIONS (Nuclear ONLY) |
| 22.0 | KILOMETRE RATES |
| 23.0 | TRANSPORTATION AND MOVING EXPENSES |
| 24.0 | RETURN TO RESIDENCE HEADQUARTERS |
| 25.0 | BOARD AND LODGING |
| 26.0 | JOINT COMMITTEES |
| 27.0 | DISTRIBUTION OF PWU NEGOTIATED POLICIES AND PRACTICES |
| 28.0 | DISTRIBUTION OF AGREEMENT AND WAGE SCHEDULES |
| 29.0 | TIME CHARGES - UNION ACTIVITIES |
| 30.0 | BANKED TIME |
| 31.0 | EYE PROTECTION |
| 32.0 | PERSONAL TOOLS |
| 33.0 | SPECIAL CLOTHING FOR EMPLOYEES |
| 34.0 | PURCHASING PRIVILEGES - SURPLUS EQUIPMENT STORES |
| 35.0 | RETURN OF COMPANY PROPERTY |
| 36.0 | TIME CHANGE - SHIFT WORKERS |
| 37.0 | REST PERIODS |
| 38.0 | BI-WEEKLY PAY DAYS |
| 39.0 | ESCALATOR CLAUSE |
| 40.0 | REDUCED WORK WEEK ENTITLEMENT (RWE) |
| 41.0 | TEMPORARY EXTERNAL PROJECT ASSIGNMENTS IN ONTARIO |
| 42.0 | RELIEF |
| 43.0 | WAGE STRUCTURE |
| 44.0 | Lump Sum Payments and Share Performance Bonus Plan |
PART A

GENERAL ITEMS

1.0 EMPLOYEE CATEGORIES

All employees fall into one or the other of four principal categories as outlined below.

1.1 Probationary

This category describes persons taken on strength on a probationary basis with the prospect, if their services are found satisfactory, of a change of category to Regular full-time or Regular part-time (Item 1.2, following).

1.2 Regular

Regular employees are those employees who, having satisfactorily met the job requirements, are judged medically fit by the Health and Safety Division for positions which are part of the continuing organization of the Company. They must have served the required time in a probationary category which is part of the Company’s continuing organization, or in a temporary category which becomes part of the Company’s continuing organization.

1.2.1 Regular Full-Time

Regular full-time employees work the regular hours of the classification into which they are hired.

1.2.2 Regular Part-Time

The establishment of a regular part-time position is a joint decision of local management and the chief steward made in a spirit of trust and co-operation. The parties will ensure that regular part-time positions are appropriately used to maintain corporate effectiveness, not to split a regular full-time position.

Regular part-time employees are regularly employed on an average of 24 hours or less per week calculated on a monthly basis. They are employed for a minimum of 16 hours per month. Regular part-time employees are treated as regular employees except where noted otherwise.

Pro-Ration Formula: The regular part-time employee benefit pro-ration formula is calculated based on the hours worked by the regular part-time employee expressed as a percentage of the normal scheduled number of hours for the classification. Where the number of regular part-time hours vary in a week it will be necessary to calculate this percentage over a jointly agreed upon extended period to get an accurate figure.

1.2.3 Regular - Job Share

Regular full time employees interested in job sharing arrangements shall find an appropriate partner from the same work location with similar skills and the same or lower terminal rates. These employees must establish an acceptable arrangement between themselves before approaching Management with the request.

Upon attaining agreement between Management and the employees, the job share arrangement will operate for a trial 6 month period. Following the 6 month trial period, the arrangement will:
(a) be considered a temporary arrangement and be extended by a maximum of six (6) months at which time the arrangement will end,

OR

(b) be considered a permanent job share arrangement. At this time the vacated position will be posted and filled in accordance with Part A, Item 17.0. In the case of the permanent job share arrangement, the incumbents are required to remain in their arrangement until one partner permanently leaves the job share. At that time, the other partner is required to assume responsibility for the full-time position on 30 days’ notice.

Employees engaged in a job share work arrangement are regular part-time employees for the purposes of benefits administration. Employees in job share arrangements will revert to regular full-time status for the purposes of application of Article 10, and Article 11.

Service credit for time spent in job sharing arrangements will be calculated on a pro-rata basis.

1.3.1 Regular-Seasonal “A”

Regular-seasonal “A” employees are those judged medically fit by Health Services for the position involved, who have attained one year’s accumulative service, and who are steadily employed through the year, except for short term layoffs. In addition, temporary employees engaged in work which is not of a continuing nature, shall be afforded regular-seasonal status upon attaining 12 months’ accumulated service.

Regular Seasonal “B”

As one of a number of efforts to deal with overcomplement staff and also to improve the efficiency of outage execution, it is proposed to increase the use of Regular Seasonal “B” staff.

The general conditions for these Regular Seasonal “B” employees are as follows:

a) To enter this classification you must:

Sever under Article 11 and move into the Regular Seasonal “B” employee category based on seniority until the category is staffed to complement. If not enough people apply then management can direct hire from the street.

A regular employee is required to sever his/her employment as a regular and be re-employed as a Regular Seasonal “B”. Management will ensure a letter of offer to a regular seasonal B position is in the employees’ hands prior to his/her severance request.

b) A Regular Seasonal “B” employee will be notified by November 30th and May 31st of the approximate timing and duration of their work assignment for the period starting the following January 1 and July 1. Employees will be notified at least one (1) week before the start of their work assignment. These work assignments shall aggregate at least 20 weeks or 800 hours in duration. They will occur in not more than four (4) occasions. Each occasion is to be four (4) weeks or 160
hours, or greater. Failure to accept will remove their name from future Regular Seasonal “B” assignments unless joint agreement is reached for extenuating circumstances e.g., death in the family or illness.

c) A Regular Seasonal “B” employee can be requested to work at other times for a minimum of two (2) weeks. Failure to accept has no consequence.

d) Floaters are earned at the rate of one (1) per seven (7) weeks (280 hours) and can be taken as mutually agreeable. Any unused floaters will be paid out at the conclusion of the assignment.

e) Vacation is earned at the rate appropriate to service as outlined in Part A, Item 6.3 and is paid out at the end of the assignment.

f) A Regular Seasonal “B” employee shall accumulate sick leave as per temporary employees (0.5 days per month – Part A, Item 16.2.4).

g) Overtime shall be paid as per the collective agreement.

h) A Regular Seasonal “B” employee will be paid 15% in lieu of benefits, including pension.

i) A Regular Seasonal “B” employee will not have rights under Article 11. Their displacement rights are outlined below.

Note: Part A – Item 1 will be amended to accommodate this classification.

j) Management will determine the size and composition of the regular seasonal crew.

The crew size will not exceed 20% of the total work force of each trade at that location.

**Displacement - Regular Seasonal “B”**

1. A Regular Seasonal “B” employee can displace a temporary employee in an equal or lower classification in his/her occupational group within his/her worksite/centre.

2. If 1. above is not available, a Regular Seasonal “B” employee can displace an agency employee in an equal or lower classification in his/her occupational group within his/her worksite/centre.

3. If 2. above is not available, employment is terminated.

**1.4 Temporary**

Temporary employees are hired to perform work that is expected to last for a short period of time or to perform work in place of a regular employee who is absent from his/her position.

For temporary full-time and temporary part-time employees, accumulated service shall mean the period of employment during which there has been no break in employment exceeding five months. Note that for pay purposes only, for temporary full time and temporary part-time employees, accumulated service shall mean the total of all periods of employment.
Benefits for temporary employees will be as outlined in Part A, Item 16.0.

1.4.1 Temporary Full-Time

Temporary full-time employees work the regular hours of the classification into which they are hired and may be engaged for up to 12 months of accumulated service.

1.4.2 Temporary Part-Time

Temporary part-time employees are employed for a period of up to 12 accumulated months on an average of 24 hours or less per week (calculated on a monthly basis). Temporary part-time employees are treated as temporary employees except where noted otherwise. Benefits are pro-rated the same as regular part-time employees.

To ensure that temporary part-time employees are properly classified as temporary, an assessment is to be made as to the regular or temporary status of the position whenever the temporary part-time employee is employed for twelve continuous\(^1\) calendar months. This assessment is subject to the grievance procedure.

This assessment is made based on the definition of a regular part-time position, i.e. the work is of a continuing nature with a minimum of 16 hours in a calendar month. If the position is determined to be temporary this will be conveyed to the Chief Steward (the employee should be given an end date and will remain temporary).

If the position is determined to be regular part-time, a joint discussion must take place as per the Regular Part-time provisions in the agreement prior to the position being posted. If the incumbent's employment exceeds 12 continuous months the incumbent will be given regular part-time status and the incumbent's seniority will be calculated on a pro-rated basis.

If as a result of the assessment above, the position is still temporary part-time at the 12 month accumulated service mark one of the following options must be selected:

1) The job is posted as a regular part-time. This decision is a joint decision as per regular part-time provisions in the agreement.

2) The Chief Steward agrees to an extension of the temporary part-timer's service for a specific period and the employee retains temporary status.

3) The temporary part-timer is terminated.

Accumulated service applies to temporary employees. Such employees do not have either seniority or service credit.

\(^1\) If an employee commences on January 20\(^{th}\) and works any portion of a calendar month for 12 continuous months, they will have 12 continuous calendar months service on January 20\(^{th}\) of the following year.
2.0 REGULAR STATUS

Appointment to regular status is contingent on satisfactorily meeting the Company's medical requirements.

1. Probationary employees must serve a minimum of three months on probation. If service is satisfactory, they may be accorded regular status at that time. A period of not more than three more months can be used as a further period of probation if it is needed. At the end of this further period, employees must either be made regular, transferred to another position or dismissed. Regular part-time probationary employees must serve up to six calendar months on probation.

2. Temporary employees engaged in work of a continuing nature, shall be afforded regular status upon attaining 12 months accumulated service. In such circumstances the employee's position will be considered to be a vacancy. If the former temporary employee is not selected to this vacancy he/she will be declared surplus in accordance with Article 11.

3. Temporary employees engaged in work which is not of a continuing nature, shall be afforded regular seasonal “A” status upon attaining 12 months accumulated service.

3.0 ANNIVERSARY PROGRESSION

Progression dates shall be calculated from the date of appointment or promotion to the position. Subsequent salary adjustments shall be on anniversary dates except as otherwise specified in Article 8 and Part A, Item 43.0.

NOTE

(a) The progression date for a regular part-time employee who works on average 50% or more of the base hours of the full time classification for the year will be at the completion of one and one third years of service.

(b) The progression date for a regular part-time employee who works on average less than 50% of the base hours of the full time classification for the year will be at the completion of two years service.

(c) Successful applicants to positions in the same or lower band will not have their anniversary progression date reset.

As a regular practice employees shall automatically progress from minimum to maximum as indicated in the respective wage schedules subject to the following:

3.1 Withholding Progression (Unsatisfactory Performance)

If an employee fails to make satisfactory progress his/her progression may be withheld for a period of six months. (8 months for a regular part-time employee working 50% or more of the base hours; 12 months for regular part-time employee working less than 50% of the base hours.)
If an employee's progression is withheld s/he will remain at their current step until the employee successfully meets the identified performance and/or training requirements. The Union may grieve on behalf of any employee whose progression is withheld.

In taking this action the Company shall provide the employee with one month’s notice and the reason for the withholding.

The performance of an employee whose progression has been withheld as above will be reviewed within seven months (nine months for a regular part-time employee working 50% or more of the base hours of the classification and fourteen months for regular part-time employee working less than 50% of the base hours of the classification). If progress and general performance are found to be satisfactory, progression shall be granted. If not, the employee shall be either transferred or dismissed.

If at the time of this review the employee's progress and general performance were found satisfactory and if six months after the review his/her performance has continued to be satisfactory, he/she may be granted the next step in his/her progression.

This will then re-establish his/her original progression status.

If an employee in a recognized training program (band III Apprentices/Trainees/Operator Trainees) has not reached the acceptable level of performance his/her progression may again be withheld in accordance with the above. Progression to the journeyperson or job rate will not be delayed by more than six months.

3.2 Deferral of Progression (Absences from Work)

When an employee has been absent from work for a period in excess of three months, excluding approved vacation, his/her progression may be deferred without prior notice for a period of time not to exceed the length of the absence. Subsequent progression dates may be adjusted accordingly.

4.0 RETROGRESSION POLICY

The term 'retrogression' is used to indicate a gradual reduction in pay to predetermined adjusted rate.

4.1 Where Applicable

1. Retrogression shall apply where a regular employee becomes unable to perform the duties of a job for which he/she is receiving the standard rate and is transferred to a lower-rated job because of:

(a) A disability caused by accident or illness.

(b) Inability to cope with increased responsibility due to change in job content.

(c) Where the unsatisfactory performance is due to faulty selection and the employee has served in the position for a period of at least one year.
Any retrogression for medical reasons is subject to ratification by the Chief Physician/Manager of Health Services.

2. Retrogression shall not apply where:

(a) An employee has less than ten years’ established service credit.

(b) The change to the lower-rated job is made at the request of the employee to escape heavy work or responsibility or for personal reasons.

(c) The change to the lower-rated job is made necessary for unsatisfactory job performance due to causes other than in Item 4.1(1.).

NOTE

Where retrogression does not apply, the employee will receive the job rate for the new job effective at the time of transfer to the new job.

4.2 How Applied

The Company will endeavour to provide an employee to whom Section 4.1 (1) applies with work he/she is capable of performing. His/her rate of pay shall be calculated as follows:

1. A new rate for the employee will be calculated at the time the employee is retrogressed. This is calculated by adding to the base rate of the new classification an additional two and one-half percent (2.5%) (except as specified below) of the differential between the base for the new job and the base rate for the employee's former job for each year by which his/her continuous service exceeds ten years at the time of transfer. For regular part-time employees, the new rate is calculated on an hourly basis. For employees with 25 or more years of service, where the reason for retrogression is one of 4.1(1)(a) or (b), five percent (5%) is used in the calculation instead of two and one-half percent (2.5%).

The calculation determines the rate to which the employee's pay will be reduced.

2. The reduction in rate will take place in steps each amounting to but not exceeding approximately four percent (4%) of his/her former base rate. (Hourly rate for regular part-time employees.) The first step shall occur three months after he/she has been transferred to the new job. The subsequent steps shall occur at six-month intervals until the rate determined in 4.2(1.) has been reached.

3. Where the retrogressed employee is unable to do the job to which he/she has been retrogressed and demotion to another job is necessary, the rate for this new job shall be based on the differential between the base rate of the original job from which he/she has been retrogressed and the base rate of his/her new job.

4. While retrogression is in progress and after retrogression is completed, increases in pay that occur will be applied only to the base rate for the new job and the retrogressed employee will only receive a benefit when the base rate for the new job exceeds his/her adjusted rate.
5. It shall be the responsibility of each Human Resources Manager/Officer to advise the Union in writing when any employees are placed on retrogression. This information will be provided to the Union as soon as possible but in any case before the reduction in rate specified in 4.2(2.) takes place.

### 4.3 Special Provisions

1. Retrogressed employees who are within 10 years of being eligible to retire without discount or who are within 15 years of normal retirement, shall have their rate frozen until the rate for the job being performed catches up to the frozen rate.

2. An employee with 20 years' service who is retrogressed for medical reasons related to the working conditions and job environment during a significant portion of his/her employment with the Company, will have his/her wages maintained until he/she is eligible for an undiscounted pension. The wage rate will be frozen thereafter. The medical reasons will be reviewed and assessed by the LTD Review Committee.

3. If, in the opinion of the LTD Review Committee, an employee is retrogressed because of a serious injury that resulted from an on-the-job accident with the Company, he/she will have his/her wages maintained until he/she is eligible for an undiscounted pension. This provision will apply to all regular employees regardless of service.

4. An employee with ten years' service who is retrogressed because of a muscular-skeletal repetitive strain injury or injury arising there from, which is deemed compensable by the WSIB and relates to his/her working conditions with the Company will have his/her wages maintained until eligible for an undiscounted pension. The wage rate will be frozen thereafter. The medical reasons will be reviewed and assessed by the LTD Review Committee.

### 4.4

Nothing in this regulation will override special commitments that have been made by the Company that in certain instances rates of pay will be maintained.

### 5.0 SERVICE CREDIT

#### 5.1 Introduction

This item defines service credit and describes the basis for calculating service credit for all purposes except those of the Pension and Insurance Plans, which are covered in the Ontario Power Generation Inc. Pension Plan and Insurance Plan Rules.

The application of such service credit to vacations, LTD, sick leave and other benefits will continue to be governed by the appropriate instructions.
5.2 Service Credit Calculation

In most cases the service credit of a regular employee is that employee's seniority. The exception to this can be found in Article 10.1.2.

Seniority applies to regular, regular-seasonal, and probationary employees only.

Temporary employees have accumulated service only.

Service credit will not be granted for absences without pay of greater than 15 days with the exception of:

1. Normal and Extended Pregnancy/Parental/Adoptive leave.
2. Elected Union officials absent on Union business.
3. Medical leave of absence.
4. Time off in lieu of overtime worked.

5.2.1 Regular Employees

Service credit shall be the period of employment with the Company and any service restored as per Part A, Item 5.3.

5.2.2 Temporary Full-Time and Part-Time Employees When Granted Regular Status

When temporary employees are granted regular or regular-seasonal status, service credit shall be granted for all previous full-time service and on a pro-rata basis for all part-time service.

5.3 Restoration of Service Credit

Regular employees who terminate and are re-employed to a continuing position shall have their service credit restored. Proof of past service must be provided by the employee in the first 60 days of re-employment unless the Company is capable of providing the proof within the first 60 days of re-employment. They shall not be required to serve a further probationary period. No service credit will be allowed for the period between termination and re-employment. Regular employees who were formerly employees of Ontario Hydro shall have their service credit restored.

Former regular employees who are rehired for temporary full-time or temporary part-time assignments will not be granted regular status upon rehire. Former regular-seasonal "A" employees will retain regular-seasonal "A" status when rehired for a temporary assignment, within one year of their last termination date.
6.0 VACATIONS

6.1 General Policy

Whenever possible, vacations will be granted at dates requested by the employees, but in view of the Company's role in providing a vital service at all times, the Company reserves the right to determine the dates when vacations may be taken. The company will respond to vacation requests in a timely manner. Local agreements will be used to achieve this.

6.2 Relationship between Vacation Year and Calendar Year

For the purpose of calculating vacation allowances, the vacation year commences July 1st of the previous year and ends June 30th of the calendar year in which the vacation is to be taken.

<table>
<thead>
<tr>
<th>Vacation Year (established credits)</th>
<th>Calendar Year (to be taken)</th>
</tr>
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<tbody>
<tr>
<td>July 1st</td>
<td>Jan 1st</td>
</tr>
<tr>
<td></td>
<td>Dec 31st</td>
</tr>
<tr>
<td>June 30th</td>
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</table>

6.3 Vacation Entitlement

Definition: The Employment Standards Act states that every employer shall give to each employee a vacation with pay of at least two weeks upon the completion of each 12 months of employment. The amount of pay for such vacation shall not be less than an amount equal to four percent (4%) of the wages of the employee in the 12 months of employment for which the vacation is given.

Wages are defined as any monetary remuneration payable by an employer to an employee under the terms of a contract of employment as well as any payment under the Employment Standards Act except vacation pay. Included in wages are termination pay, overtime pay, holiday pay, sick pay, equal pay adjustments, shift differentials, premiums for weekend or holidays, on-call and standby.

Wages do not include vacation pay previously paid in the 12-month period, supplementary unemployment benefits, tips or other gratuities, gifts and bonuses that are dependent on the discretion of the employer and are not related to hours, production or efficiency. Also excluded are travelling allowances or expenses, contributions made by an employer to pension funds, unemployment insurance, death grants, disability plans, accident plans, sickness plans, medical plans, nursing plans or dental plans.

Where an employee receives a greater benefit for vacation or vacation pay, that benefit will prevail over the conditions set out in the Employment Standards Act.

The amount of pay for a vacation shall be not less than an amount equal to four percent (4%) of the accumulated wages of the employee in the 12 months of employment for which the vacation is given and in calculating wages no account shall be taken of any vacation pay previously paid.
Regular Employees

A regular employee shall be eligible for a vacation of:

Less than One Year's Service by June 30th: One working day for each full month of service completed between June 30th of the previous year and July 1 of the current year up to a maximum of two weeks (10 working days).

The employee shall be paid four percent (4%) of the accumulated wages in the year for which the vacation is given.

For One Year and Less Than Three Years' Service: 10 working days (two weeks) annually. Vacation pay shall equal 10 days' base earnings or four percent (4%) of accumulated wages, whichever is greater.

For Three to Seven Years of Service: 15 working days (three weeks) annually when an employee has completed from three to seven years of service by the end of any calendar year. Vacation pay shall equal 15 days' base earnings or four percent (4%) of accumulated wages whichever is greater.

For Eight to Fifteen Years of Service: 20 working days (four weeks) annually when an employee has completed 8 to 15 years of service by the end of any calendar year. Vacation pay shall equal 20 days' base earnings.

For Sixteen to Twenty-Four Years of Service: 25 working days annually when an employee has completed 16 to 24 years of service by the end of a calendar year.

Vacation pay shall equal 25 days' base earnings.

In the year in which the employee is first eligible for 25 working days' vacation, he/she shall be granted it in one continuous period if he/she so requests.

NOTE

Employees hired on the first working day of January shall be deemed to have completed a calendar year on December 31st of the same year.

For Twenty-Five or More Years of Service: 30 working days' vacation in the calendar year in which he/she completes 25 years of service, and in each succeeding year.

Vacation Bonus

In the calendar year in which a regular employee completes:

- 26 years' service - 1 day's base pay
- 27 years' service - 2 days' base pay
- 28 years' service - 3 days' base pay
- 29 years' service - 4 days' base pay
- 30 years' service - 5 days' base pay
- 31 years' service - 6 days' base pay
- 32 years' service - 7 days' base pay

79
33 years’ service - 8 days’ base pay
34 years’ service - 9 days’ base pay
35 years’ service - 10 days’ base pay and beyond

The vacation bonus shall be calculated on the employee’s base rate of pay as of July 1st of the year in which the bonus is payable. These bonuses are payable on the closest payday to July 1st of each year.

Regular Part-Time Employees

Regular part-time employees are eligible for paid vacation time off. The entitlement is based on calendar years of service and payment for time off is calculated on a pro-rata basis. (Ref. Part A, Item 1.2.2).

Probationary Employees

A probationary employee shall be entitled to a vacation of one working day for each full month of service completed between June 30th of the previous year and July 1st of the current year up to a maximum of two weeks (10 working days).

Four percent (4%) of the total pay of the employee shall be paid in the year for which the vacation is given - whichever is greater.

Temporary Employees Made Regular

On attaining regular status, temporary employees will receive vacation entitlement for all service as defined in Part A, Item 5.2.2.

Temporary Employees

For less than one year’s accumulated service: Entitled to a cash vacation allowance of four percent (4%) of all accumulated wages.

6.4 Special Provisions and Allowances

6.4.1 Deferment or Interruptions of Vacations

Reimbursement will be made for out-of-pocket expenses incurred by an employee who, at the request of the Company, either defers an approved vacation or returns before the vacation has expired.

When an employee is called back from vacation or when an employee’s vacation is cancelled at the request of the Company, the employee shall receive premium rates of pay for all normal hours worked on cancelled vacation days for which seven calendar days’ notice has not been given up to a maximum of seven calendar days.

NOTE

In the above cases, the deferred or interrupted vacation days are to be rescheduled at a later date subject to Items 6.1 and 6.5.
6.4.2 Statutory Holidays and Vacations

If statutory holidays, to which an employee is entitled with pay, occur within his or her vacation period, the employee shall be granted an additional day's vacation for each in lieu thereof.

6.4.3 New Employees

An employee joining the staff between January 1st and June 30th and taking a vacation before July 1st, shall receive only the days allowed for service to the date of commencing the vacation. Any remaining days credited for service between the vacation commencement date and June 30th shall be taken between July 1st and December 31st.

An employee joining the staff between January 1st and June 30th and taking his vacation after July 1st, shall receive only the days allowed for service to June 30th.

If an employee joins the staff between July 1st and December 31st, no vacation allowance can be used until after December 31st.

6.4.4 Re-engaged Employees

An employee whose employment is terminated and who is re-engaged within 12 months of termination shall be granted a vacation allowance based on the employee's re-established service credit (see Part A, Item 5.0). However, the initial vacation allowance, while prorated on the same basis as above, must be taken as outlined in Item 6.4.3.

6.5 Postponed Vacations

6.5.1 With the exception of new employees as outlined in Item 6.4.3, vacations appropriate to the particular calendar year may be granted at any time but normally must be completed by the end of that year. Carry-over or postponement of vacations beyond the end of that year shall be in accordance with the following:

1. Where it is mutually agreeable, the employee may carry-over a maximum of two week's vacation to the following year (to be taken by April 30th of that following year). Request for carry-over must be made prior to September 1st.

2. Under special extenuating circumstances (as identified in Subsections 6.4.1, 6.5.2 and 6.5.4), application for postponement or carry-over of more than two week's vacation may be made to the respective director, or official of equivalent rank, but the vacation must be completed by April 30th of the next year.

3. Upon eligibility of 25 working days (5 weeks) of annual vacation, employees may defer and accumulate any vacation entitlement beyond 15 days per year. A maximum of 30 weeks' vacation may be banker. Banked vacation may be taken at a later date, subject to the supervisor's approval, or may be taken as a cash payment upon retirement.
6.5.2 An employee who is on sick leave shall not be granted a vacation until judged fit to return to work. If still disabled when sick leave credits expire, however, the employee may be placed on earned vacation.

6.5.3 An employee who becomes ill while on vacation shall not be placed on sick leave until after termination of the vacation. Under exceptional circumstances in case of very serious illness, sick leave may be granted at the discretion of the Chief Physician/Manager Health Services. The employee would then be entitled to the unused portion of his/her vacation after recovery from the illness.

Minor illnesses and injuries may cause some degree of discomfort or disability to an employee while on vacation. Yet for the most part, these do not necessitate complete removal from the vacation setting or loss of the beneficial effects of the holiday. However, when an employee on vacation becomes seriously ill or injured and as a result must be removed from vacation setting entirely, he or she should be entitled to sick leave.

The decision as to when an illness or non-occupational injury is sufficiently severe to justify transfer from vacation to sick leave should be made on medical grounds and rests with the Health and Safety Division. Normally hospitalization or complete confinement to bed in the home under regular physician’s care have been the criteria used to judge severity, often after consultation with the attending doctor. "Exceptional circumstances" may include a number of things such as hospitalization, the need to be flown home from a trip abroad, becoming seriously ill on the first day of vacation, etc.

The decision to transfer from vacation to sick leave must be based on reliable medical evidence and made by a physician in the Health and Safety Division. All cases of requests for such consideration should be referred to the Health and Safety Division without exception.

6.5.4 Where an employee is on sick leave or workers’ compensation and thereby is unable to use his or her vacation credit during the current year such vacations may be carried over to the following year in accordance with Items 6.1 and 6.5.1. Any outstanding vacation credit that has not been approved for carry over into the next year shall be paid out by Dec. 31st of the current year.

6.6 Vacation Payment on Termination

An employee whose service is terminated by the Company or by resignation shall be entitled to a cash payment in lieu of an outstanding vacation allowance, calculated proportionately from July 1st marking the beginning of the 12-month period in which the vacation entitlement applies. Upon the death of an employee, his or her estate shall be entitled to the same payment.

The payment will be based on:

1. Four percent (4%) of accumulated wages for an employee entitled to the prorated amount of 10 working days annually.
NOTE

In each of the following subsections, the minimum amount to be paid must be at least four percent (4%) of accumulated wages (see Definition, Item 6.3) of the employee in the year for which the vacation is earned.

2. Six percent (6%) of base earnings to date for an employee entitled to 15 working days annually.

3. Eight percent (8%) of base earnings to date for an employee entitled to 20 working days annually.

4. Ten percent (10%) of base earnings to date for an employee entitled to 25 working days annually.

5. Twelve percent (12%) of base earnings to date for an employee entitled to 30 working days annually.

The value of the vacation bonus will be based on the employee’s base rate at the time of termination. The vacation bonus for the incomplete year of service is pro-rated for the number of completed months from the employee’s ECD to the date the employee terminates.

Vacation allowance regulations for employees whose service is terminated owing to retirement on early, normal, disability or postponed pension are in accordance with the above.

6.7 Retirement Bank

An employee may defer vacation equivalent to the banked time earned in Part A, Item 30 into the Retirement Bank to a maximum of their annual vacation entitlement but at no time greater than 141 hours annually.

The deferred vacation in the Retirement Bank may only be taken after the employee has become eligible for an undiscounted pension. The employee may utilize the Retirement Bank by:

- Taking the time off immediately prior to retirement; or
- Cash out the full amount upon retirement or termination; or
- A combination of time taken immediately prior to retirement and cash out upon retirement.

When the employee takes deferred vacation from their Retirement Bank in the form of time off, they will receive their base pay and accrue pensionable service. Once these deferred vacation weeks are taken the employee must retire.

If an employee retires or terminates with time in the Retirement Bank such time will be paid out.

For further clarity when the employee takes time from the Retirement Bank, such time must be taken by the employee in one consecutive period after they become eligible for an undiscounted pension and immediately preceding their retirement.

The Retirement Bank may not exceed 2080 hours (52 weeks).
The Company shall contribute 7 hours for every 40 hour block of time that a shift worker contributes to the Retirement Bank, up to a maximum Company contribution of 21 hours per calendar year.

This clause is only applicable to shift workers who are scheduled to work the majority of a 12 month (calendar year) schedule consisting of twelve (12) or eight (8) hour rotating shifts required for continuous 24-hour operations.

Should any employee who utilizes this provision and fails, by their choice, to work the majority of the year on shift, the Company will recoup their contribution from the employee’s retirement bank.

The Company will not recoup any contribution from an employee where they are assigned off shift, preventing them from working the majority of the year.

7.0 STATUTORY HOLIDAYS

7.1 Recognized

The days listed below will be recognized by the Company as statutory holidays, regardless of any conflict between these holidays and those declared as statutory holidays by municipal, provincial or federal statutes.

<table>
<thead>
<tr>
<th>New Year's Day</th>
<th>Civic Holiday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family Day</td>
<td>Labour Day</td>
</tr>
<tr>
<td>Good Friday</td>
<td>Thanksgiving Day</td>
</tr>
<tr>
<td>Easter Monday</td>
<td>Christmas Day</td>
</tr>
<tr>
<td>Victoria Day</td>
<td>Boxing Day</td>
</tr>
<tr>
<td>Canada Day</td>
<td></td>
</tr>
</tbody>
</table>

When Canada Day falls on a Saturday or a Sunday it shall be observed on the following Monday.

In the event that Boxing Day or New Year's Day falls on a Sunday, it shall be observed on Monday. Similarly, if Christmas Day falls on a Sunday, it shall be observed on Monday and Boxing Day on Tuesday.

When Christmas falls on Tuesday, Boxing Day shall be observed on Monday.

All regular and probationary employees shall be paid for statutory holidays.

A statutory holiday falling within an employee's vacation period shall not be counted as part of his/her vacation but shall be taken as an extra day of holiday.

Regular part-time employees will be entitled to statutory holiday pay as identified in the Collective Agreement consistent with the Employment Standards Act.

Payment for such statutory holidays will be the amount the employee would normally earn on a scheduled day of work.
7.2 Sick Leave Credits

If an employee is not scheduled to work on a statutory holiday and falls sick, his/her pay for that day will not be charged against his/her sick leave credits and he/she will receive payment at 100 percent (100%) of his/her normal daily base earnings.

If an employee is scheduled to work on a statutory holiday and falls sick, that day is treated as a normal sick day and the employee would receive a lieu day at a later date.

8.0 FLOATING HOLIDAYS

Regular, regular-seasonal and probationary employees who have accumulated 20 weeks' continuous service in any calendar year will be entitled to three floating holidays subject to the following:

1. Floating holidays may be taken on such days as the employee and his/her supervisor mutually agree upon, following reasonable advance notice on the part of the employee.

2. Floating holidays shall not be carried over into the following year unless work considerations prevent the employee from taking the floater(s) in the year of entitlement.

3. Where the employee is unable to reach mutual agreement with his/her supervisor to take his/her floating holiday(s) before year-end because of absence due to illness (except when exhausting sick leave prior to LTD) unused floating holidays will be assigned on the last working day(s) of the year.

4. Where an employee falls sick on his/her scheduled floating holiday, that day will not be charged against his/her sick leave credits, but shall be treated as a floating holiday for pay purposes.

5. Regular and probationary employees may take their floating holiday(s) before accumulating 20 weeks' service in a calendar year.

6. Regular part-time employees are entitled to three (3) floating holidays upon completing 20 weeks of service. Pay treatment for the three (3) days is on a pro-rata basis. (Ref. Part A, Item 1.2.2)

7. Entitlement on Termination: If the employee terminates after having accumulated 20 weeks' service in the calendar year, the Company will make a cash payment in lieu of any unused floating holiday credit.

If the employee terminates prior to accumulating 20 weeks' service in the calendar year, entitlement will be as follows:

(a) If the employee has not qualified for entitlement in the previous year, he/she will have no entitlement in the current year. If he/she was granted a floating holiday under 5. above, the Company will recover one day's pay for each floating holiday taken.

(b) If the employee has qualified for entitlement in the previous year, his/her entitlement will be prorated based on the number of weeks' accumulated service in the year of
termination. For example, an employee who terminates after accumulating five weeks of service in the year would be entitled to 5/20ths of three days.

The Company will either make a cash payment in lieu of any unused floating holiday credit or recover the value of the unearned portion of floating holidays taken under 5. above.

In no case will an employee be entitled to more than three floating holidays or floating holiday credit in a calendar year.

9.0 SPECIAL TIME OFF

9.1 Additional Time Off at Christmas and New Year's Holidays

When Christmas falls on Friday and Boxing Day on Saturday, an additional half holiday will be granted to employees on the preceding Thursday.

When Christmas falls on Saturday and Boxing Day on Monday, an additional half holiday will be granted to employees on the preceding Friday.

When Christmas falls on Wednesday, the Friday following Boxing Day shall be granted as an additional holiday.

When New Year's Day falls on a Saturday, an additional holiday shall be granted on either the preceding Friday or the following Monday.

Those regular part-time employees whose regular scheduled day of work falls on the holidays referenced above shall be granted the time off and compensated at a rate equal to their normal daily earnings.

9.2 Payment for Time in 9.1

Eligible employees required to work during the days in 9.1 shall be paid as follows:

1. If employees are normally scheduled to work and are required to work on such a day, they shall be paid straight time for such work within normal scheduled hours and given equivalent time off with pay, up to a maximum of normal scheduled hours, within the following six months.

2. If employees are not normally scheduled to work on such a day and are required to work, they shall be paid at the rate normally paid for overtime work.

3. Eligible shift employees on a seven-day coverage basis whose normal scheduled day off falls at such designated time, shall be allowed equivalent time off with pay, within the following six months.
9.3 Remembrance Day

The following employees will be eligible for time off and/or payments as described in 9.4.

1. Those employees who are serving or have served in the Canadian Forces including those who are currently active in the reserve component, or who were deployed as part of the Canadian Forces.

9.4 Remembrance Day Payment and Time Off Provisions

If on Remembrance Day eligible employees as described in 9.3 are:

1. Normally scheduled to work, eligible employees shall be allowed time off with pay, at straight time for scheduled hours as far as work schedules will permit.

2. Scheduled to work and they are required to work, they shall be paid at the rate that normally applies for that day and given equivalent time off with pay, at straight time up to a maximum of normal scheduled hours, within the following six months.

3. Not normally scheduled to work and they are required to work, they shall be paid at the rate normally received for overtime work.

4. Shift workers on a seven-day coverage who are on a regular day off, shall be allowed equivalent time off with pay within the following six months.

9.5 Treatment for Vacation

Special time off, as noted in 9.1 and 9.3, falling within eligible employees' vacation period shall not be counted as part of their vacation but shall be taken as additional time off.

9.6 Sick Leave Credit

When special time off, as noted in 9.1 and 9.3 occurs while eligible employees are on sick leave credit, their pay will not be charged against sick leave credits and they will receive 100% payment at their base rate for normal scheduled hours.

10.0 LEAVE OF ABSENCE

10.1 With Pay

Occasionally, an employee will be in a situation where there is no reasonable alternative to being absent from work for personal reasons. Sometimes the employee will, at the same time, be committed to considerable additional expense. Provision is made so that the Company may ameliorate the hardship to the employee, which may result.
10.1.1 General

When in the Company's judgment the circumstances warrant such action, leave of absence with pay will normally be granted.

This leave is based upon reasons of personal emergency, such as severe illness in the immediate family which would necessitate remaining home until adequate arrangements could be made for outside help, or being in close attendance at a hospital. Also, in cases where an employee is faced with the effects of a severe storm, fire or flood.

10.1.2 Funerals

A regular employee may be released from duty for a period up to three days without reducing base earnings in the event of the death of a member of the immediate family including parent, parent-in-law, brother, brother-in-law, sister, sister-in-law, spouse, son, son-in-law, daughter, daughter-in-law, grand-parents, grandparents-in-law and grandchildren.

In the event of the death of a fellow employee, a regular employee may be allowed time off with pay to attend the funeral. Usually the time required is less than one-half day. Regular part-time employees shall be granted the time off with pay if scheduled to work.

NOTE

Item 10.1.2 is a guide applicable under ordinary circumstances, on the distinct understanding that it does not set rigid limits either maximum or minimum.

10.1.3 Service with Reserve Components of the Canadian Forces

A regular employee who serves with the Reserve Component of the Canadian Forces and can be released from work may be granted a leave of absence in order to attend annual training or a forced call out.

Top up for Annual Training

For the period of time the employee attends annual training the employee will be paid the difference between the gross amount received from the Department of National Defence for the full training period and base earnings for the period of absence. The employee will be required to furnish his/her supervisor with a statement from the commanding officer or Finance Department of the reserve unit, showing the amount received from the Department of National Defence for the training period.

10.1.4 Legal Hearings

Base earnings will be maintained when an employee is called for jury duty or is subpoenaed to appear in court as a witness except in cases involving inter-union jurisdictional disputes.
10.2 Equivalent Time Off Without Pay

Employees who have worked overtime may be granted one hour off for each hour worked, without pay, in increments of not less than one-half day, provided the employee requests the time off and the workload permits.

10.3 Family Care

A regular employee is entitled to take up to five (5) days per calendar year for the purpose of providing family care to an immediate family member. The employee must pay this time back at a time mutually agreed to by his/her supervisor within three months of taking the absence or by taking time off without pay. The time taken shall be worked back on an hour for hour basis.

11.0 PREGNANCY/ ADOPTION/PARENTAL LEAVES

11.1 General Provisions

To be eligible the employee must have worked for the Company for a period of at least 13 weeks preceding the estimated delivery date or have been employed by the Company for 13 weeks by the date on which the child comes into the custody, care and control of the parent for the first time.

These leave provisions are available to all categories of employees. In addition, regular employees including regular part-time employees eligible for pregnancy leave or adoption leave are entitled to supplementary unemployment benefits (Ref. 11.4).

Pregnant employees are entitled to pregnancy leave including those women whose pregnancies are terminated by still-birth or miscarriage within 17 weeks of the expected birth date (Ref. 11.2). Following the birth of the child, the employee is also eligible for parental leave. (Ref. 11.5)

Adoption leave is available to the parent who is designated as the primary caregiver (Ref. 11.3). Parental leave is also available to such an employee (Ref. 11.5).

Parental leave is also available to employees not eligible for pregnancy or adoption leave but who have become the parent of a child (e.g. an employee whose spouse has given birth to a child or the adoptive parent who is not the primary caregiver. Ref. 11.5).

A leave extension is available to employees who take a pregnancy leave followed by a parental leave (Ref. 11.6).

Service credit will be granted for the full duration of such leaves.

Two weeks' notice is required for such a leave, except as noted in 11.2.2. The commencement date can be advanced or delayed upon the giving of a further two weeks notice. Similarly, the termination date can be advanced or delayed upon giving four weeks notice.
Eligibility for such leave does not necessarily mean the employee is entitled to EI benefits. However, EI benefits may be available in the case of such a leave and employees should be referred to the nearest EI office to check their entitlement.

The Company will continue for the duration of any such leave to pay the same share of the premiums for OHIP, EHB, Dental Plan, Life Insurance and Pension Plan that it would normally pay for the employee. This will not apply with respect to any benefit plan where the employee is normally required to make an employee contribution and he/she has given the Company written notice that he/she does not intend to pay such contributions.

An employee going on such a leave may prepay his/her pension contributions prior to taking the leave or make up contributions on return to work to establish pensionable service for the period of absence. Prior to the leave, he/she must sign the appropriate forms indicating whether or not he/she wishes to prepay the pension plan contributions.

Positions temporarily vacated as a result of a pregnancy/adoption or parental leave will be filled on a temporary basis only until the employee on leave returns.

Provided the employee returns to work no later than the expiration of his/her leave entitlement, he/she will be offered:

(a) The position most recently held if it still exists at a rate of pay not less than his/her wages at the commencement of the leave or if greater the wages that the employee would be earning had the employee worked throughout the leave.

(b) Should the position most recently held not exist as a result of a surplus in the unit in accordance with Article 11 he/she will be offered a comparable position at the location he/she was previously working at a rate of pay not less than his/her wages at the commencement of the leave or if greater the wages that the employee would be earning had the employee worked throughout the leave.

(c) Should (a) or (b) not exist he/she will be declared surplus in accordance with Article 11.

The granting of extensions to the normal 90-day acting period for positions vacated by an employee on pregnancy/adoption/parental leave shall be automatic. The Union chief steward shall be advised of all cases where this subsection applies.

11.2 Pregnancy Leave - General

Prior to commencing pregnancy leave, the female employee must indicate in writing her desire to return to work following her pregnancy.

The Canadian Human Rights Act requires the employer to accommodate the needs of pregnant employees in the workplace, unless to do so would cause undue hardship to the business. If a pregnant employee is unable to work in her regular work location because of the possible radioactivity level, her normal base rate of pay will be maintained during the period of relocation.
11.2.1 Duration of Leave

An eligible female employee may apply for pregnancy leave, to commence after the 22nd week of pregnancy for a duration of up to 17 weeks.

The pregnancy leave of an employee who is not entitled to take parental leave ends on the later of the day that is seventeen weeks after the pregnancy leave began or the day that is six weeks after the birth, still-birth or miscarriage.

NOTE

Female employees who are the parent of a child are entitled to parental leave in addition to pregnancy leave. Parental leave is described in 11.5. Unless otherwise mutually agreed, parental leave must immediately follow the pregnancy leave unless the child has not come into the custody, care and control of the parent for the first time.

11.2.2 Physician's Certificate

When a female employee applies for pregnancy leave she must provide her supervisor with a certificate from her physician stating that she is pregnant and giving the estimated date of delivery at least two weeks prior to the date she plans to commence the leave.

In the case of a female employee who stops working prior to the commencement of her scheduled leave because of a birth, still-birth or miscarriage that happens earlier than the employee was expected to give birth, that employee must, within two weeks of stopping work, give her supervisor:

(a) written notice of the date the pregnancy leave began or is to begin, and

(b) a certificate from a legally qualified medical practitioner that,

   (i) states the date of the birth, still-birth or miscarriage and the date the employee was expected to give birth.

When a female employee resigns without notifying her supervisor that she is pregnant and she has not applied for pregnancy leave, but within two weeks following her resignation, provides her supervisor with a certificate from her physician stating she was unable to perform her job duties because of a medical condition arising from her pregnancy and giving the estimated or actual delivery date, she shall be entitled to pregnancy leave if it is requested.

NOTE

The supervisor should obtain the advice and assistance of Health Services Division if clarification is required.
11.2.3 Pregnancy and the Sick Leave Plan

Normal pregnancy leading to confinement is not an illness under the terms of the Sick Leave Plan. However, absences due to pregnancy-related illnesses or complications shall be considered as sick leave under the terms of the sick leave plan.

11.3 Legal Adoptions -- Primary Care-Giver

In cases of legal adoption where the child is raised in the home the following will apply after receipt of the child.

1. Where the child is less than elementary school age, the primary caregiver will be granted leave of up to 17 weeks.

2. Where the child is elementary school age or older and the primary caregiver requests leave, the duration will be based on the recommendation of the adoption agency with the final decision being made by the Company’s Chief Physician.

3. The primary caregiver is also entitled to parental leave (Ref 11.5).

11.4 Benefits Under the Supplementary Unemployment Benefit Plan for Regular Employees

Provided they qualify for EI payments regular employees who are eligible for pregnancy leave or parental leave shall be paid a benefit in accordance with the Supplementary Unemployment Benefit Plan. In order to receive this benefit, the employee must provide the Company with proof that he/she has applied for and is eligible to receive unemployment insurance benefits pursuant to the Employment Insurance Act. The grant payment may only be paid upon receipt of proof that the employee is eligible for EI benefits. The simplest "proof of eligibility" is the counterfoil from the employee’s first EI cheque.

According to the Supplementary Unemployment Benefit Plan payment will consist of:

1. For those on pregnancy leave, two weeks at 93 percent (93%) of the employee's base pay.

2. For those on pregnancy leave, up to fifteen additional weekly payments dependent on the length of his/her EI entitlement, equivalent to the difference between the unemployment insurance benefits the employee is eligible to receive and 93 percent (93%) of the employee's base pay.

3. For those on parental leave, the equivalent of 93% of the employee’s base pay for three weeks.

4. Other earnings received by the employee will be considered so that the total combination of SUB, EI benefit and other earnings will not exceed 93 percent of the employee's base pay.

These payments will only be made if the employee signs an agreement with the Company, providing:

(a) that he/she will return to work and remain in the Company’s employ for a period of six months from the date of return to work;

(b) that he/she will return to work on the date of the expiry of her pregnancy leave or his/her adoption, or parental leave, unless the employee is entitled to another leave provided for in this agreement;
that the employee recognizes that he/she is indebted to the Company for the payments received if he/she fails to return to work as per the provisions of subsections (a) and (b).

11.5 PARENTAL LEAVE

11.5.1 General

Employees who have been employed by the Company (including service with Ontario Hydro) for a period of at least 13 weeks by the date on which the child is born or comes into the custody, care and control of the parent for the first time are eligible for an unpaid parental leave. A parent includes a person with whom a child is placed for adoption and a person who is in a relationship of some permanence with a parent of a child and who intends to treat the child as his or her own.

11.5.2 Duration of Leave

Employees eligible for parental leave may take this leave beginning not later than 52 weeks of the child being born or coming into care. Unless otherwise mutually agreed females on pregnancy leave wishing to take a parental leave must commence parental leave immediately following the end of the pregnancy leave unless the child has not come into custody, care and control of the parent for the first time. The duration of this leave is up to 35 weeks. Those employees who do not take pregnancy leave and all other new parents can take up to 37 weeks of parental leave.

Employees who wish to take this leave must give the Company two weeks’ notice in writing prior to the date the leave would begin and four weeks notice of the date the leave will end if they wish to terminate the leave prior to 35 or 37 weeks following the date the leave commenced.

An employee, who takes a pregnancy leave followed by a parental leave as per Item 11.2 and 11.5 may elect to have the total leave extended up to 56 weeks. This constitutes an extension of up to 4 weeks.

11.6 Service Credit

Employees who were granted pregnancy/adoptive/parental leave from the Company or its predecessor, Ontario Hydro, on or after November 18th, 1990 will be eligible for service credit for the full duration.

11.7 Restoration of Previous Service

11.7.1 Female employees of the Company or its predecessor, Ontario Hydro, who were granted maternity leave will be eligible for service credit as follows:

(a) those employees who took normal maternity leaves will be eligible for service credit up to a maximum of 17 weeks.

(b) those employees who took extended maternity leaves on or after April 1st, 1977 will be eligible for service credit for the full duration.
12.0 DISABILITY BENEFITS AND INCOME PROTECTION

12.1 Sick Leave Plan

The benefits of the Company’s Sick Leave Plan shall be considered as part of this Agreement. However, it is recognized that its provisions are not an automatic right of an employee and the administration of this plan and all decisions regarding the appropriateness or degree of its application shall be vested solely in the Company.

The Company’s Sick Leave Plan will provide that probationary and regular employees will commence with a credit of eight days at 100 percent (100%) and 15 days at 75 percent (75%) pay, payable from the first day of sickness. This credit will continue to be available until the employee attains his/her first annual accumulation date as a regular employee. At the time of this accumulation date and each subsequent accumulation date he/she will acquire additional credits of eight days at 100 percent (100%) pay and 15 days at 75 percent (75%) pay. The accumulation of credits will be subject to the provisions of the Company’s Sick Leave Plan.

Regular part-time employees shall receive a pro-rated number of sick days. When a regular part-time employee is absent due to illness on a scheduled day of work, they shall be paid for the hours of work scheduled for that day provided sick leave credits are available.

Normally employees will be expected to arrange routine medical or dental appointments during non-working hours. Where such appointments cannot be arranged during non-working hours and the employee can be released from his/her duties, then the time shall be charged against an employee’s sick leave time except in the case of medical appointments of less than half a day where normal earnings will be maintained.

Employees who are on sick leave for 30 days or more may be eligible to participate in a vocational rehabilitation program in accordance with the Company’s policy.

All major medical absence forms will be completed for any absence of four (4) continuous days/shifts or more or when requested by management. The Company will compensate the employee for the cost associated with completing these forms up to a maximum of $30.00. Additionally, the company will compensate the employee for the full cost of all medical notes, medical forms or medical information required to support LTD or other Wellness programs. This provision applies to Doctor’s notes requested by Line Management as part of the administration of the sick leave plan.

Employees will be required to submit all forms required by management through their personal physician.

Sick Leave benefits are conditional upon receipt of these forms and it is the responsibility of the employee to ensure that the employer receives these forms within a reasonable period of time.

Any discipline related to sick leave that is imposed and grieved by the union will be referred directly to Martin Teplitsky for resolution.
12.2 Long Term Disability

12.2.1 General Provisions of LTD Plan

The Long Term Disability (LTD) Plan provides financial security and rehabilitative employment features to regular employees during their absence from work due to extended sickness or injury. LTD benefits commence upon completion of the qualifying period, which is defined below. Regular employees who are approved for the provisions of the LTD Plan will be subject to the following contractual provisions.

All employees who are in receipt of LTD benefits will be eligible to participate in the Rehabilitation and Re-employment Programme dependent upon their medical suitability and procedural requirements.

DEFINITIONS:

LTD Qualifying Period - The qualifying period is defined as the period six calendar months from the starting date of the employee's continuous absence due to disability; or a total of six months in accumulative authorized medical absences in the year prior to the date sick leave expires due to the same progressively deteriorating disability; or the expiration of sick leave whichever is longer.

Disability Period - The period in which an employee cannot continuously perform the essential duties of any position available in accordance with the priority placement criteria of the Rehabilitation and Re-Employment Procedure.

Benefit Level - The Company agrees to assume the full cost of a LTD Plan for all regular employees. The Plan would provide for a monthly income during the disability period equal to the lesser of:

1. Sixty-five percent (65%) of base earnings at the end of the qualifying period for LTD benefits, or
2. Seventy-five percent (75%) of base earnings at the end of the qualifying period for LTD benefits less any compensation awards from the Workplace Safety and Insurance Board (WSIB) (excluding the Non-Economic Loss award) and/or the Canada Pension Plan, excluding benefits for dependents.

NOTE

Regular part-time employees shall be eligible for pro-rated income benefits.

Miscellaneous Provisions - A person who runs out of sick leave credits will be granted a leave of absence without pay until such time as the LTD qualifying period elapses. The employee will continue to receive service credit during this period and have coverage maintained in but will not be required to contribute to the Company’s Pension Plan, Health and Dental benefits, and the Company’s Group Life Insurance Plan.

Where an employee has been retrogressed to a lower-rated job for medical reasons and within two years (not including the LTD qualifying period) begins receiving a monthly income under the LTD Plan for reasons directly related to the original medical condition, the base earnings used to compute the LTD monthly income payment shall be the current rate of the employee’s original classification.

Exceptions and Limitations to the LTD Plan

LTD benefits will not be made available for claims resulting from:
1. A disability for which the person is not under continuing medical supervision and treatment considered satisfactory by the Insurance Carrier and the Company.

2. A disability caused by intentional self-inflicted injuries or illness while sane.

3. A disability from bodily injury resulting directly or indirectly from insurrection, war, service in the armed forces of any country, or participation in a riot.

4. Normal pregnancy leading to confinement.

5. Disability from occupational injuries for which the employee is receiving Total Temporary Disability Benefits or during the first 24 months of a Future Economic Loss Award or during the first 24 months from the date of Loss of Earning (LOE) Award from the Workplace Safety and Insurance Board.

No amount of LTD benefit will be payable with respect to the disability of an employee during any of the following periods:

1. If the disability is due to mental disorder, any period while the employee is not under the continuing care of a certified psychiatrist or other care authorized by the employee's psychiatrist.

2. If the disability is due to substance abuse, alcoholism and/or drug addiction any period in which the employee is not certified as being actively supervised by and receiving continuing treatment from a rehabilitation centre or a provincially designated institution.

3. The period during which the employee is on leave of absence, including Pregnancy Leave of Absence. The LTD qualify period begins on the date the employee is expected to return to work from that leave of absence.

12.2.2 Benefits While on LTD

1. Service Credit: Service credit shall not continue while the employee is in receipt of LTD benefits. Upon return to work, service credit shall be applied as per Item 12.2.4.

2. Vacation Credit: Any outstanding vacation entitlement for a person going on LTD will be paid in cash upon expiry of sick leave. The cash payment will be calculated on the base earnings at the expiration of sick leave for the prorated days of vacation entitlement, any outstanding lieu days, any outstanding floating statutory holidays, and banked time for 40-hour per week employees. No vacation entitlement, floating holidays, or banked time for 40-hour per week employees accrues while a member is in receipt of LTD benefits.

3. Vacation Credit During Rehabilitation Employment: Vacation credits will be earned based on the hours worked and the employee's vacation entitlement multiplied by the corresponding percentage listed below. These credits will be paid in cash in the last pay period of the year if not used by December 31, or upon return to regular employment, or upon termination.
4. The Company health and dental coverage premiums continue to be maintained by the Company.

5. The Company Pension Plan: The employee’s membership in the plan continues. Upon expiry of sick leave, the requirement for employee contributions is waived. An employee is not required to make contributions to the plan while he/she is receiving LTD benefits. The retirement pension continues to accumulate. Years of service continue to accumulate for entitlement to rights and benefits under the Pension Plan.

6. The Company Group Life Insurance Plan: Commencing the first day of the month following the end of the qualifying period for LTD benefits, an employee will continue receiving the same insurance option during receipt of LTD benefits as that in force prior to such receipt. An employee who is in receipt of LTD benefits is not required to make contributions to the Group Life Insurance plan.

7. Sick Leave Entitlement: Upon receipt of the memorandum from the Chief Physician recommending that the employee should make application for LTD benefits, entitlement to accumulate or restore sick leave credits shall cease on the day following the next accumulation date provided that it falls within the qualifying period.

8. Union Dues: Upon expiry of sick leave an employee’s Union dues shall cease.

9. Employee status will continue with respect to maintaining redress rights to contractual provisions.

12.2.3 Recurring Disability After Return to Regular Work

If, on return to regular employment after receiving disability benefits, a subsequent period of disability recurs within six months and is related to the cause of the previous disability, the following shall apply:

Entitlement to existing sick leave credits shall cease, the qualifying period shall be waived, and the employee shall immediately receive LTD benefits as if there had been no return to work.

12.2.4 Individual Returns to Regular Employment

1. Service Credit: Service Credit continues to accrue while on LTD.

2. Vacation Credit: The employee will start earning vacation credit based on total service credit.
3. The Company Health and Dental Coverage: Premiums continue to be maintained by the Company.


6. Sick Leave Entitlement: Eight days at 100 percent (100%) and 15 days at 75 percent (75%) pay shall be immediately credited. On the first accumulation date, restoration of sick leave credits will take place based on the total service credit. It is recognized that this provision is subject to the provisions of recurring disability as defined in Section 12.2.3.


12.2.5 Termination of LTD Benefits

The LTD benefit ceases when any of the following events occur:

1. The date the individual ceases to be totally disabled or engages in any occupation for wage or profit except as permitted by the Rehabilitative Employment Clause.

2. The date the individual reaches age 65.

3. The date the individual fails unreasonably to furnish proof of the continuance of such total disability, or fails to submit to an examination requested by the Plan's medical advisors. At that point all LTD benefits will cease and the employee will be terminated.

When an employee does not comply with the above requirements the Union will be informed and act as the employee's advocate prior to such termination.

4. The date the individual dies.

5. The date the individual receives pension under the Company Pension Plan.

12.2.6 Indexation

1. LTD Benefits: Individuals who are in receipt of LTD benefits will have their LTD benefit level indexed by the same amount that pensions are indexed.

2. Pension Calculation - Base Earnings: For the purposes of calculating the pension benefit for LTD recipients the base earnings at the end of the qualifying period will be increased by the amount of the indexation increase granted in 1. above.

3. Insurance Benefit - Base Earnings: It is agreed that for purposes of calculating the group life insurance benefit for LTD recipients, the base earnings at the end of the qualifying period will be increased by the amount of the indexation increase granted in 1. above.
12.3 Rehabilitation and Re-employment

Rehabilitative employment is an important feature of the Plan, which provides an employee with additional financial incentive and assistance to re-enter the work force. It is defined as any employment within the Company and remains in effect until the employee is offered regular employment.

If during the disability period, an employee becomes capable of working, the Company shall endeavour to provide an (disabled) employee with work he/she is capable of performing. It is recognized that an employee must be prepared to attempt rehabilitative employment. In the event the employee refuses reasonable rehabilitative or regular employment, he/she shall be terminated and forfeit all rights to LTD benefits.

During rehabilitative employment, remuneration will be prorated based on the hours worked and the hourly rate of the current base rate of the rehabilitative position. Employees will continue to receive approved LTD/Sick Leave benefits, however, the benefit level will be adjusted so that the total of the rehabilitative earnings and these benefits shall not exceed the current base rate of the position occupied prior to disablement.

After the employee has successfully completed his/her rehabilitative employment and has been placed in a regular job on a continuing capacity, he/she will be paid at the normal rate of the job in which he/she has been placed, subject to any applicable retrogression policy.

12.4 Workplace Safety and Insurance Board Payments

The Workplace Safety and Insurance Board (WSIB) is responsible for administering the Workplace Safety and Insurance Act, and payments will be made according to the provisions set out within that Act. Any future legislative or regulatory changes may necessitate further discussion on the part of both parties.

Pending the decision of the WSIB regarding entitlement to awards, an employee's normal earnings will be maintained at his/her current level of sick leave (i.e. 100%, 75%, 0%).

12.5 Supplementary Grant

12.5.1 Definition of Supplementary Grant

The supplementary grant is an amount equal to the difference between the WSIB award and the employee's normal earnings after income tax deductions.

NOTE

WSIB award for this section excludes permanent impairment awards granted for accident dates prior to January 1st, 1990, Non-Economic Loss Awards or Older Worker Supplements.

The employee's earnings for the purpose of calculating the supplementary grant will include only regular scheduled hours for a normal week.

The supplementary grant will be such an amount as to maintain the employee's normal net pay.
NOTE

Such a grant will not include payments for shift bonus, relief pay, overtime or premium hours or other payments which are not applicable when the employee is absent from and not available for work.

12.5. 2 Who Receives the Supplementary Grant

The supplementary grant will be made only to probationary and regular employees.

Employees who are receiving Workplace Safety and Insurance Board benefits for claims or injuries suffered while in the employ of an employer other than the Company are required to notify the Company of being in receipt of those benefits in order to qualify for the supplementary grant. These employees will not be eligible for sick leave while receiving Workplace Safety and Insurance Board benefits that qualify for the supplementary grant.

12.5. 3 Responsibility for Payment

The responsibility for payment will be in accordance with The Standard Authorities - Payroll Documents.

12.5. 4 Withholding the Grant

The award of the supplementary grant should not be withheld unless there is strong evidence of gross negligence or obvious misconduct on the part of the injured employee. The supplementary grant will be withheld if the employee is not co-operating in the Early and Safe Return to Work Process or a Labour Market Re-entry Plan or refuses a medically suitable position.

Authority for withholding the grant is vested in directors or construction managers in consultation with Human Resources and Compensation and Benefits.

12.5. 5 Payment While in Receipt of WSIB Award

An employee in receipt of Total Temporary Disability (TTD) benefits will receive the supplementary grant for the entire period. Upon notification of the amount of the FEL award and/or LOE award the Company agrees to pay supplementary grant monthly on the FEL award and/or Loss of Earning (LOE) award for a maximum of 24 months. Any workers’ compensation payments in excess of the FEL award and/or LOE award, excluding the Non-Economic Loss (NEL) award, shall be considered part of the FEL award and/or LOE award for purposes of calculating the supplementary grant. Upon request, the employee shall be paid out any outstanding vacation entitlement while payments are being processed.

For employees on rehabilitative employment the total compensation of FEL and/or WSIB Award plus rehabilitative earnings plus the Company supplementary grant shall not exceed 100% of the current rate of the pre-disability job.

If after 24 months in receipt of supplementary grant and a FEL award and/or LOE award the employee is still unable to return to work, he/she shall be placed on sick leave. The employee will continue to draw from his/her sick leave bank on a daily basis at the rate of half a day if the amount equal to the supplementary grant is equal to, or less than 4 hours, and a full day if the amount equal to the supplementary grant is greater than 4
hours per day. While on approved sick leave, however, the benefit level will be adjusted so that the total of any WSIB award and the sick leave benefit shall not exceed the employee's current base rate. Upon expiry of sick leave, if the employee is still unable to return to work, he/she shall qualify for LTD less any award, pension entitlement and/or any supplement from the Workplace Safety and Insurance Board (excluding NEL award) and/or the Canada Pension Plan.

12.6 Waiver of Posting or Selection

If at any time an individual who is in receipt of LTD or Workplace Safety and Insurance Board benefits is capable of returning to any further service with the Company or if a medically suitable position becomes available for an employee who is medically restricted while at work or on sick leave, the Company will request, and the Union shall normally grant a waiver of posting or selection after considering all medically restricted employees eligible under the Rehabilitation and Re-Employment Policy.

12.0A DISABILITY BENEFITS AND INCOME PROTECTION

These Changes will take effect for new hires on January 1st, 2001

12.1A Sick Leave Plan

The benefits of the Company's Sick Leave Plan shall be considered as part of this Agreement. However, it is recognized that its provisions are not an automatic right of an employee and the administration of this plan and all decisions regarding the appropriateness or degree of its application shall be vested solely in the Company.

The Company's Sick Leave Plan will provide probationary and regular employees with substantial income protection regardless of their seniority. Probationary and Regular Employees will accumulate 8 sick leave credits (a credit equals 8 hours, 7.5 or 7 hours, whichever applies to the employee) per year of service at 100% of the employee's base pay.

When employees have exhausted their sick leave credits, they will be paid at 75% of their base rate for a period of up to 6 months.

Employees who are on continuous sick leave for 6 months and who qualify will be placed on Long Term Disability (LTD).

In the event of denial of the LTD benefits the employee will have their wages maintained at 75% of base wages until completion of an LTD appeal process.

All major medical absence forms will be completed for any absence of four (4) continuous days/shifts or more or when requested by management. The Company will compensate the employee for the cost associated with completing these forms up to a maximum of $30.00. Additionally, the company will compensate the employee for the full cost of all medical notes, medical forms or medical information required to support LTD or other Wellness programs. This provision applies to Doctor's notes requested by Line Management as part of the administration of the sick leave plan.

Employees will be required to submit all forms required by management through their personal physician.
Sick Leave benefits are conditional upon receipt of these forms, and it is the responsibility of the employee to ensure that the employer receives these forms within a reasonable period of time.

Any discipline related to sick leave that is imposed and grieved by the union will be referred directly to Martin Teplitsky for resolution.

Regular part-time employees shall receive a pro-rated number of sick leave credits. When a regular part-time employee is absent due to illness on a scheduled day of work, they shall be paid for the hours of work scheduled for that day provided sick leave credits are available.

Normally employees will be expected to arrange routine medical or dental appointments during non-working hours. Where such appointments cannot be arranged during non-working hours and the employee can be released from his/her duties, then the time shall be charged against an employee's sick leave time except in the case of medical appointments of less than half a day where normal earnings will be maintained.

Employees who are on sick leave for 30 days or more may be eligible to participate in a vocational rehabilitation program in accordance with the Company’s policy.

12.2A Long Term Disability

12.2.1A General Provisions of LTD Plan

The Long Term Disability (LTD) Plan provides financial security and rehabilitative employment features to regular employees during their absence from work due to extended sickness or injury. LTD benefits commence upon completion of the qualifying period, which is defined below. Regular employees who are approved for the provisions of the LTD Plan will be subject to the following contractual provisions.

All employees who are in receipt of LTD benefits will be eligible to participate in the Rehabilitation and Re-employment Programme dependent upon their medical suitability and procedural requirements.

DEFINITIONS:

LTD Qualifying Period - The qualifying period is defined as the period six calendar months from the starting date of the employee's continuous absence due to disability; or a total of six months in accumulative authorized medical absences in the year prior to the date sick leave expires due to the same progressively deteriorating disability.

Disability Period - The period in which an employee cannot continuously perform the essential duties of any position available in accordance with the priority placement criteria of the Rehabilitation and Re-Employment Procedure.

Benefit Level - The Company agrees to assume the full cost of an LTD Plan for all regular employees. The Plan would provide for a monthly income during the disability period equal to the lesser of:

1. Sixty-five percent (65%) of base earnings at the end of the qualifying period for LTD benefits, or
2. Seventy-five percent (75%) of base earnings at the end of the qualifying period for LTD benefits less any compensation awards from the Workplace Safety and Insurance Board (WSIB)
(excluding the Non-Economic Loss award) and/or the Canada Pension Plan, excluding benefits for dependents.

NOTE

Regular part-time employees shall be eligible for pro-rated income benefits.

Miscellaneous Provisions - A person who runs out of sick leave credits will be placed on 75% of their base pay until the LTD qualifying period elapses. The employee will continue to receive service credit during this period and have coverage maintained in but will not be required to contribute to the Company’s Pension Plan, Health and Dental benefits, and the Company’s Group Life Insurance Plan.

Where an employee has been retrogressed to a lower-rated job for medical reasons and within two years (not including the LTD qualifying period) begins receiving a monthly income under the LTD Plan for reasons directly related to the original medical condition, the base earnings used to compute the LTD monthly income payment shall be the current rate of the employee’s original classification.

Exceptions and Limitations to the LTD Plan

LTD benefits will not be made available for claims resulting from:

1. A disability for which the person is not under continuing medical supervision and treatment considered satisfactory by the Insurance Carrier and the Company.

2. A disability caused by intentional self-inflicted injuries or illness while sane.

3. A disability from bodily injury resulting directly or indirectly from insurrection, war, service in the armed forces of any country, or participation in a riot.

4. Normal pregnancy leading to confinement.

5. Disability from occupational injuries for which the employee is receiving Total Temporary Disability Benefits or during the first 24 months of a Future Economic Loss Award or during the first 24 months from the date of Loss of Earning (LOE) Award from the Workplace Safety and Insurance Board.

No amount of LTD benefit will be payable with respect to the disability of an employee during any of the following periods:

1. If the disability is due to mental disorder, any period while the employee is not under the continuing care of a certified psychiatrist or other care authorized by the employee’s psychiatrist.

2. If the disability is due to substance abuse, alcoholism and/or drug addiction any period in which the employee is not certified as being actively supervised by and receiving continuing treatment from a rehabilitation centre or a provincially designated institution.
3. The period during which the employee is on leave of absence, including Pregnancy Leave of Absence. The LTD qualify period begins on the date the employee is expected to return to work from that leave of absence.

12.2.2A Benefits While on LTD

1. Service Credit: Service credit shall not continue while the employee is in receipt of LTD benefits. Upon return to work, service credit shall be applied as per Item 12.2.4A.

2. Vacation Credit: Any outstanding vacation entitlement for a person going on LTD will be paid in cash upon expiry of sick leave. The cash payment will be calculated on the base earnings at the expiration of sick leave for the prorated days of vacation entitlement, any outstanding lieu days, any outstanding floating statutory holidays, and banked time for 40-hour per week employees. No vacation entitlement, floating holidays, or banked time for 40-hour per week employees accrues while a member is in receipt of LTD benefits.

3. Vacation Credit During Rehabilitation Employment: Vacation credits will be earned based on the hours worked and the employee’s vacation entitlement multiplied by the corresponding percentage listed below. These credits will be paid in cash in the last pay period of the year if not used by December 31st, or upon return to regular employment, or upon termination.

<table>
<thead>
<tr>
<th>Vacation Entitlement (Based on Service Credit)</th>
<th>Percentage of Accumulated Earnings/Hours Worked</th>
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</thead>
<tbody>
<tr>
<td>10 working days or less annually</td>
<td>4%</td>
</tr>
<tr>
<td>15 working days annually</td>
<td>6%</td>
</tr>
<tr>
<td>20 working days annually</td>
<td>8%</td>
</tr>
<tr>
<td>25 working days annually</td>
<td>10%</td>
</tr>
<tr>
<td>30 working days annually</td>
<td>12%</td>
</tr>
</tbody>
</table>

4. The Company health and dental coverage premiums continue to be maintained by the Company.

5. The Company Pension Plan: The employee’s membership in the plan continues. An employee is not required to make contributions to the plan while he/she is receiving LTD benefits. The retirement pension continues to accumulate. Years of service continue to accumulate for entitlement to rights and benefits under the Pension Plan.

6. The Company Group Life Insurance Plan: Commencing the first day of the month following the end of the qualifying period for LTD benefits, an employee will continue receiving the same insurance option during receipt of LTD benefits as that in force prior to such receipt. An employee who is in receipt of LTD benefits is not required to make contributions to the Group Life Insurance plan.

7. Sick Leave Entitlement: Upon receipt of the memorandum from the Chief Physician recommending that the employee should make application for LTD benefits, entitlement to accumulate or restore sick leave credits shall cease on the day following the next accumulation date provided that it falls within the qualifying period.
8. **Union Dues:** Upon expiry of sick leave an employee's Union dues shall cease.

9. **Employee status will continue with respect to maintaining redress rights to contractual provisions.**

### 12.2.3A Recurring Disability After Return to Regular Work

If, on return to regular employment after receiving disability benefits, a subsequent period of disability recurs within six months and is related to the cause of the previous disability, the following shall apply:

Entitlement to existing sick leave credits shall cease, the qualifying period shall be waived, and the employee shall immediately receive LTD benefits as if there had been no return to work.

### 12.2.4A Individual Returns to Regular Employment

1. **Service Credit:** Service Credit continues to accrue while on LTD.

2. **Vacation Credit:** The employee will start earning vacation credit based on total service credit.

3. **The Company Health and Dental Coverage:** Premiums continue to be maintained by the Company.

4. **The Company Pension Plan:** Employee contributions recommence.

5. **The Company Group Life Insurance Plan:** Employee contributions recommence.

6. **Sick Leave Entitlement:** Eight sick leave credits shall be immediately credited.

7. **Union Dues:** Union dues recommence.

### 12.2.5A Termination of LTD Benefits

The LTD benefit ceases when any of the following events occur:

1. The date the individual ceases to be totally disabled or engages in any occupation for wage or profit except as permitted by the Rehabilitative Employment Clause.

2. The date the individual reaches age 65.

3. The date the individual fails unreasonably to furnish proof of the continuance of such total disability, or fails to submit to an examination requested by the Plan's medical advisors. At that point all LTD benefits will cease and the employee will be terminated.

When an employee does not comply with the above requirements the Union will be informed and act as the employee's advocate prior to such termination.

4. The date the individual dies.

5. The date the individual receives pension under the Company Pension Plan.
12.2.6A Indexation

1. LTD Benefits: Individuals who are in receipt of LTD benefits will have their LTD benefit level indexed by the same amount that pensions are indexed.

2. Pension Calculation - Base Earnings: For the purposes of calculating the pension benefit for LTD recipients the base earnings at the end of the qualifying period will be increased by the amount of the indexation increase granted in 1. above.

3. Insurance Benefit - Base Earnings: It is agreed that for purposes of calculating the group life insurance benefit for LTD recipients, the base earnings at the end of the qualifying period will be increased by the amount of the indexation increase granted in 1. above.

12.3A Rehabilitation and Re-employment

Rehabilitative employment is an important feature of the Plan, which provides an employee with additional financial incentive and assistance to re-enter the work force. It is defined as any employment within the Company and remains in effect until the employee is offered regular employment.

If during the disability period, an employee becomes capable of working, the Company shall endeavour to provide an (disabled) employee with work he/she is capable of performing. It is recognized that an employee must be prepared to attempt rehabilitative employment. In the event the employee refuses reasonable rehabilitative or regular employment, he/she shall be terminated and forfeit all rights to LTD benefits.

During rehabilitative employment, remuneration will be prorated based on the hours worked and the hourly rate of the current base rate of the rehabilitative position. Employees will continue to receive approved LTD/Sick Leave benefits, however, the benefit level will be adjusted so that the total of the rehabilitative earnings and these benefits shall not exceed the current base rate of the position occupied prior to disablement.

After the employee has successfully completed his/her rehabilitative employment and has been placed in a regular job on a continuing capacity, he/she will be paid at the normal rate of the job in which he/she has been placed, subject to any applicable retrogression policy.

12.4A Workplace Safety and Insurance Board Payments

The Workplace Safety and Insurance Board (WSIB) is responsible for administering the Workplace Safety and Insurance Act, and payments will be made according to the provisions set out within that Act. Any future legislative or regulatory changes may necessitate further discussion on the part of both parties.

Pending the decision of the WSIB regarding entitlement to awards, an employee's normal earnings will be maintained at his/her current level of sick leave (i.e. 100%, 75%, 0%).
12.5A Supplementary Grant

12.5. 1A Definition of Supplementary Grant

The supplementary grant is an amount equal to the difference between the WSIB award and the employee's normal earnings after income tax deductions.

NOTE

WSIB award for this section excludes permanent impairment awards granted for accident dates prior to January 1st, 1990, Non-Economic Loss Awards or Older Worker Supplements.

The employee's earnings for the purpose of calculating the supplementary grant will include only regular scheduled hours for a normal week.

The supplementary grant will be such an amount as to maintain the employee's normal net pay.

NOTE

Such a grant will not include payments for shift bonus, relief pay, overtime or premium hours or other payments which are not applicable when the employee is absent from and not available for work.

12.5. 2A Who Receives the Supplementary Grant

The supplementary grant will be made only to probationary and regular employees.

Employees who are receiving Workplace Safety and Insurance Board benefits for claims or injuries suffered while in the employ of an employer other than the Company are required to notify the Company of being in receipt of those benefits in order to qualify for the supplementary grant. These employees will not be eligible for sick leave while receiving Workplace Safety and Insurance Board benefits that qualify for the supplementary grant.

12.5. 3A Responsibility for Payment

The responsibility for payment will be in accordance with The Standard Authorities - Payroll Documents.

12.5. 4A Withholding the Grant

The award of the supplementary grant should not be withheld unless there is strong evidence of gross negligence or obvious misconduct on the part of the injured employee. The supplementary grant will be withheld if the employee is not co-operating in the Early and Safe Return to Work Process or a Labour Market Re-entry Plan or refuses a medically suitable position.

Authority for withholding the grant is vested in directors or construction managers in consultation with Human Resources and Compensation and Benefits.
12.5A Payment While in Receipt of WSIB Award

An employee in receipt of Total Temporary Disability (TTD) benefits will receive the supplementary grant for the entire period. Upon notification of the amount of the FEL award and/or LOE award the Company agrees to pay supplementary grant monthly on the FEL award and/or Loss of Earning (LOE) award for a maximum of 24 months. Any workers’ compensation payments in excess of the FEL award and/or LOE award, excluding the Non-Economic Loss (NEL) award, shall be considered part of the FEL award and/or LOE award for purposes of calculating the supplementary grant. Upon request, the employee shall be paid out any outstanding vacation entitlement while payments are being processed.

For employees on rehabilitative employment the total compensation of FEL and/or WSIB Award plus rehabilitative earnings plus the Company supplementary grant shall not exceed 100% of the current rate of the pre-disability job.

If after 24 months in receipt of supplementary grant and a FEL award and/or LOE award the employee is still unable to return to work, he/she shall be placed on sick leave. The employee will continue to draw from his/her sick leave bank on a daily basis at the rate of half a day if the amount equal to the supplementary grant is equal to, or less than 4 hours, and a full day if the amount equal to the supplementary grant is greater than 4 hours per day. While on approved sick leave, however, the benefit level will be adjusted so that the total of any WSIB award and the sick leave benefit shall not exceed the employee’s current base rate. Upon expiry of sick leave, if the employee is still unable to return to work, he/she shall qualify for LTD less any award, pension entitlement and/or any supplement from the Workplace Safety and Insurance Board (excluding NEL award) and/or the Canada Pension Plan.

12.6A Waiver of Posting or Selection

If at any time an individual who is in receipt of LTD or Workplace Safety and Insurance Board benefits is capable of returning to any further service with the Company or if a medically suitable position becomes available for an employee who is medically restricted while at work or on sick leave, the Company will request, and the Union shall normally grant a waiver of posting or selection after considering all medically restricted employees eligible under the Rehabilitation and Re-Employment Policy.

13.0 HEALTH INSURANCE PLANS

13.1 Regular Employees, Pensioners and Regular Employees Receiving Workplace Safety and Insurance Board Payments

Subject to the condition that employees enroll their spouse and dependent children, the Company agrees to pay 100 percent (100%) of the premiums for:

Exception: Regular part-time employees shall be eligible for Health Insurance Plan coverage. Such employees will be required to pay costs of premiums (except OHIP) based on hours not worked divided by the regular hours of the classification. If he/she elects not to pay, coverage will not be provided.

1. OHIP - Covers medical and standard ward hospital services.
2. Supplementary Plan - Covers semi-private hospital services.

3. Ontario Power Generation Extended Health Benefit Plan - Coverage details are contained in the current brochure entitled "Power Workers' Union Employees, Pensioners and Dependents Health and Dental Benefits Understanding Your Plan."

4. Ontario Power Generation Group Dental Insurance Plan - Coverage details are contained in the current brochure entitled "Power Workers' Union Employees, Pensioners and Dependents Health and Dental Benefits Understanding Your Plan."

An employee may voluntarily discontinue coverage in plans 2., 3. and 4. Upon re-entry, and depending upon the terms of each plan, a waiting period must be satisfied before services will be covered. This would not apply to changes relating to marital/dependents status.

Effective January 1st of each year of the Collective Agreement, dentist fees will be paid up to the amounts shown in the current ODA Fee Guide.

13.2 Probationary Employees

The Company will pay 100 percent (100%) of all claims and fees for all probationary and regular employees who are covered by the Semi-Private Hospital Accommodation Plan, and Power Workers' Union Employees, Pensioners and Dependents Health and Dental Benefits Understanding Your Plan. Coverage will commence on the employee's Established Commencement Date and will cease on the employee's termination date.

The Company will pay 100 percent (100%) of OHIP premiums commencing the second month of employment.

14. PENSION AND INSURANCE

14.1 Pension Plan

As soon as is practicable following ratification, the parties agree to form a joint team to discuss the advantages of introducing a defined contribution pension plan as an option for employees who wish to be members of such a plan.

Effective April 1st, 2002, the rules of the pension plan will be amended to allow employees to retire/start any day of the month.

Effective April 1st, 2002, the pension plan will be amended to provide for the reduction of the CPP integration adjustment factor from .625% to .500%. At the same time the plan will be amended to provide for employees' contribution to increase by .5% when the assets fall below 106% of the liabilities based upon a solvency valuation.

Effective April 1, 2015, employee pension contributions will increase by 1.0% below YMPE / 1.0% above YMPE.

Effective April 1, 2016, employee pension contributions will increase by 1.0% below YMPE / 1.0% above YMPE.
Effective April 1, 2017, employee pension contributions will increase by 0.5% below YMPE/1.0% above YMPE.

Effective March 31, 2025 for future service benefit accruals for current and new hires:

i. Adjust the number of years for final average earnings to 5 years from 3 years;
ii. Early retirement rule of 85 (from rule of 82).

14.1.1 The OPGI Pension Plan forms part of this Collective Agreement and is generally described in the current brochure "Your Pension Plan".

Changes to the plan affecting employees within the jurisdiction of the Union shall be subject to the following:
1. Changes other than legislative changes shall be made only upon mutual consent.
2. Ontario Power Generation shall not request legislation or Order-in-Council approval for proposed regulations or make rules which would change employee benefits unless upon mutual consent. Moreover, Ontario Power Generation will not unilaterally seek legislation to change access to surplus unless upon mutual consent.
3. In the event of the enactment of any general* pension legislation applicable to the employees of Ontario Power Generation, amongst others, Ontario Power Generation may, after notification to the Union, effect amendment of the Plan provided that the combination of benefits resulting from the Plan as so amended and such legislation will not be less in the aggregate than the benefits now provided.

*As opposed to legislation initiated by the Company as in Item 14.1.1(2.).

14.1.2 Pension items will be submitted at the time that regular amendments to the Collective Agreement are submitted and will be negotiated at the time of regular bargaining.

14.1.3 The interest rate on contributions returned to terminated employees will be calculated as set out in the OPGI Pension Plan.

14.1.4 Integration with Other Benefits: Pension disability to be discontinued upon implementation of LTD Plan. Those presently on pension disability to continue under the existing provisions.

14.1.5 In recognition of proposed benefit improvements the Union agrees that the value of any EI rebate shall accrue to Ontario Power Generation.

14.1.6 Early Retirement - Without Discount

1. Rule of 82

Effective July 1st, 2000, any member who on the date of retirement is represented by the Power Workers Union may, on or after the first day of the month in which the sum of the member's age in years and years of continuous employment is equal to or greater than eighty two, receive a pension
that is 100 percent of the member's earned pension computed in accordance with the rules of the pension plan, in particular, rule 15.

2. Employees who do not qualify for an unreduced early retirement pension under 14.1.7(1) or 14.1.7 (2) may retire without discount after completing 35 years of continuous service.

### Early Retirement Discounts

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Table 2</th>
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<tbody>
<tr>
<td>All employees with 25 or more years’ continuous service</td>
<td>All employees with 15 or more but less than 25 years’ continuous service</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td><strong>Percent Discount</strong></td>
</tr>
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**NOTE**

The above factors apply to employees who do not otherwise qualify for undiscounted early retirement pension.

**14.1.7 Early Retirement - With Discount**

1. The early retirement discount factors shown in Table 1 are for employees with 25 or more years’ continuous service who do not qualify for undiscounted early retirement pension.

2. All employees who terminate and vest their pension will be entitled to the same early retirement discount as set out under 1. above provided they had completed 25 years’ continuous service by the date of their termination.

3. The early retirement discount factors shown in Table 2 apply to all employees who have 15 or more but less than 25 years’ continuous service.
14.1.8 Transfer of Pension Credits Between Reciprocal Employers and Ontario Power Generation

Providing the reciprocal employers agree, the pension credits may be transferred to and from the reciprocal employer and Ontario Power Generation if the affected employees have fully vested their pension credits with the former employer and were hired by Ontario Power Generation/reciprocal employer within three months of the termination date. This provision allows retroactive application.

14.1.9 Indexing

Pension benefits for Pension Plan members who immediately prior to termination of employment were members of the Power Workers’ Union, will be increased on January 1st of each year by 100 percent of the increase in the Consumer Price Index, up to a maximum of 8 percent per year. In the event that the increase in the CPI exceeds 8 percent, the increase shall be carried forward to future years. In the event that the CPI decreases, the percentage decrease shall be applied in determining subsequent increases in pension benefits. A decrease in the CPI shall not reduce pension benefits in payment.

14.1.10 Survivor Benefits

Effective July 1st, 2000, pensions of survivors of retirees who were members of the PWU on the day that he/she retired, shall be based on 66 2/3 percent of the member’s pension.

14.1.11 Continued Contributions

Effective July 1st, 2000, employees may elect to continue to contribute to the pension plan beyond 35 years of service.

14.2 Group Life Insurance

The OPGI Insurance Plan forms part of the Collective Agreement and is generally described in the current brochure “Your Group Life Insurance.”

Insurance items will be submitted at the time that regular amendments to the Collective Agreement are submitted and will be negotiated at the time of regular bargaining.

14.2.1 Employees will have the option to purchase more units of life insurance (4x or 5x base pay) at no cost to the Employer. Medical information will be required to determine eligibility.

14.2.2 At the time permanent wage adjustments to base annual earnings (as defined in the insurance plan) are implemented, adjustments will also be made in insurance coverage as follows:

1. If the change is effective on or between the first calendar and the first fiscal day of the month, eligibility is established for the given month.
2. If the change is effective on any other day of the month, eligibility is established for the next month.

14.2.3 Life insurance coverage of $20,000.00 will be provided for employees who are required to work or travel in helicopters or aircraft. This coverage shall be in addition to the Group Life Insurance Plan.
14.2.4 Spousal Life Insurance

Effective July 1st, 1994, eligibility under the Spousal Life Insurance Program in place as of April 1st, 1994 will be extended to PWU represented employees.

15.0 RETIREMENT

15.1 Bonus and Outstanding Vacation Payments on Retirement

1. An employee, who has completed 10 years of continuous employment, shall be given, on retirement, a cash bonus equal to one month’s pay. (In the case of a regular part-time employee, the one month’s pay will be pro-rated as per Part A, Item 1.2.2.)

2. The employee on retirement shall also be given a cash payment for any outstanding vacation credits. The cash payment will be on the same basis as outlined in Part A, Item 6.6 - Vacation Payment on Termination.

3. If required by the Company to postpone his/her vacation for the year immediately prior to retirement, he/she shall receive a cash payment for that period. No payment shall be made for unused vacation for any other years.

15.2 Retirement While Ill

An employee who falls ill and is not able to return to work prior to the approved normal or early retirement date, shall, subject to approval by the Chief Physician, continue to be carried on the payroll as follows:

15.2.1 Sick Leave Grant Extends to or Beyond Retirement Date

If the sick leave grant carries the employee to or beyond the approved retirement date, the employee shall be retired upon being declared fit to return to work, or upon expiration of the sick leave grant, whichever comes first. The employee shall be given a cash payment in lieu of any outstanding vacation entitlement up to normal retirement date [see Subsection 15.1(2.) preceding], plus a bonus of one month’s pay [if applicable, see Subsection 15.1(1.)].

15.2.2 Vacation Credit and Bonus Extends to or Beyond Retirement Date

If the sick leave grant expires prior to the approved retirement date, but part or all of the outstanding vacation credit (Part A, Item 6.6 - Vacation Payment on Termination) and bonus of one month’s pay [if applicable, see Subsection 15.1(1.) preceding] carries to or beyond the approved retirement date, the employee shall be given a cash payment in lieu of any unused portion of:

1. The vacation credit accumulated up to the expiry of the sick leave; and/or
2. The month’s bonus.
15.2.3 Sick Leave Grant, Vacation Credit and Bonus Expires Before Retirement Date

If the sick leave grant together with any outstanding vacation credit and month's bonus [where applicable, see the preceding Subsection 15.1(1.)] does not carry to the approved date, the case shall be referred to the Director of Health and Safety for a determination of the employee's eligibility for LTD.

15.2.4 Unused Vacation Credit for Preceding Year

An employee on sick leave grant which extends over the beginning of a calendar year may be allowed credit for any unused vacation for the preceding year, subject to the approval of the director, or official of equivalent or higher status with the concurrence of the Director of Health and Safety.

16.0 TEMPORARY EMPLOYEES

16.1 Definitions

See Section 1.0 for the definition of temporary employee and accumulated service.

16.2 Benefits

The following are the benefit provisions that apply to temporary employees.

16.2.1 Vacations

Entitled to a cash vacation allowance of four percent (4%) of accumulated wages.

16.2.2 Statutory Holidays

Temporary employees will be entitled to statutory holiday pay as identified in the Collective Agreement consistent with the Employment Standards Act.

Payment for such statutory holidays will be the amount the employee would normally earn on a scheduled day of work.

16.2.3 Floating Holidays

Temporary employees who have accumulated 20 weeks' service in a calendar year will be entitled to three floating holidays subject to the following:

1. Floating holidays may be taken on such days as the employee and his/her supervisor mutually agree upon, following reasonable advance notice on the part of the employee.

2. Floating holidays shall not be carried over into the following year unless work considerations prevent the employee from taking the floater(s) in the year of entitlement.
3. Where the employee is unable to reach mutual agreement with his/her supervisor to take his/her floating holiday(s) before year-end because of absence due to illness, unused floating holidays will be assigned on the last working day(s) of the year.

4. Where an employee falls sick on his/her scheduled floating holiday, that day will not be charged against his/her sick leave credits, but shall be treated as a floating holiday for pay purposes.

5. Entitlement on Termination: If the employee terminates after having accumulated 20 weeks' service in the calendar year, the Company will make a cash payment in lieu of any unused floating holiday credit.

   If the employee terminates prior to accumulating 20 weeks' service in the calendar year, entitlement will be as follows:

   (a) If the employee has not qualified for entitlement in the previous year, he/she will have no entitlement in the current year. If he/she was granted a floating holiday under 4. above, the Company will recover one day's pay for each floating holiday taken.

   (b) If the employee has qualified for entitlement in the previous year, his/her entitlement will be prorated based on the number of weeks' accumulated service in the year of termination. For example, an employee who terminates after accumulating five weeks' service in the year would be entitled to 5/20ths of three days.

   The Company will either make a cash payment in lieu of any unused floating holiday credit or recover the value of the unearned portion of floating holidays taken under 4. above.

   In no case will an employee be entitled to more than three floating holidays or floating holiday credit in a calendar year.

6. Temporary part-time employees shall receive pro-rated payment. (Ref. Part A, Item 1.4.2)

16.2.4 Sick Leave Entitlement

Temporary employees shall earn sick leave credit of one-half day at 100 percent (100%) pay for each month of accumulated service.

16.2.5 Health Insurance Plan (Excluding Students Regardless of Wage Schedule Paid From)

These employees shall be considered as a group in order that they may apply to participate in the Supplementary Plan and the Extended Health Benefit Plan at group rates. One hundred percent (100%) of all premiums will be paid by the employees.

The Company will pay one hundred percent (100%) of the Ontario Health Insurance Plan premium for temporary employees who have four months' accumulated service.
16.3 Notice of Termination

When the employment of a temporary employee is terminated for other than cause, he/she is entitled to one week’s notice in writing if his/her period of employment is three months or more.

17.0 POSTING OF VACANCIES AND TRANSFER UPON APPOINTMENT

17.1 Post and Transfer - General

All regular full-time and regular part-time positions within or one level above the Union’s jurisdiction will be advertised province-wide when they become vacant. Selection to be made or the vacancy cancelled within four months after the posting date of the advertisement. Transfers of successful applicants to be made or rate for the new position paid in accordance with the Promotion Rule as identified in Article 8.9, 60 days from the date of selection for the position.

Management will provide the Union Office with an electronic copy of the vacancy and an electronic list of all applicants for the job postings within two (2) weeks after the closing date for applications.

17.2 Notification to Applicants

1. If the decision has been made within five weeks of the closing date of the advertisement, then at that time, the supervisor with the vacancy or his/her personnel manager will be responsible for:

   Advising all applicants who have been interviewed of the decision in writing.

   Supplying Human Resources with the list of successful applicants for publication. The published list will be considered appropriate notification for those applicants who were not interviewed.

2. If the decision has not been made within five weeks of the closing date of the advertisement, then at that time, the supervisor with the vacancy or his/her personnel manager will be responsible for:

   Ensuring that all applicants who do not possess the necessary qualifications are notified that their applications have been considered and they were not successful.

   Ensuring that all remaining applicants are informed of the delay, the status of their application and when a decision is likely to be made.

3. When a final decision has been made, the supervisor or his/her Human Resources Manager will ensure that:

   The unsuccessful applicants not yet informed are notified of the final decision as soon as possible. The name of the successful applicant should be given as well as being provided to the PWU office.

   The successful applicant and his/her supervisor is notified.

   Notify Human Resources of the name of the successful applicant for publication.
17.3 Similar Vacancies

When a similar vacancy occurs beyond four months following the posting date of the advertisement, it must be reposted and considered separately.

17.4.1 Instructors and Training Technicians (Nuclear)

Advertised vacancies for instructors and training technicians may be filled on a temporary basis. The time period shall not exceed 18 months after which the incumbent will revert to his/her regular classification and location. The position(s) will be advertised each time with the provision that an employee will not be selected for two consecutive terms. The employee will be compensated at the appropriate Training Technician rate. While he/she is retained in the Training Technician position, progression in his/her original classification will not be delayed because of such a temporary assignment. The number of positions in a department filled on a temporary basis will not exceed 50% of the positions filled on a regular basis. Exceptions to this clause may be jointly agreed to between the Sector Vice-President or delegate and Management.

17.4.2 Instructors (Non-Nuclear)

Advertised vacancies for instructors may be filled on a temporary basis. The time period shall not exceed 18 months after which the incumbent will revert to his/her regular classification and location. The position(s) will be advertised each time with the provision that an employee will not be selected for two consecutive terms. The employee will be compensated as per Article 8 for the position while he/she is retained in it and his/her progression in his/her original classification will not be delayed because of such a temporary assignment. The number of positions in a department filled on a temporary basis will not exceed 50% of the positions filled on a regular basis. Exceptions to this clause may be jointly agreed to between the Sector Vice-President or delegate and Management.

17.5 Internal Temporary Rotational Opportunity

Internal temporary rotational opportunities required for greater than twelve months will be posted at the location. Selection criteria will be per Article 10 Selection Rules.

18.0 HEADQUARTERS

18.1 General

Two classes of headquarters are established by the Company: work headquarters and residence headquarters.

18.2 Definitions

Work Headquarters - Regular: That location to which the employee normally reports in order to receive his/her daily work assignment or to perform his/her regular duties.

Work Headquarters - Temporary: The centre from which an employee is directed to work when carrying out all or part of his/her duties away from his/her regular work headquarters.
Residence Headquarters: The residence headquarters is that location within which or adjacent to which he/she is expected to reside or is assumed by the Company to reside for purposes of payment of allowances.

NOTE

The residence headquarters may or may not be the same location as the work headquarters.

Householder: Householder is defined as a person who maintains a complete dwelling.

18.3 Establishment of Headquarters

18.3.1 Work Headquarters

The Company may, at its discretion, establish work headquarters in any location for effective administration.

Notice Period - Overnight Absence at Temporary Work Headquarters: In the event an employee is assigned to temporary work headquarters and overnight absence is required, seven (7) days' notice will be given. For unplanned water management operations in Hydro Electric, three (3) days' notice will be given. Notice will not be required where emergent conditions exist.

NOTE

For Non-Nuclear such notice will be personal notice as defined in the Collective Agreement.

Penalty: Failure to provide notice as above will require payment of premium\(^2\) rates for work performed from the temporary work headquarters until the notice period has expired.

18.3.2 Residence Headquarters

The establishment of residence headquarters will be dependent upon the presence of adequate living facilities at that location.

Residence headquarters for employees with no spouse or dependents may be any location where there are boarding facilities either Company or privately owned.

Residence headquarters for employees with a spouse and/or dependents may be any location where there is housing accommodation whether it be Company or privately owned.

NOTE

Such accommodation must be one at which it is reasonable for the employee to reside.

Establishment of New Residence Headquarters: When a residence headquarters is established in a location which was not previously so designated, the human resources manager shall advise Labour Relations who, in turn, shall advise the Union.

\(^2\) Two times base rate
NOTE

The Union need not be advised on individual moves from one established residence headquarters to another.

18.4 Change of Headquarters Upon Transfer

18.4.1 Advice of Headquarters

An employee shall be advised, when employed or transferred, of the location of his/her residence and work headquarters.

18.4.2 Notice of Transfer

When employees with more than one month's service are transferred and a change of residence headquarters is involved, a minimum of one month's written notice shall be given. This shall not apply in the case of an employee being transferred as a result of an advertised vacancy or as a result of the Worksite/Location Redeployment clause of Article 11.0.

18.4.3 Duration of Stay in New Residence Headquarters

Householder: A change in residence headquarters will not be made for a householder unless it would appear that he/she will be located at the new residence headquarters for a period of at least six months.

Living in Trailers: For those employees living in household trailers, moves for lesser periods than six months may be authorized at the discretion of the division or region concerned, bearing in mind the distance and economics involved.

19.0 TRAVELLING TIME OUTSIDE NORMAL WORKING HOURS

When a supervisor directs an employee to travel between one work centre and another work centre, they shall be entitled in any calendar day to payment for travel time that is incremental to the time it takes for their normal commute to their regular work headquarters at the appropriate premium rate in accordance with conditions governing overtime up to a maximum of the number of hours which constitute a normal work day subject to the following:

1. Overtime will be paid when employees are required to drive a Company vehicle outside normal working hours unless being used exclusively for their own personal transportation.

2. When travelling by public transportation, travelling time shall be considered to include waiting periods beyond the employee's control up to a maximum of five hours; both preceding, during and subsequent to the travelling period, but excluding meal periods (one hour each) occurring during the waiting period.

3. When a berth or overnight accommodation is allowed and available, compensation shall not be made between 2300 hours and 0800 hours, nor shall the time spent for noon and evening meals (one hour each) be subject to compensation.
4. Travel time outside of normal working hours associated with attendance at training courses of five
days or more or attendance at conventions (where it is part of the employee’s normal function) will
be compensated at straight time up to a maximum of a normal day’s basic pay for each day
involved.

5. Normally, selection interviews are conducted during employees’ normal working hours.
Where it is unavoidable and interviews are scheduled outside an employee’s normal
working hours, payment will be made, at straight time, for each hour spent in interviewing
or travelling up to a maximum of a normal day’s basic pay for each day involved.

6. No compensation for travelling time outside the normal working hours shall be made in the
following circumstances:

(a) When a change of residence headquarters and related transfer is involved, the employee
will normally travel during normal working hours without any loss of base pay. If the
employee is required to travel on a regular day off, payment for travelling time will be
made at straight time up to a maximum of the number of hours, which constitute a normal
work day.

(b) On periodic return to residence headquarters resulting from a permanent transfer, as
outlined in Item 24.0.

(c) For a new employee reporting to some administrative centre or station for instruction or
training before reporting for work at his/her new location.

7. Where the Company normally provides transportation facilities between residence headquarters
and work headquarters for normal daily hours an employee required to work extension overtime
will be provided free transportation to the residence headquarters.

NOTE

Equivalent time off without pay may be granted on the basis of an hour off for each hour
spent travelling provided the workload permits.

20.0 Compensation for Travelling Expense

Employees required to work at a temporary work headquarters will be paid a travel expense equivalent to the
return road kilometres between the temporary work headquarters and the regular work headquarters subject to
the conditions below:

1. Employees who travel 5 kilometres or less in one day between a temporary work headquarters and
the regular work headquarters do not qualify for benefits under this provision.

2. The company will provide a rental vehicle/company vehicle when it is in the company’s interest to
do so. The company will not pay for a rental vehicle unless the employee has obtained prior
approval.
3. No travel expense payments shall be made to a passenger in a vehicle.

4. No travel expense payments shall be made to an employees travelling in a Company paid rental vehicle or company vehicle.

5. When it is reasonable to do so the employee may remain at the temporary work headquarters rather than commuting daily.

6. It is the responsibility of the employee to report to the temporary work headquarters at their normal starting time and remain until their normal quitting time, unless directed otherwise.

In addition to the travel expense those employees at the temporary work headquarters shall be paid:

For time spent travelling that is incremental to the time it takes for their normal commute to their regular work headquarters on the first trip when the work headquarters is changed and the last trip when he/she returns to his/her regular headquarters;

Entitled once every two weeks to payment for actual time spent travelling that is incremental to the time it takes for their normal commute to their regular work headquarters at straight time up to a maximum of three hours each way between temporary headquarters and regular work headquarters.

21.0 TRANSPORTATION TO OUTLYING STATIONS (Nuclear ONLY)

Transportation to outlying stations shall be in accordance with Mid-Term Agreement PW-8.

Employees at the Bruce Site who avail themselves of the bus service shall be charged a standard fare of $1.00 each way and $2.00 per round trip.

The kilometre rates applicable under Mid-Term Agreement PW-8 shall be two-thirds of the current Company kilometre rate.

22.0 KILOMETRE RATES

Kilometre rates paid to employees using their automobiles on Company business shall be as follows:

1. The rate paid per kilometre is related to changes in the Private Transportation Index component of the Consumer Price Index of Canada.

2. The rate of .52 cents per kilometre will take effect on April 1st, 2015.

3. Future increases of one cent per kilometre will occur with each additional ten percent (10%) point increase from the base figure of 31.5 (1992 CPI = 100) in accordance with the formula described in a letter of agreement between Ontario Hydro and the Union dated May 25th, 1983.

4. Conversion factor is 1 mile = 1.6 km.
5. A decline in the index below the level of a previously surpassed trigger point for two or more consecutive months will result in a reduction in the paid rate to the appropriate amount.

6. The effective date for any new kilometre rate triggered by this indexing formula will be the first of the month following the month in which the index is published.

7. The additional payment for hauling household trailers will be nine cents per kilometre. The payment for hauling smaller trailers (camper, ski-doo, boat, etc.) will be three cents per kilometre.

8. The above rates will apply on a province-wide basis.

As a condition of employment, the Company does not require anyone to own a car. When transportation is required, the employee may, with the Company’s approval elect to use his/her own car at the approved kilometre rate but if he/she does not elect to use his/her own car or if he/she does not own a car, the Company will, if necessary, provide alternative transportation appropriate to the occasion. However, ownership of an appropriate driver’s license may be a condition of employment in some situations.

23.0 TRANSPORTATION AND MOVING EXPENSES

23.1 General

Method of Transportation: The method of transportation and all expenses chargeable to the Company in moves of employees are subject to the control and approval of the Company.

Packing and Shipping Furniture: In view of the Company’s willingness to pay for packing furniture, as well as transportation, employees usually will not be allowed time or travelling expenses to return from point of work in order to look after packing and shipping of furniture, subject to Subsection 23.5, Time Off For Move.

23.2 Notice of Transfer

Refer to Item 18.4.2.

23.3 Transfer of Temporary Employees

The Company will only pay necessary travelling expenses of temporary employees when they are moved from one location to another at the Company’s request.

NOTE

The transportation of families and/or furniture of such employees will not be paid.

23.4 Appointment of New Probationary Employees

A new employee hired for a regular position in a location other than the point of hire will not ordinarily be recompensed for moving expenses.
NOTE

In exceptional cases, as part of the employment agreement, a director may pay all or part of the moving expenses of the employee and household to the location where the employee will be employed.

This rule applies to a new operator-in-training or a new apprentice who is being assigned to the first location.

NOTE

Costs of transporting the family of an operator-in-training or of an apprentice to a new location during the training period will be paid, but costs of moving the household effects of an operator-in-training or of an apprentice who is a householder will only be paid when they have attained two years' service or on the final move to a regular position.

23.5 Transfer of Regular Employees

The following instructions will apply to all regular employees subject to the following limitations: An operator-in-training, or an apprentice will be eligible when progressing satisfactorily with the training course, after the attainment of two years' service. In the case of regular part-time positions, expenses for employees will be prorated based on the hours of the position into which they are moving except for moves governed by Article 11.21 in which case Part A, Item 23.0 applies in whole.

Householders: When the work headquarters of a regular employee who is a householder is changed he/she will be entitled to the moving expenses outlined below if;

(1) His/her current residence is not within a reasonable commute* of the new work headquarters; and

(2) His/her new residence is within a reasonable commute* of the new work headquarters.

*reasonable commutes are reviewed independent of one another

NOTE

A householder is defined as a person who maintains a complete dwelling.

1. Transporting the employee and family.

2. The packing, freight or truck charges on household effects, among which will be included boats and second automobiles which are part of the personal effects of the employee.

NOTE

Items of this kind which are used for business farming or commercial purposes, as well as large boats such as houseboats which would require special transportation would not be included in moving expenses paid by the Company.

together with,
3. The cost of board and lodging for the employee's family while furniture is in transit.

Board and Lodging: The Company will also pay the expenses or board and lodging allowance for the employee as applicable under Part A, Item 25.0.

Part E Employees: Moving expenses will only be paid when there is a minimum of six months' work available at an established work headquarters or on a special project for these employees who are householders.

NOTE

For regular employees living in household trailers, moves for lesser periods of time than six months may be authorized by the department head or construction manager concerned. In this connection the distances and economics must be carefully considered.

Incidental Out-of-Pocket Moving Expenses: Employees may claim a $5,500 allowance for miscellaneous out-of-pocket expenses required by the move. The requirement for supporting receipts and taxability of the allowance will be governed by Accounting Service Procedures.

Lease Termination: The Company will pay up to the maximum of two months rent towards the actual cost in terminating a lease.

Time off for Move: If regular employees who are householders are required to move their household to new residence headquarters on a regular scheduled day of work, they shall be granted one day off with pay to assist in the move.

NOTE

Extension of this time off with pay will be at the discretion of the director concerned.

Non-householders: When the residence headquarters of a regular employee who is a non-householder is changed, the cost of transporting the employee will be paid. A director, at his/her discretion, may authorize actual moving expenses to a maximum of $1000.00 or a lump sum payment of $1000.00 towards the cost of moving personal effects, including furniture. No reimbursement will be made for incidental out-of-pocket expenses.

NOTE

This section does not apply to operators-in-training nor to indentured apprentices with less than two years' service.

Kilometre: All employees described under the Householders and Non-householders sections may be allowed the regular kilometre rate for driving the employee's car to the new location provided that such cost is not more than it would otherwise cost for transportation of the employee's family and for freight on shipment of the automobile.
NOTE

When the Company considers a preliminary trip to the new location is necessary for interview or for the employee to seek a house, the time, board and lodging and travelling expenses of the employee may be paid.

Legal and Real Estate Brokerage Fees: In addition to the provisions of the Householders and Kilometre sections, with the exception of employees and circumstances listed in Exceptions subsection below, regular employees who are householders, required by the Company to move their principal residence, shall be entitled to the following:

1. The Company will reimburse the employee up to $18,000.00 for standard brokerage fees related to the sale of the old principal residence and legal fees and disbursements actually incurred in selling the old residence and/or buying the new principal residence, (legal fees will be in accordance with a standard recognized scale and could include such items as land transfer tax, survey and legal fees associated with arranging or discharging a first mortgage and mortgage appraisal fees).

2. To qualify for payment of expenses involved in purchasing a new residence, the employee must give written notice at the time of his/her transfer that he/she intends to buy a residence.

3. If an employee sells a mobile home [i.e., a trailer designed and used exclusively as a residence which exceeds 2.6 metres (8.5 feet) in width or 10.67 metres (35 feet) in length], he/she is considered to have sold his/her residence.

Exceptions: Any transaction, which is not commenced within one year of the date of the employee's transfer. Extension of this time period shall be at the discretion of a director.

Moves resulting from a demotion for cause.

23.6 Housing Assistance Plan

Eligibility for the Housing Assistance Plan is conditional on the employee abiding by all the requirements of the Housing Assistance Plan as listed below:

23.6.1 Application

23.6.1.1 The housing assistance plan applies to regular employees eligible under Item 23.5 who are subject to a forced transfer or who have received a written declaration that they are surplus.

23.6.1.2 The provisions of this policy are only applicable to the principal residence of the employee, but do not cover other commercial (income producing) properties, cottages which are not the principal residence, farms, commercial real estate holdings, tenanted properties (e.g. duplex or triplex), mobile homes on leased land, or residences with urea formaldehyde foam insulation (UFFI) or properties as defined in Item 23.6.1.3.

23.6.1.3 It will be the prerogative of the Company to reject an employee's application for Housing Assistance if the property is not an acceptable risk, with free and clear title.
23.6.2 Purchase Guarantee

23.6.2.1 The Company will provide a purchase guarantee based on an appraisal of the property's current worth by a group of up to three appraisers, to be selected by mutual agreement between Corporate Real Estate and the employee. The appraisals will be done at a time that is convenient to the employee and his/her family. Individual appraisals provided to the Company by the realtors/appraisers will not be disclosed to ensure objectivity for current and future appraisals.

23.6.2.2 The Company will not request appraisals until the employee is ready to list his or her house in the marketplace, providing this is within one year of the employee's transfer to the new work location, and the employee is prepared to abide by Subsection 23.6.2.4 and Subsection 23.6.3.1.

23.6.2.3 The employee must accept or reject the Company’s Purchase Guarantee within ten working days of its receipt. If the employee rejects the Purchase Guarantee, the Company has no further responsibility with regard to Housing Assistance or the Purchase Guarantee, however, the employee will still be entitled to the other relocation assistance benefits including 23.6.5.3.

23.6.2.4 If the employee wishes to participate in the Housing Assistance Plan, the employee must not list the property for sale until the Purchase Guarantee has been accepted.

23.6.3 Listing of Property

23.6.3.1 If an employee chooses to participate in the Housing Assistance Plan, by accepting the Purchase Guarantee, the employee will immediately list the property for 90 days on MLS (where such service is available) at a price not exceeding 107% of the guaranteed price.

23.6.3.2 Under the Housing Assistance Plan, the Company purchases an employee's principal residence in the former location at market value, if the employee is unable to sell it within 90 days. The house may be purchased by or turned over to the Company after 30 days if the house is vacant and the employee agrees with this action. The employee must put in writing that no real estate fees will be paid if the property is purchased by the Company.

23.6.3.3 The employee will retain the right to sell to a third party until such time as the property is purchased by or turned over to the Company for resale.

23.6.3.4 In order to assist the employee to dispose of the property expeditiously and at a fair market value, the employee must notify the Employee Relocation Administrator of all offers to purchase during the listing period. The Company may ask the employee to accept an offer, which is lower than the Purchase Guarantee, whereupon the employee will be compensated for the difference between the Company's Purchase Guarantee and the amount of the offer. The employee's acceptance of any offer less than the Company's Purchase Guarantee is not mandatory and the employee will retain control of the sale of the residence throughout the listing period. All offers to purchase will be held in confidence by the Employee Relocation Administrator.
23.6.4 Sale of Property by the Company

23.6.4.1 The employee must be prepared to sign power of attorney authorizing the Company to sell property on the employee’s behalf on the first day following the 90 day listing period. If the employee will be unable to vacate the premises at that time, the Employee Relocation Administrator must be notified.

23.6.4.2 The Company will pay to the employee the difference between the value of the property to the Company (Purchase Guarantee) and all existing encumbrances, including the advance of equity when the house is turned over to the Company or at the end of the 90 day listing period, whichever comes first.

23.6.4.3 When an employee applies for assistance under this procedure, he or she must declare under oath, if required by the Company, all encumbrances of any nature or kind whatsoever, including executions, chattel mortgages, and notices of conditional sales contracts which the employee is obliged to pay.

23.6.4.4 In consideration of the payment to the employee of the amount established in Subsection 23.6.4.2, the employee will complete a deed of sale of the property, conveying the same by good and marketable title, but subject to all existing encumbrances, to the Company or its nominee.

23.6.5 Advance of Equity

23.6.5.1 In order to provide the employee with funds for a deposit or down payment on a residence at the new location, an advance of up to 100% of the employee’s equity (Purchase Guarantee minus encumbrances) in the employee’s principal residence at the former location may be loaned to the employee by the Company.

23.6.5.2 If the employee accepts the Company purchase guarantee and sells his/her principal residence during the 90 day listing period, he/she is responsible for repaying the Advance of Equity to the Company within five working days of the closing date of the sale of the former residence. Failure to do so will activate the appropriate interest charges to the employee based on the Bank of Canada’s weekly 5-year mortgage rate (employee housing loan five-year term) in effect on the closing date of sale. It is the employee’s responsibility to repay the Advance of Equity to the Company within five days of the sale of the former residence, or within 90 days from the date of issue of the Advance, whichever comes first.

23.6.5.3 An employee who rejects the Company’s Purchase Guarantee, may take advantage of the Advance of Equity option. If the former principal residence is not sold within 90 days of the date of issue, the employee must pay interest to the Company at his/her own expense commencing on the 91st day. The interest rate will be based on the Bank of Canada’s weekly 5-year mortgage rate (employee housing loan five-year term) upon the expiration of the 90-day period. It is the employee’s responsibility to repay the Advance of Equity to the Company when the former residence is sold, or within 180 days (six months) from date of issue of the Advance, whichever comes first.
23.6.6 House Evaluation and Guarantee Plan

Upon subsequent transfer within the Company, an employee will be guaranteed his/her purchase price up to a maximum of four times his/her base salary at the time of the transfer (plus or minus $3,000 for improvements or damages to the property). This guarantee will be for a period of ten years from the date of purchase. Improvements must be verified by receipts and do not include normal painting, decorating and maintenance costs. An employee may not sell his/her house for less than the guaranteed amount without the consent of the Company.

If an employee contracts to have a house built in the new location, the Employee Relocation Administrator, Corporate Real Estate, must arrange for an appraisal of the new principal residence upon completion to establish the "guarantee amount".

If an employee who is eligible for the House Evaluation and Guarantee Plan rejects, or does not qualify for, the Company’s Housing Assistance Plan, the following stipulation will apply. The employee must not sell to a third party for a price less than the employee’s original purchase price, unless the sale price is approved by the Employee Relocation Administrator, Corporate Real Estate.

The price level guaranteed by the House Evaluation and Guarantee Plan will be modified downwards in the event of a significant reduction in the level of real estate prices throughout Ontario.

23.7 Transfer of Regular Employees - Staff Reduction and Recall Procedure - PWU Agreement - Article 11

No moving expenses will be paid for an employee being recalled to a vacancy.

Recall shall include employees who are reclassified from a lower classification to their original classification as well as employees who have terminated employment and are recalled.

23.8 Allocation of Moving Expenses

When an employee is moved from one location to another, the expenses involved shall be charged to the location to which the employee is moved except in the case of a move of a retiring employee occupying a Company-owned house. In this instance the expenses shall be charged to the residence headquarters at the time of retirement.

23.9 Change of Residence Headquarters

On a change of residence headquarters the employee shall be entitled to actual expenses for a period of up to one month. He/she shall be entitled to an allowance of $75.00 each day he/she is eligible thereafter.

23.10 Terminations and Retirements Following Relocation

The Company is not required to provide moving expenses to an employee who is entitled to moving expenses as per Part A, Item 23 unless the employee signs an agreement with the Company providing:

(a) that the employee agrees that in the event he/she voluntarily terminates from OPG less than three years from the date of relocation they will be obligated to repay a prorated portion of the
relocation benefits discounted at a rate 50% in year one and 25% in each year two and in year three.

NOTE: The above provision does not apply to employees who are moved as a result of a forced transfer or in the case of an employee who has a dramatic and serious change in circumstances.

24.0 RETURN TO RESIDENCE HEADQUARTERS

24.1 General

It is often necessary for Company employees including those on transfer to work at temporary work headquarters, which are at points distant from their residence headquarters.

Having due regard to the nature, importance, and length of the job and when practicable, the Company shall, within reasonable limits, reimburse the employee for expenses incurred in returning to his/her residence headquarters once each week. If an employee chooses to remain at the temporary work headquarters, the Company will pay the lesser of the cost of meals and accommodation or the cost of the return trip to his/her regular work headquarters.

24.2 Return to Residence Headquarters on Permanent Transfer

An employee permanently transferred to a new residence headquarters will be reimbursed for expenses incurred in returning to his/her old residence headquarters once each week until he/she moves his/her family to the new location. The maximum period of entitlement will be four months from the date of transfer to the new residence headquarters unless extension is authorized by the appropriate director.

Entitlement shall cease when the employee moves his/her family to the new location.

All travel time associated with the return to residence headquarters will be outside the employee’s scheduled hours of work.

The employee will not be entitled to claim payment for travel time.

24.3 Return to Residence Headquarters When Transferred to a Temporary Work Headquarters

Entitlement will be for the duration of the transfer (subject to postponement as per 24.5.2 below).

All travel time associated with return to regular headquarters will be outside the employee’s scheduled hours of work. The employee will be entitled to payment for incremental time spent travelling at straight time to a maximum of eight hours each way.

24.4 Assignments to Training Courses

Employees assigned to temporary work headquarters for training courses of five days or more will be compensated for expenses incurred in returning to his/her residence headquarters once each week.
Payment for incremental travelling time each way will be at straight time rates up to a maximum of a normal day's basic pay.

24.5 Qualifications to Above Policy

The return trips mentioned in Item 24.1, will be granted subject to the following conditions:

24.5.1 Scheduling of Trips

Return trips to residence headquarters shall be made at times when service or apparatus will not be jeopardized thereby except in case of emergency such as illness in the family or other matters highly important to an employee.

The Company will schedule the trip to meet the needs of the majority concerned or by mutual agreement where the work of some employees is dependent on the assistance or presence of other employees.

24.5.2 Postponement of Return to Residence Headquarters

If, at the end of a week, when a return to residence headquarters would normally take place, it appears that the job will be completed on or before Wednesday of the following week, the return trip may be postponed until the job has been completed. If work is not planned on the weekend, the employee will have the option of remaining at the temporary headquarters or claiming the equivalent cost of staying at the temporary work headquarters and make his/her own arrangements.

24.5.3 Use of Company Vehicles

The round trip to residence headquarters must be made within the scheduled non-working period. It must be made in a Company vehicle whenever the services of a suitable vehicle are available.

When a suitable Company vehicle is available, employees who do not avail themselves of these facilities will not be reimbursed for transportation expenses. Those who remain at the temporary work headquarters will be treated as if they were at residence headquarters.

When transportation by Company vehicle is not provided, the equivalent of public transportation costs or the standard kilometre allowance, whichever is lesser, will be authorized by his/her supervisor for an employee who chooses to use his/her own car instead of public transportation for himself/herself alone or for carrying other employees as passengers.

24.5.4 Isolated Locations

In special cases when a temporary work headquarters is remote from public transportation, employees will be allowed to accumulate or "bank" overtime at straight time rates to a maximum of 40 hours in order to have extra time away from the job. Such permission shall only be granted when the majority of the affected employees agree.

NOTE
Each special case is subject to agreement between the PWU Executive Committee and Labour Relations.

24.6 Alternative to Return to Residence Headquarters

The Company will consider paying travelling costs up to a maximum of the costs to residence headquarters when an employee wishes to go to some other location for personal reasons such as to join his/her family who are vacationing.

25.0 BOARD AND LODGING

25.1 General

The payment or nonpayment of board and lodging (or living-out allowance in lieu thereof) shall be predicated on separation or non-separation from the employee's Residence Headquarters as defined in Part 'A' Item 18.0.

NOTE

No free board and lodging shall be given to employees while they are located in their residence headquarters except where camp facilities are provided.

When Applicable: Board and lodging allowance is only applicable when the employee is absent from residence headquarters for more than one month.

For periods of time up to one month, the employee is entitled to submit an expense report for actual expense incurred.

25.2 Rate of Allowance

The board and lodging allowance shall be $75.00 per day.

Statutory Holidays and Vacation: Board and lodging will be allowed for statutory holidays.

During annual vacation period, lodging expenses only will be allowed, whenever it is necessary for the employee to retain this lodging for use after vacation, and approval has been obtained from the department head.

NOTE

If, under certain circumstances and local conditions, the standard rate is considered inadequate, and it would result in undue hardship to the employee, a higher weekly limit, commensurate with existing conditions, may be set with the approval of the vice-president or the general manager concerned. In this case, the request must be supported by vouchers.
The standard rates for board and lodging in Company boarding houses shall be $4.60 per day. The rates for OITs, apprentices, junior clerks and summer students earning the equivalent of salary range 54 or lower shall be $23.00 per week.

25.3 Absence from Residence Headquarters

The Company shall assume, within reasonable limits, the cost associated with meals, travel and lodging while an employee is assigned to a temporary headquarters. Where possible, single room accommodation will be provided.

Board and lodging shall be supplied without charge if the employee is living in Company-operated quarters.

When employees are required to work away from their normal headquarters for three consecutive days or more in a week, they shall be entitled to claim $30.00 in compensation for laundry and long distance telephone calls home. The provisions of this item shall also apply to employees who are in receipt of actual expenses or board and lodging allowance due to change in residence headquarters in accordance with Section 25.4.

25.4 Change of Headquarters

25.4.1 Regular Employees - Householders

A regular employee shall be paid expenses up to a maximum period of four months as follows:

Actual expenses for up to one month from the date of actual transfer to the new location, and thereafter for a maximum of three months, the standard board and lodging allowance until the time the household is occupied in the new location.

NOTE

Such an employee must be a householder and entitled to the payment of expenses as outlined in Part A, Item 23.0.

Extension of Allowance: Payment of any allowance beyond the period of four months must be authorized by the appropriate director.

Eligible Employees: Payment of this allowance will be made only to an employee who indicates an intention to move to the new location.

If the employee fails to move within the time limit, any cash allowance paid in lieu of board allowance shall be recovered by the Company unless the reasons for not moving were beyond the control of the employee and/or the employee actually did board in the new location during this period.

25.4.2 Non-householders

On transfer to Company-operated quarters, an employee who is a non-householder shall pay for board and lodging immediately on transfer.
If not living in Company-operated quarters, an employee who is a non-householder shall be permitted actual expenses to a maximum of up to one month, after which no allowance will be made.

25.4.3 Apprentices

If transferred to a new headquarters upon completion of the training course, the apprentice shall receive allowances as provided for a non-householder in Item 25.4.2.

25.4.4 Attendance at Company-Operated Training Courses

Board and lodging shall be provided or board and lodging allowance shall be paid to all employees when attending a Company-operated training course.

26.0 JOINT COMMITTEES

26.1 Joint Pension and Insurance Committee

Note:

Nomenclature and participation on this Committee are subject to change pending the implementation of amendments to the Ontario Power Generation Pension Plan. The parties agree to revise this item as necessary for the next printing of the Collective Agreement.

1. Scope: To monitor the administration and the financial status of the OPGI Pension and Insurance Plans covering all plan members and to recommend changes as set out below:

2. Personnel: The "Joint Pension and Insurance Committee" shall meet at least twice a year or as requested by either party and shall consist of the following members:

   - three PWU members
   - three Ontario Power Generation management members

   Each party will have the right to have a reasonable number of resource personnel attend the meeting.
   The chair will rotate between Ontario Power Generation and PWU, one meeting each.

   - every effort will be made to reach unanimous decisions. In the event that a unanimous decision cannot be reached, decisions will be by a vote of a majority of members representing both PWU and Ontario Power Generation.

3. Function: In an advisory capacity with access to the necessary information: (This is limited in that it does not apply in respect of information as to the service, salary, pension benefits or other personal information related to any specific person without that person's prior consent.)
Pensions

(a) Monitor Ontario Power Generation’s administration of the Pension Plan in accordance with the Pension Benefits Act, associated regulations and rules, and other applicable legislation.

(b) Make recommendations respecting the administration of the Pension Plan.

(c) Promote awareness and understanding of the Pension Plan on the part of Plan members.

(d) Review the Ontario Power Generation’s approved annual financial statements and investment performance.

(e) Review the Ontario Power Generation’s approved Actuarial Valuations of the Pension Plan and discuss the need for assumption changes.

(f) Identify potential benefit changes and discuss cost and other implications. Committee recommendations for benefit level changes will be subject to ratification of the respective parent bodies.

(g) The Committee will have the role of making recommendations generally with respect to the notational account.

Life Insurance

(a) Review the financial position, premiums and taxable benefits of the OPG Life Insurance Plan.

(b) Identify potential benefit changes and discuss cost and other implications. Committee recommendations for benefit level changes will be subject to ratification of the respective parent bodies.

26.2 Joint Health and Safety Consultation

The parties will consult regularly on corporate level employee health and safety matters. The following two joint committees will be established to facilitate this consultation.

26.2.1 Joint Policy Committee on Health and Safety

1. Goal

To participate in the formation of health and safety strategy and policy by providing information and opinion from the Union to the Company’s executive on employee health and safety.

2. Personnel

(a) Company Health and Safety Advisory Committee.
(b) Union Executive Committee and chairperson of Union Provincial Health and Safety Committee and Union staff advisor.

(c) The chair will rotate between the chair of the Company Health and Safety Advisory Committee and the Union Provincial Health and Safety Committee.

3. Function

(a) Identify problems and issues of Company significance which have not been resolved in the Joint Health and Safety Working Committee.

(b) Review proposed initiatives and advise the corporate executive.

(c) Evaluate existing policy and advise the corporate executive on recommended changes. This function applies particularly to safety rules and work protection code.

(d) Develop Joint Policies on Health and Safety

i) Authority to Stop Work.

(e) The committee will meet once a year or as mutually agreed.

26.2.2 Joint Health and Safety Working Committee

1. Goal

(a) To provide recommendations to assist Corporate Safety and Wellness in the development, implementation and evaluation of OPG employee health and safety policy and programs.

2. Personnel

(a) Membership will consist of:

- Two Management representatives
- Two PWU representatives

(b) Additional Management and PWU resources as required.

3. Function

(a) Participate in the identification and resolution of problems and issues of Company significance in employee health and safety policy and practice.

(b) Participate in the development, promotion and implementation of Company health and safety programs.
(c) Study, develop and make recommendations for changes to the Corporate Safety Rules and Work Protection Code. This function can be delegated to an ad hoc group with mutual agreement.

(d) Recommend and establish additional working committees and task groups as required to fulfill the purpose of this committee.

(e) The committee will normally attempt to resolve issues of mutual interest before seeking intervention by senior management or the Joint Policy Committee on Health and Safety.

26.2.3 Joint Committee on Radiation Protection

A joint committee shall be established on the following basis:

1. Name: Joint Committee on Radiation Protection.

2. Goal: To provide a forum for communications between Management and employee representatives on radiation protection topics, and to develop recommendations to senior management for improvements in the radiation protection program. The resulting program is expected to lead to a level of performance that compares favourably with the best in our business.

3. Structure:

   a) Chair: The chair shall rotate on a yearly basis between Management and a PWU Executive Representative.

   b) Members:

      • Six Management representatives
      • Six PWU representatives
      • Two Society representatives

   c) Secretary: Shall rotate on a yearly basis between the Management representatives and the PWU support staff. Management or the PWU shall not hold both secretary and chair positions at the same time.

4. Functions: Provide, with respect to employee and public health and safety, group recommendations on improvements to the radiation safety program to the Chief Nuclear Officer by:

   • reviewing performance, evaluating against targets and external standards, and recommending broad goals and performance objectives
   • evaluating performance, identifying problem areas and seek commitment for change as appropriate
   • promoting good radiation protection practices
- defining overall program direction
- defining appropriate changes to the Radiation Protection Regulations, supporting procedures, and associated programs

26.2.3.5

Frequency of meetings and quorum: the Joint Committee on Radiation Protection will meet quarterly. A quorum will be not less than 50% of the members from each of the parties. In the event that a quorum is not achieved, that quarterly meeting will be cancelled.

26.2.4 Joint Employment Equity/Diversity Committee

1. Goal: To provide a joint forum for work on OPG Corporate Employment Equity, Human Rights and Diversity policies and/or associated corporate issues.

2. Personnel: (a) The committee will be structured to provide broad representation from the Company and the PWU. Up to six positions will be made available to be shared equally between the PWU and the Company (b) The PWU and the Company will be allowed staff advisors as required.

3. Function: To meet and exchange information regularly to ensure that the committee is informed of progress on initiatives undertaken by the Corporation and the Union. Each party will identify and bring forward emerging corporate issues for discussions. Both parties will attempt to agree on recommendation(s) acceptable to all parties and for delivery to the Senior Vice President, OPG Human Resources and/or to the PWU Executive where appropriate. Where agreement cannot be reached, each party will communicate expeditiously their positions to the above appropriate party.

4. Management is responsible for time and expenses, except for union staff time associated with this committee.


26.2.5 Joint Employee and Family Assistance Committee

A joint committee will be established on the following basis:

1. Name: Joint Employee and Family Assistance Working Committee

2. Goal: Provide recommendations to assist the Company and the Union in the development, implementation and evaluation of employee and family assistance policy and programs.

3. Personnel

   (A) Chair: The chair shall rotate on a yearly basis between the Company and a PWU representative.

   (B) Members:
. Representative from the Company
. Two (2) PWU representatives and one staff advisor.
. Two (2) Society representatives

(C) Secretary: The secretary shall be supplied by the Company.

4. Function:

4.1 Participate in the identification of problems and issues of significance in employee and family assistance policy and practices.

4.2 Participate in the development, promotion and implementation of employee and family assistance programs throughout the province.

4.3 On an ongoing basis study, develop and make recommendations for change to the Company employee and family assistance program. This function can be delegated to a sub-committee by mutual agreement.

4.4 The committee will normally attempt to resolve issues of mutual interest before seeking intervention by the Senior Joint Union/Management Committee.

27.0 DISTRIBUTION OF PWU NEGOTIATED POLICIES AND PRACTICES

The Company will supply the Union with PWU Negotiated Policies and Practices in quantities to distribute to its stewards and with revisions as may be issued.

28.0 DISTRIBUTION OF AGREEMENT AND WAGE SCHEDULES

The parties will make all reasonable efforts to resolve any outstanding issues within 3 months after ratification. The agreement will be distributed within 6 months from date of ratification. This Agreement shall be printed as soon as practicable after the date of signing and made available by the Company to the Union in sufficient quantities for distribution to its membership.

29.0 TIME CHARGES - UNION ACTIVITIES

29.1 Time Charges and Expenses - Union Representatives

Time off and expenses for Union officers will be granted in accordance with Negotiated Policies and Practices Number 3.

29.2 Time Charges for Employees On Union Business

When the time of employees on Union business is payable by the Union, such time shall be charged at normal rates of pay. The normal payroll burden without the administration charge of ten percent (10%) will be applicable only for Union releases in excess of five consecutive days.
30.0 Banked Time

The following Banked Time in Lieu Of Overtime agreement shall apply to all PWU represented employees as follows:

An employee who has accumulated overtime hours shall receive this in earnings, calculated at the appropriate premium rate and cannot be required to take time off in lieu of payment. However, the employee may instead elect to accrue lieu time credit calculated at the appropriate premium rate in place of payment.

If no request is made prior to the overtime being worked, payment at the appropriate overtime rates will be automatic and paid, Part A, Item 10.2 will continue to apply.

The accrued lieu time will be taken at a time, which is mutually agreeable to both parties. Banked time can not be taken when overtime is required to cover the shift that the individual is requesting off.

The employee can bank up to 40 hours, and can only renew the 40 hours or a portion thereof after it has been scheduled off or paid out or used to defer vacation time as per Part A, Item 6.7. If the employee chooses to cancel scheduled banked time it will be paid out and cannot be put back in the bank.

Any banked time in lieu of overtime not scheduled off, taken or used to defer vacation time as per Part A, Item 6.7 as of December 1st each year will be paid out as of December 31st of each year.

31.0 EYE PROTECTION

Approved eye protection shall be supplied to individual prescription to all employees who normally wear glasses and are required to wear eye protection for an appreciable amount of time in the performance of their duties.

32.0 PERSONAL TOOLS

The following applies to Nuclear:

T&WE mechanics at Pickering and Darlington

The company will provide T&WE mechanics at Pickering and Darlington the tools necessary to perform their job.

The following applies to Non-Nuclear:

32.1 General

Employees in trade categories and designated clerical/technical categories will provide at their own expense, the ordinary hand tools of the trade. These tools are listed in the appropriate job document and must be of at least industrial quality, which permits employees to perform their work safely, efficiently and to the standard ordinarily demanded in any given trade. (Owing to the marked differences in the nature of work performed by employees who are classified in the same trade category, it is unreasonable to expect a tradesperson to
possess or have on the job, every tool listed for his/her trade. Learners and Improvers must acquire any of the tools listed as and when his/her work demands their use. Employees are encouraged to buy tools which carry a lifetime guarantee.) Tools which are required for equipment of special types, which are peculiar to certain locations as well as tools that fall in the class of shop equipment, will be supplied and maintained by the Company. These, and similar types of tools, have been purposely omitted from the lists.

32.2 Tool Replacement/Upgrading

Each employee, as described in 32.1, will be allowed 8% of the personal tool list retail price calculation per calendar year for tool replacement or upgrading based on his own tool list as defined in the Occupational Definition. A minimum allowance of $50.00 per year for each employee in each classification is available. For those entitled to the minimum allowance of $50.00, the unused portion for one year may be carried forward to the following year to a maximum of $50.00.

To qualify for any reimbursement receipts must be accumulated and submitted for amounts in excess of $50.00. For amounts of less than $50.00 these receipts should be submitted at the end of the year.

32.3 Loss by Fire or Theft

Personal tools which are stolen, are destroyed or damaged by fire to an extent which renders them unusable, will be replaced by the Company. These losses must be incurred in the exercise of Company business and on Company property, except where they occur on or at non-Company locations in the exercise of Company business. Small or inconsequential losses would be recovered through 32.2.

33.0 SPECIAL CLOTHING FOR EMPLOYEES

33.1 General Policy Regarding Work Clothing

Except where provided by the Company in accordance with this Collective Agreement, employees must provide at their own expense suitable clothing for the performance of their regular duties. In general, clothing must be suitable for the safe and efficient performance of the work but need not be uniform in appearance.

So far as is consistent with standard stores' policy, the Company will purchase certain types of work clothing in bulk for resale on the most favourable terms possible to employees requiring them in connection with Company work.

33.2 Special Clothing That May Be Provided at Company Expense

Subject to certain conditions outlined herein, special clothing may be obtained at the expense of the Company for issuance to employees under the following conditions:

33.2.1 Where Uniform Appearance is Required in Nuclear

Where uniform appearance is required by the Company as in the case of certain receptionists, guides, messengers, drivers, and security guards uniforms will be provided.
Where employees are required to wear uniforms they will be provided yearly with a $200 allowance to offset the cost of cleaning.

33.2.2 Where Uniform Appearance is Required for Non-Nuclear Security Guards

Security Guards who are required to wear a uniform will be provided an annual $200 cleaning allowance.

33.2.3 For Work Outside of the Employee’s Regular Routine Duties

A limited number of rainproof coats and hats may be obtained and kept available at construction headquarters, attended stations, etc., for persons who normally work indoors but who are occasionally required to work out of doors under adverse weather conditions, as for example when working during emergencies, operating switches, cleaning racks, etc.

Clothing supplied at stations should be limited to one or two coats and hats, depending upon the number of employees.

33.2.4 For Normal Work Which Must be Performed Occasionally, Under Extreme Conditions

Hip or knee length rubber boots and weatherproof coats and hats may be obtained and issued temporarily to construction workers, maintenance workers, and labourers when required to work in extremely wet locations or under adverse weather conditions.

One or two rainproof coats and hats, depending upon the number of employees involved, may be provided for each line, forestry and maintenance truck or gang for use in emergencies when workers could not be reasonably expected to have protective clothing available at all times.

33.2.5 For Work Involving Exposure to Materials that are Injurious to Health and Particularly Destructive of Clothing

Rubber boots, aprons and gloves of an approved material may be provided for employees when handling acids for batteries, cleaning transformer coils or for other work which is similarly destructive of clothing.

Aprons, gloves and sleeves made of plastic, plastic-coated or other approved material may be provided for employees who are required to handle creosote, creosoted poles or timber as a protection against burns or damage to clothing.

Protective clothing such as coveralls, gloves and rubber boots may be provided for temporary issuance to employees for use when applying herbicides.

Because of the fire hazard in welding and the destructive nature of the work, welders’ aprons, armlets and gauntlets may be provided.
33.2.6  To Promote Safety

Safety headgear, eye protection, rubber gloves (electrical), and similar items which are designed exclusively for the safety of employees and the wearing of which is made obligatory on certain types of work, will be provided by the Company.

Special footwear will be provided for the safety of workers when required to work near forebays, sluices, etc., under icy, slippery or otherwise hazardous conditions.

Safety Footwear:

I  Employees required to wear protective footwear will be reimbursed as follows:

The dollar limits (actual cost) are:

(1) For those persons required to regularly wear climbing spurs or who are regularly required to climb steel structures as part of their normal duties:

   one or two pairs in one calendar year to a combined maximum of $350.

(2) One or two pairs in one calendar year to a combined maximum of $300 will apply to others who choose or are required to wear CSA approved ESR protective footwear.

(3) Others who choose not to wear approved ESR protective footwear, will be reimbursed fifty per cent (50%) of the actual cost, up to a maximum reimbursement of $75.00 per pair.

II  Employees who are not required to wear protective footwear:

Employees who purchase safety footwear will be reimbursed thirty-three and one-third percent (33-1/3%) of the actual cost up to a maximum reimbursement of $20.00 per pair subject to the approval of the appropriate manager or supervisor.

NOTES

Temporary employees will be reimbursed for a maximum of one pair in each six-month period.

A limit of two pairs of safety shoes or boots per person will be subsidized in a calendar year.

These actual cost maximums include applicable taxes.

33.2.7  Special Conditions

Requests for items of clothing not mentioned but which might be reasonably supplied under the conditions set forth herein will be considered, each case on its own merits.

The company will supply maternity clothing where it is reasonably available to the Company and is requested by a pregnant employee.
33.3 Issuance, Care of, and Responsibility for Clothing Provided by the Company

In order that the use obtained from clothing purchased by the Company may justify the expenditure, the following shall be carefully observed:

1. Except in isolated cases, special clothing must not be issued to any one employee for exclusive use but must be kept available for any employee who may require it for Company purposes mentioned herein.

2. When no longer required on the job, clothing must be promptly returned to local headquarters, station or truck where it will be readily available when required.

3. All clothing furnished by the Company will remain the property of the Company and must be clearly and prominently marked for easy identification.

4. Where loss or destruction of Company clothing issued to an employee occurs as a result of carelessness on the part of the employee, the employee will be required to make good such loss.

34.0 PURCHASING PRIVILEGES - SURPLUS EQUIPMENT STORES

Employees shall have purchasing privileges at Surplus Equipment and Material Stores to the same limit as extended to the general public.

35.0 RETURN OF COMPANY PROPERTY

It is agreed that employees whose employment terminates with the Company shall be responsible for the return of any Company property issued to them during the term of their employment. Failure to return such property shall result in the Company deducting its current value from any monies owing to the employees.

36.0 TIME CHANGE - SHIFT WORKERS

When the clocks are changed due to daylight saving time, the following principles will apply:

1. Employees who are scheduled to work during the affected hours will work a shift which is either shortened or extended by one hour.

2. Payment for the shortened or extended shift will not be calculated on the basis of actual hours worked, rather will be based on the number of hours normally worked (eight or twelve).

37.0 REST PERIODS

Each employee shall be entitled to a 10 minute rest period in the first half and second half of each scheduled work day at a time designated by the Company.
38.0 **BI-WEEKLY PAY DAYS**

38.1 Salaries and wages of all employees throughout the Company covered by this Agreement shall be once every two weeks on the third Thursday following completion of the pay period. This payment will be by direct deposit to one account designated by the employee in a Canadian financial institution with a Canadian Payment Association (CPA) serviceability code of 1 or 2. (CPA serviceability code definitions in effect June 5th, 1991 or subsequent code numbers providing equivalent accessibility). The Company is responsible for the cost of depositing these funds to the employee’s account.

38.2 Existing employees who were paid the equivalent of one week’s base pay during the transition from weekly pay to weekly direct deposit pay will have the amount of this one week payment deducted from their final payment of salaries and wages from the Company (i.e., termination, retirement, etc.)

39.0 **ESCALATOR CLAUSE**

This clause is suspended for the duration of the collective agreement.

1. The parties have agreed for the three year term of this Collective Agreement to include an escalator clause applicable in the last year of the contract. This provision will terminate as of March 31st, 2015 and will not be automatically renewed in any subsequent collective agreement. This escalator clause is designed to generate a maximum of one wage increase on April 1st, 2014 and none thereafter.

2. In the third year of the Collective Agreement, namely April 1st, 2014 to March 31st, 2015, the following formula shall apply:

   (a) An increase of more than 2.75% in the Ontario All Items index (2002 = 100) published by Statistics Canada in February, 2014 (published in March, 2014) over the index for February, 2013 (published in March, 2013) will activate the escalator clause.

   (b) On April 1st, 2014, base rates and band rates will be increased by an amount equivalent to the amount by which the increase in the Index exceeds 2.75% in the 12 month period specified in (a) above but in no case shall the amount of such increase exceed 2.75%.

   (c) This wage increase would be implemented effective April 1st, 2014 at the same time as the negotiated 2.75% wage increase referred in Part A, Item 43.0 below. There will be no compounding of these wage increases.

3. In the calculation of fractions, the simple 5/4 method of rounding will be used. That is, .00001 to .00499 rounds to down and .00500 to .00999 rounds up. This rounding methodology is to be used in the calculation of wage rates.

4. The availability of the escalator shall depend upon the continued availability of the Index calculated on its present base and in its present form. If the Index is not available, the parties will meet and agree on an appropriate alternative conversion of the Index.
40.0 Reduced Work Week Entitlement (RWE)

This clause is applicable only to those employees who were forty (40) hour workers on or before October 3rd 2001 and who voted in favour for the restoration of a RWE.

The RWE shall operate in the following manner:

Employees who voted in favour for the restoration of RWE shall continue to work forty (40) hours per week. They will be paid for thirty nine (39) of these hours and the additional worked hour will be banked to a maximum of fifty (52) hours per year.

1. The normal scheduled and paid hours of work will remain at 40 per week.

2. Overtime rates will be paid for all hours in excess of normal scheduled hours.

3. This banked time may be taken on such days as the employee and his/her supervisor mutually agree upon following reasonable advance notice on the part of the employee.

4. Banked time may be taken off in a minimum of half-day (i.e., four-hour) increments.

5. Banked time accumulated in a calendar year must be taken by April 30th of the following year.

6. Where the employee is unable to reach mutual agreement with his/her supervisor to take his/her banked time entitlement (except when exhausting sick leave prior to LTD as noted in Part A, Item 12.2.1), unused banked time entitlement will be assigned on the last working day(s) prior to April 30th.

7. Where an employee falls sick on his/her scheduled banked time off, that day will not be charged against his/her sick leave credits, but shall be treated as banked time off for pay purposes.

8. Banked time will not accumulate for any period of unpaid leave exceeding 40 consecutive scheduled hours. Scheduled days off will not be considered as breaking the consecutive nature of scheduled hours. Banked time will accumulate during a paid leave of absence and Pregnancy / Adoptive / Parental Leave.

9. When an employee terminates or when an employee is reclassified to a job where the normal hours of work are less than 40 hours per week, unused banked time will be paid off at straight time rates.

41.0 TEMPORARY EXTERNAL PROJECT ASSIGNMENTS IN ONTARIO

This provision deals with the rights of PWU members who accept temporary external project assignments involving project work to be performed within Ontario.

1. The PWU maintains the right of representation for members performing work on such projects.
2. The PWU recognizes the need to have the ability to assign volunteer PWU members to such project assignments, away from Company facilities. In order to meet these needs, OPG may require labour contract flexibility.

3. The Sector Vice-President and OPG will jointly develop principles for the establishment of labour terms and conditions for external projects involving work to be performed by PWU workers in Ontario.

4. The proposed labour terms and conditions for Ontario-based work for a particular external project will be submitted by OPG to the PWU Sector Vice-President for review. Where the principles (jointly developed under Item 3) have been satisfied, the Sector Vice-President will provide written agreement to the proposed terms and conditions within 48 hours. Where the principles have not been satisfied, the Sector Vice-President will advise OPG within 48 hours of the issues to be addressed, will negotiate with OPG to resolve these issues, and will reach a final joint decision (agreement or rejection) within an additional 48 hours. The terms and conditions jointly agreed upon for a particular project will change the normal provisions of the Collective Agreement for the term of the particular external project.

5. In the event of applying Article 11, employees who accept temporary OPG assignments will continue to be considered as though they had remained in their home work unit and will be subject to the contractual terms and conditions then in force. Employees will be entitled during the term of their Ontario-based OPG assignments to exercise their redeployment rights unless OPG determines that to do so would seriously jeopardize the international project, in which case the affected employees' rights will be deferred until they return to their home unit.

42.0 Relief

If an employee, relieving in a higher position falls sick, he/she will be paid sick benefits of the rate of the job in which he/she is relieving only up to the first point on the schedule where he/she would have normally returned to his/her basic rate. From this point onward, sick benefits during this illness will be based on his/her basic classification rate.

In recognition that employees are regularly required and scheduled to provide relief in higher positions, they shall receive for their full vacation period the rate of the higher position when such relief has been provided for 50 percent (50%) or more of a vacation year. Employees relieving in a higher position for less than 50 percent (50%) of the vacation year will be paid the rate of their regular classification during the full vacation period.
Part A, Item 43.0  WAGE STRUCTURE

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**Band 3 Apprentices/Trainees/Operator Trainees**

| Band II | Step 0 | Step 3 | Step 5 | | | | | | |
|---------|--------|--------|--------| | | | | | |
| Band III|        |        |        | Step 3 | Step 4 | Step 5 | Step 6 | Step 7 | Step 8 |

**Students:** First year: Band 1 Step 0; Second year and every year thereafter: Band 1, Step 1

44.0  Lump Sum Payments and Share Performance Bonus Plan

**Lump-Sum Payments**

PWU employees contributing to the Pension Plan as of April 1, 2015 will receive the following:

i.  Lump sum payment of 1% of salary as of April 1, 2015 (adjusted if less than 12 months until employee no longer makes pension contributions)

ii. Lump sum payment of 2% of salary as of April 1, 2016 (adjusted if less than 12 months until employee no longer makes pension contributions) provided the individual is still an employee of OPG as of April 1, 2016 and contributing to the Pension Plan
Share Performance Bonus Plan

PWU employees contributing to the Pension Plan as of April 1, 2015 will participate in a Share Performance Plan related to the Hydro One IPO, as follows:

i. Share awards will be made on April 1st of each year starting April 1, 2017 and continuing up to and including April 1, 2031 (i.e., maximum of 15 share awards) provided the individual is still an active employee of OPG as of the award date and has less than 35 years of pensionable service, with the number of shares awarded to each individual each year calculated as 2.75% of Salary as of April 1, 2015/Initial Share Price:

ii. Value of share award at each award date will equal number of shares awarded x Hydro One share price at date of award

iii. Share award will be made in Hydro One shares with the employee having the option to take 50% of award in cash to pay the taxes since the value of the share award is a taxable event. As per current tax rules, the employee may direct the payment of shares into an RRSP, providing the employee has room within their contribution limits.

Example – if an employee has a salary on April 1, 2015 of $88,000, and the initial share price is $20.00, the employee will get a share award of 121 shares (2.75% x $88,000/$20.00) each year. If the share price is $30.00 at the time of the award, the share award value will be 121 shares x $30.00 per share or $3,630.
PART B

HYDROELECTRIC AND FACILITIES
MAINTENANCE TRADES
TABLE OF CONTENTS

PART B

HYDROELECTRIC AND FACILITIES

MAINTENANCE TRADES

1.0 HOURS OF WORK
2.0 DIFFERENTIAL FOR SHIFT WORK, MAINTENANCE TRADES EMPLOYEES
3.0 PAYMENT OF MEALS
4.0 EXTENSION OF LUNCH PERIODS
5.0 OVERTIME, MAINTENANCE TRADES EMPLOYEES
6.0 SPECIAL PROVISIONS CONCERNING OVERTIME
7.0 TRAVELLING TIME TO AND FROM THE JOB
8.0 WATER WORKERS
9.0 APPRENTICES/TRAINEES
10.0 SUPERVISORY RESPONSIBILITIES
11.0 PAYMENT FOR TEMPORARY SUPERVISION
12.0 ADVERSE WEATHER
13.0 CLOTHING
14.0 ACTING IN VACANCIES
15.0 ON-CALL
16.0 HEADQUARTERS
17.0 SHIFT WORK - PRINTING SERVICES DEPARTMENT
18.0 ASSIGNMENT OF OPERATOR AGENTS
PART B

HYDROELECTRIC AND FACILITIES MAINTENANCE TRADES

Specific Matters of Agreement

1.0 HOURS OF WORK

1.1 Facilities Maintenance Trades Employees (Except Hydroelectric & Building Operators at 700 University)

1. The normal work week of all facilities maintenance trades employees of the Company shall be 40 hours per week consisting of five days of eight hours (not before 7:00 am and not later than 6:00 pm) Monday to Friday inclusive.

2. A change to established hours of work within the core hours (7:00 a.m. to 6:00 p.m.) shall be a matter for discussion between the Union (Chief Steward) and the Company. When changes in hours of work are contemplated the preference of 70% of affected staff in the classification(s) will be considered to be the preference of that classification(s). Where the work of classifications is interdependent (e.g., rehabilitation work, electrical, mechanical, civil), the preference of 70% of the employees in the interdependent classifications will be deemed to be the preference.

However, if in the Company's opinion the desired hours of work of the affected classifications cannot be accommodated then the Company will provide the Union (Chief Steward) with written rationale for such a decision.

3. Excepting for shift work, all other work outside of the normally scheduled hours shall be considered overtime and paid for at the appropriate premium rates.

1.2 Shift Work (Facilities Maintenance Trades Employees - Except Hydroelectric & Building Operators at 700 University)

1. The procedures for establishing shift work are as follows:

(a) In order to establish shifts, it shall not be necessary to have a continuity of the same specific operation.

(b) Seventy-two hours' notice shall be given in writing stating the group and the estimated length of the work period involved. A copy of the notice shall be forwarded to the Chief Steward of the Union.

(c) If the work period is for three working days or less, the appropriate premium rate shall be paid.
(d) For periods of longer than three working days for which the 72 hours' notice has been
given, the appropriate shift differential shall be paid.

(e) Work performed on Saturdays, Sundays and statutory holidays shall be at the appropriate
premium rate.

(f) Facilities Maintenance Trades Employees on afternoon shift will be paid straight time for
the one hour of normal working time between 0000 hours (midnight) Friday and 0100
hours Saturday morning.

1.3 **Hours of Work - Hydroelectric**

Maintenance trades employees of Hydroelectric will be assigned by Management to either day work or shift work.

1.3.1 **Day Work - Hydroelectric**

1. The normal work week of all maintenance trades employees of Hydroelectric shall be 40 hours per
week consisting of five days of eight hours (not before 7:00 am and not later than 6:00 pm) Monday
to Friday inclusive.

The normal work week for former T&W-Field Mechanics shall be 40 hours per week consisting of
five(5) days of eight (8) hours (not before 6:00 a.m. and no later than 8:00 p.m.), Monday to
Friday inclusive. The start times for these employees may be adjusted within the window by
Management with seven (7) days' notice to the affected individuals. Such adjusted start times will
be equitably rotated among all employees in the classification at the work site.

2. A change to established hours of work within the core hours (7:00 am to 6:00 pm) shall be a matter
for discussion between the Union Chief Steward and the Company. When changes in hours of work
are contemplated the preference of 70% of affected staff in the classification(s) will be considered to
be the preference of that classification(s). Where the work of classifications is inter-dependent (e.g.,
electrical, mechanical and civil), the preference of 70% of the employees in the inter-dependent
classifications will be deemed to be the preference.

However, if in the Company's opinion the desired hours of work of the affected classifications cannot
be accommodated then the Company will provide the Union Chief Steward with written rationale for
such a decision.

3. Except for shift work, all other work outside of the normally scheduled hours shall be considered
overtime and paid for at the appropriate premium rates.

4. A minimum of seven (7) days personal notice shall be given when the employees hours of work are
changed.

In the case of illness which would result in a staff shortage, four (4) days personal notice will be
given when placing an employee on shift.
5. In emergencies three (3) days personal notice shall be given when the employee's hours of work are to be changed.

6. Failure to provide the required notice period will result in the payment of double time being paid until the required notice period has elapsed.

NOTE

Personal notice means the employee will be contacted personally, face to face or by telephone. The contact must be made with the employee, no messages. Personal notice will be followed up within 72 hours with posted notice which will list the time and date the employee was personally contacted. If the notice is not posted within 72 hours, management will pay 4 hours at straight time to the person who was shift changed.

1.3.2 Shift Work (Including Building Operators at 700 University)

Shift work may be established for Hydroelectric maintenance trades employees under the following conditions:

1. (a) Eight-Hour Shifts

   Shifts: The normal hours of work for non-time balanced eight hour shifts are 40 per week. Shifts may be performed in one, two or three shifts per day, Monday to Sunday inclusive.

   - 1st Shift - 0000 hrs to 0800 hrs
   - 2nd Shift - 0800 hrs to 1600 hrs
   - 3rd Shift - 1600 hrs to 2400 hrs

   The above shift start and stop times may be changed by local agreement between the Plant Group Manager and the Union Chief Steward.

   Shift Differential

   - 1st Shift - 85 cents per hour
   - 2nd Shift - No shift differential
   - 3rd Shift - 65 cents per hour

   Meal Periods

   One (1) paid meal period will be included within each shift as conditions permit.

   Schedule

   A maximum of five (5) consecutive eight (8) hour shifts in any seven (7) day period.
Time Balance

Eight (8) hour shifts may be subject to the time balance provisions of Section 8. if these shifts are used in conjunction with ten (10) and/or twelve (12) hour time balance shifts.

Notice Period

A minimum of seven (7) days' personal notice shall be given when an employee's hours of work are to be changed (except as per 1.3.1 (4.) and (5.).

(b) Ten-Hour Shifts

Shifts: The normal hours of work for non-time balanced ten hour shifts are 40 per week. Shifts may be performed in one or two shifts per day, Monday to Sunday, inclusive, and may be performed within the following shift windows:

1st Shift - 0600 hrs to 1800 hrs
2nd Shift - 1400 hrs to 0200 hrs

Shift start/stop times and/or shift windows can be changed by local agreement between the Plant Group Manager and the Chief Steward.

Shift Differential

1st Shift - No shift differential
2nd Shift - 70 cents per hour

Meal Period

One (1) paid meal period will be included within each shift.

Schedule

A maximum of four (4) consecutive ten (10) hour shifts may be scheduled in any seven (7) day period.

Time Balance

Ten (10) hour shifts may be subject to the time balance provisions of Section 8.

Notice Period

A minimum of seven (7) days' personal notice shall be given when an employee's hours of work are to be changed (except as per 1.3.1 (4.) and (5.).
Twelve-Hour Shifts

Shifts: Shifts may be performed in one or two shifts per day, Monday to Sunday, inclusive, and may be performed within the following shift windows:

- 1st Shift - 1800 hrs to 0800 hrs
- 2nd Shift - 0600 hrs to 2000 hrs

Shift start/stop times and/or shift windows can be changed by local agreement between the Plant Group Manager and the Chief Steward.

Shift Differential

- 1st Shift - $1.00 per hour
- 2nd Shift - No shift differential

Meal Periods

Two (2) paid meal periods will be included within each shift as conditions permit.

Time Balance

Twelve (12) hour shifts will be subject to the time balance provisions of Section 8 (a).

Notice Period

A minimum of seven (7) days' personal notice shall be given when an employee's hours of work are to be changed (except as per 1.3.1 (4.) and (5.).

2. Short Duration Shifts

Shifts as per 1.3.2.1 (a.), (b.) and (c.) may be scheduled for short durations (maximum three (3) consecutive weeks) for maintenance trades employees. No more than four (4) rotations onto these shifts may be worked by any individual in one (1) calendar year.

3. Work Schedules for Shift Work

The Company will post a work schedule for shift workers showing days, hours of work, position and work headquarters of each employee. The design of the work schedule shall provide for a minimum of sixteen (16) hours off between shifts for eight (8) hour shifts, twelve (12) hours off between shifts for ten (10) and twelve (12) hour shifts. Failure to provide the minimum time off between shifts shall require premium rates to be paid for the first affected shift. Without specific commitment, the Company acknowledges the responsibility that such work schedules shall be posted as far in advance as is practicable and subject to the penalty indicated in Subsection 5(d). Until a new work schedule is posted, the existing posted work schedule will remain in effect.
Although the content, preparation, posting and administration of shift schedules is the sole responsibility of the Company, the preference of the majority of shift workers at each station for a particular basic type of schedule will be adopted. Such preferences will be made known to the Company prior to commencement of preparation of a new schedule. However, if in the Company's opinion, the efficiency of the station or the health of a shift worker could be detrimentally affected by the chosen work schedule, then the Company will provide the Union (Chief Steward) with reasons or medical opinions why the desired schedule cannot be implemented.

The preference of individual shift workers regarding vacation periods will be considered, providing such preferences are made known prior to commencement of preparation of new schedules.

The following are the recognized criteria of an acceptable shift schedule:

(a) The schedule should equitably rotate among all crews.
(b) The schedule should follow a repeating pattern so that it is easily understood.

Ten-hour non-time balanced shift schedules will be assigned as follows:

- A minimum duration of four (4) weeks and;
- A maximum of four (4) days of 1st shifts in a row and;
- A maximum of four (4) days of 2nd shifts in a row.

4. Premium Payments - Scheduled Shift Work

1. One and one-half times the employee's basic rate shall be paid for normal scheduled hours of work performed on Saturdays and Sundays.

2. Two times the employee's basic rate shall be paid for normal scheduled hours of work performed on a statutory holiday which occurs on a Monday to Friday. A day off in lieu of this worked holiday shall be scheduled within the following six months. The employee will advise the Company of his/her preferred day off within 30 days after the holiday is worked. If mutual agreement cannot be reached within 30 days of the worked holiday, management may, on seven days’ notice, schedule the lieu day off.

3. Two times the employee's basic rate shall be paid for normal scheduled hours of work performed on a statutory holiday which occurs on a Saturday. There is no entitlement to a day off in lieu of this worked holiday.

4. If mutually agreeable, three times the employee's basic rate shall be paid for normal scheduled hours worked on a statutory holiday occurring on a Monday to Friday. No lieu day would be granted.

5. Special Provisions Concerning Notice of Transfer to a Different Work Schedule or Work Headquarters

One (1) day notice in this item is defined as 24 hours prior to the start of the first affected shift.
(a) When an employee's work headquarters are to be changed, seven (7) days' personal notice will be provided.

(b) When a shift employee is being changed back to his/her normal schedule, he/she shall be given two (2) days' notice if returning to normal schedule within fifteen (15) days of the original change and seven (7) days' notice if returning to normal schedule fifteen (15) days or more after the original change.

(c) Trades Trainees in Steps 0 to 1 may be changed within a calendar day for training purposes, provided that a notice period of sixteen (16) non-working hours is given before the start of the first affected shift.

(d) Failure to provide the required notice period will result in the payment of double time until the required notice period has elapsed.

6. Special Provisions Concerning Shift Differential

The appropriate shift differential shall be paid for regular shift hours only in accordance with Item 1.3.2(1.) (a), (b) and (c), and shall not apply for overtime hours. When premium time is involved for payment of shift work, the premium rate shall be computed on the standard base rate, excluding shift differential.

7. Calendar Day for Shift Workers

Premium payments for a regular continuous shift shall be recorded and treated as if they occurred during the calendar day in which the shift ends.

8. Provisions Concerning Time Balance Shift

A current six-month time balance schedule may not be terminated. Either eight-hour, ten-hour or twelve-hour time balance shift work which is in effect for any work group may be terminated by the Sector Vice President or Delegate or the Plant Group Manager upon two (2) months' written notice from one authority to the other prior to the end of a current six-month schedule. When the Sector Vice President or Delegate has exercised the right to opt out of time balance schedules for any group of employees, no new time balance schedule may be introduced for those employees without mutual agreement of management and the Union.

Time balance shift schedules will only be introduced at any work location providing seventy percent (70%) or more of all eligible employees so desire and vote in favour. That vote will be as determined by a secret ballot, scrutinized jointly by Management and the Union.

A six (6) month master work schedule will be posted thirty (30) days prior to its starting date. The time balance period of the six (6) month schedule may be less than six (6) months. The six (6) month schedule may include day work outside the time balance shift period. The schedule will average forty (40) hours per week using either eight, ten or twelve (8, 10 or 12) hour shifts, or any combination of the three. The schedule will indicate the days, hours of work (shifts) and position for each employee. The schedules will end on the last day of the shift cycle closest to April 30th and October 31st.
The hours of work for each employee, as shown on a work schedule, must balance to zero at the end of the shift cycle.

The zero time balance date must be indicated on each posted schedule.

The posted time balance date must be indicated on each posted schedule.

The posted master work schedule should never be far off balance and should reasonably approximate the time off provisions of day work. It follows then that such a schedule should not leave long sequences of work without time off, nor long sequences of time off.

(a) Plus Time Balance

Plus time balances which exist on the time balance date will be paid for at double time. At the time of layoff all positive time balances will be paid out at 2X.

(b) Minus Time Balances

Minus time balances which occur as a result of changes to the master work schedule shall be worked off within two fiscal months of the end of the fiscal month in which the minus balance occurs. Minus balances not worked off within this two-month period will be written off.

(c) Lieu Days

When scheduled work is performed on a statutory holiday, a day off will be scheduled in lieu of the statutory holiday. This lieu day shall be identified on the schedule and will be included when computing time balances. When workload permits, the employee may request that the lieu day be interchanged with another scheduled working day after the statutory holiday.

(d) Provisions Concerning Time Off

(i) The following items will be credited for pay purposes on an hour-for-hour basis. In the application of undernoted Items, 1, 2, 3 and 4, a reference under the appropriate contract provision to "days" entitlement will mean eight (8) hours. Therefore a twelve (12) hour shift will constitute one and one-half (1.5) days deducted from credits and a ten (10) hour shift will constitute one and a quarter (1.25) days deducted from credits.

(1) Vacation
(2) Floating Holiday
(3) Sick Leave
(4) Leave of Absence
(5) Travelling Time Outside Normal Working Hours
(6) Payment for Temporary Supervision
(7) Time Charges and Expenses for Employee Union Representatives
(ii) When an employee is scheduled to work a ten (10) or twelve (12) hour shift and one of the undernoted conditions occurs, a "day" will be considered to be ten (10) or twelve (12) hours respectively:

1. Jury Duty
2. Funerals
3. Moving Day

(e) Statutory Holidays and Special Time Off

The basic statutory holiday and special time off provisions remain unchanged in that the time off will be calculated on an eight (8) hour basis. However, employees eligible for Remembrance Day and scheduled to work will get the normally scheduled hours off with pay.

(f) Assignment to Day Work or Eight Hour Shifts

Shift workers with a plus (+) or a minus (-) time balance assigned to day work or eight (8) hour shifts for an indeterminate period of time may be required to take off, or work a four (4) hour period respectively.

1.4 Non-Maintenance Trades Employees

The normal work week of Hospitality Workers and General Tradespersons who assist them shall be 40 hours per week consisting of any five consecutive days of the week not before 0530 hours and not later than 2030 hours.

2.0 DIFFERENTIAL FOR SHIFT MAINTENANCE TRADES EMPLOYEES (EXCEPT HYDROELECTRIC)

Shift differentials shall apply to employees required to work on a three-shift schedule or a two-shift schedule. The first part of a three-shift or a two-shift schedule shall begin at normal starting time.

A shift differential of 65 cents per hour shall be paid to employees who are scheduled to work between the hours of 1600 and 2400.

A shift differential of 85 cents per hour shall be paid to employees who are scheduled to work between the hours of 0000 to 0800.

For Regular part-time and Temporary part-time employees, shift differential is not applicable when the shift starts and ends between the hours of 0700 and 1800.

The appropriate shift differential shall be paid for the first eight hours of each scheduled shift on any regular scheduled day of work and shall not apply for any overtime hours. When premium time is involved for payment of shift work, the premium rate shall be computed on the standard basic rate excluding shift differential.
3.0 PAYMENT OF MEALS

3.1 Conditions Governing Allowance for Meals

Recognizing the fact that employees are required to provide their own meals (except as in 3.2) the following conditions will apply:

1. The Company shall not require an employee to carry or provide more than one meal on a day when work is performed.

2. Wherever possible, supervisors shall notify employees who do not normally carry a lunch of the necessity to carry a lunch the following day.

3. If an employee is sent away from headquarters in an emergency without sufficient notice for him/her to provide and take his/her own lunch, the Company will pay the cost of the employee's noon day meal.

4. If an employee is required to continue working beyond a normal day, the Company will provide the employee's meal after two hours or more and every four hours thereafter while the employee continues working.

5. If an employee is required to work extended periods of overtime, Monday to Friday inclusive, the Company shall pay the cost of the employee's meal on a four-hour interval basis.

6. If an employee is called out to work extended periods of overtime on Saturday, Sunday or statutory holidays without forewarning, the Company shall pay the cost of the employee's meal on a four-hour interval basis. If forewarned, the employee shall carry or provide the first meal and the Company shall pay the cost of any further meals on a four-hour interval basis.

7. When overtime has been scheduled in advance, a meal period will be allowed and no time will be paid for this period. When the overtime is not scheduled in advance, no time will be deducted if employees eat at the job site in a minimum of time.

8. In the conditions outlined in 3, 4, 5, and 6, the Company will either bring the meal to the employee or release him/her from duty long enough to secure and eat it. Where necessary, the Company will provide transportation for this purpose. Employees shall have the choice of the actual cost of the meal or a $15 meal allowance.

9. It is recognized that between the hours of midnight and normal starting time, it may not be feasible for the Company to provide a hot meal. The employee shall have the choice of a $15 meal allowance or the actual cost of the meal to be procured following the completion of his/her shift.
3.2 Winter Meal Provisions

In general, the winter months, for the purpose of this clause, shall cover the period of November 1st to April 30th for the areas south of the French River and the period October 1st to May 31st for areas north of the French River. However, if unseasonable weather is experienced any day during the two-week period immediately prior to the opening dates or subsequent to the closing dates, the supervisor in charge may, at his/her discretion, treat such days in the same manner as though they were included in the prescribed period.

During the winter months, if employees are required to work outdoors or in unheated buildings, subject to 3. hereunder, the Company will:

1. Provide means for carrying or storing the employee's lunches in some warm place and also provide where necessary, transportation for reaching some warm and suitable place for eating lunch. Such time involved in transportation both ways to be absorbed by the Company, thereby allowing the full meal period upon arrival, or

2. Supply or pay for a hot meal and provide transportation. The meal period's duration will be between the times of departure and re-arrival at the point of work and thus any time involved in transportation, both ways, is absorbed by the employee. Should the meal period be extended beyond its normal duration, any such excess will be absorbed by the employee by working equivalent overtime at straight time rates which will result in a total of normal daily hours of work and pay. This shall not preclude the providing of a meal when time involved is in excess of the normal meal period.

3. In some thinly-settled localities, there may be no warm place for storing or eating lunches, and no place where hot meals may be prepared within a reasonable distance from the point of work. Such conditions are beyond the Company's control and necessarily form part of the working conditions in that locality. In such cases, lunches must be carried but employees will eat on the job in a minimum period of time. Such time shall not be deducted and the conditions listed above do not apply.

4.0 EXTENSION OF LUNCH PERIODS

Where lunch periods are restricted to half an hour and when it has been demonstrated that it has been difficult for employees to get their lunch and return to the job within one-half hour, the Company may exercise its prerogative in extending the lunch period to a maximum of one hour, with the necessary adjustments to the working hours of the day.

5.0 OVERTIME

5.1 Due to the nature of the Company operations, some employees will be required to work overtime. Overtime will be minimized and managed within the limits of corporate effectiveness and customer impact. In recognition of employee well-being and inconvenience, an effort shall be made to equitably distribute overtime amongst all qualified employees. Overtime, as used herein,
means that part of the actual working time which is outside the normal scheduled hours and is, therefore, subject to compensation at premium rates.

5.2 Premium Payments

Premium payment for overtime which does not include shift work shall be as follows:

1. One and one-half times the employee's basic rate shall be paid for all work performed during the first four clock hours after normal quitting time, Monday to Friday inclusive.

2. Two times the employee's basic rate shall be paid for:

   All work performed outside of the first four clock hours after normal quitting time, Monday to Friday inclusive.

   All work performed on a regular day off, on Saturdays, Sundays or statutory holidays.

3. When less than 48 hours' notice has been provided and an extra trip to the work location has been made to work overtime, time shall be counted from the time the employee leaves his/her home until he/she returns.

5.3 Overtime Cancellation Payments

All overtime cancelled within 48 hours of its scheduled commencement shall result in a cancellation payment of two hours at straight time rate except in the following circumstances:

1. Overtime arranged during normal scheduled hours as an extension to those normal scheduled hours requires no cancellation payments.

2. Overtime arranged as an extension before the normal hours of work requires no cancellation payment if cancelled with more than 16 hours' notice prior to its commencement.

5.4 Overtime Minimum Payments

All overtime performed, or reported for due to lack of notice of cancellation, shall result in a minimum payment of the greater of four hours at the appropriate premium rate or the actual time worked at the appropriate premium rate, except in the following circumstances:

1. Overtime arranged during normal working hours and worked as an extension before and/or after the employee’s normal hours of work requires no minimum payment.

2. When short call-outs are repeated within one hour of the completion of a previous call-out for which the minimum was paid, no additional minimum payment is required.
3. For overtime call-outs occurring less than two hours before the commencement of normal starting time, the minimum will not apply and the appropriate premium rate will be paid continuously from call-out time until normal starting time.

6.0 SPECIAL PROVISIONS CONCERNING OVERTIME

1. Because an employee was required to work overtime or because he/she lost time in changing shifts, he/she shall not be prevented from working his/her total number of normal daily hours in any normal scheduled day of work. If the employee cannot be supplied with the work required to make up the eight hours' work in that day, his/her pay shall be adjusted to provide a minimum of eight hours' work.

2. If an employee who has worked overtime is physically capable and the gang of which he/she is ordinarily a member is at work, he/she shall not be deprived of the opportunity of working his/her normal scheduled hours in addition to the overtime he/she may have worked.

3. An employee who has accumulated overtime hours shall receive this, in earnings, calculated at the appropriate premium rate and cannot be required to take time off in lieu of payment.

4. Employees who have worked overtime qualify for a rest period based on the following:

1. An employee who is required to work continuously for more than 16 hours, or an employee who accumulates 16 hours of working time in any 24-hour period without a minimum five-hour continuous break between 2300 and 0700 hours, shall be entitled to an eight-hour rest period. Time spent for meals may be deducted from the total elapsed time but is not to be considered as breaking the continuity of the hours worked.

   If the rest period extends into the employee's normal scheduled hours of work he/she shall be paid at straight time rates for the portion of the rest period which extends into the normal scheduled hours. This is in addition to the overtime worked.

   Should the employee be required to continue working beyond the above 16-hour work periods, the employee shall be paid two times his/her normal basic rate until an eight-hour rest period is granted.

   Should an employee be released before 16 hours have elapsed, he/she will not be entitled to an eight-hour rest period, and his/her right to continue work at straight time will be governed by Section 6.0(2.), above.

2. An employee on day work who is required to work four or greater accumulative overtime hours between the hours of 2300 and 0700 shall be entitled to an 8 hour rest period.

3. If the rest period in 2 above extends into the employee's normal scheduled hours of work, he/she shall be paid at straight time rates for the portion of the rest period which extends into the normal scheduled hours. Should the employee be required to continue working
during normal scheduled hours, the employee shall be paid at two times his/her normal basic rate until the rest period is granted.

5. In computing overtime for employees on shift work, one and one-half times the employee’s basic rate shall be paid for all work performed during the four-hour period following the scheduled shift and two times the employee’s basic rate shall be paid for all work performed during the 12-hour period prior to the start of the scheduled shift, Monday to Friday inclusive. All work performed on Saturday, Sunday and statutory holidays shall be paid at two times the employee's basic rate.


7. Hospitality Workers and General Tradespersons who assist them shall be paid two times the employee’s basic rate for all work performed on the sixth and seventh day of their five-day schedule, and on statutory holidays.

8. Overtime - Regular Part-Time and Temporary Part Time Employees

Overtime is defined as: (1) hours worked which are in excess of the normal daily hours of the classification; or (2) hours worked in excess of 24 in a week; or (3) hours worked on a regular day off.

Premium Payment for Overtime:

Extension Overtime: Overtime hours worked within the first four clock hours will be at one and one-half times the employee’s basic rate unless the employee works more than 28 hours in a week in which case the hours in excess of 28 will be paid at two times the employee's basic rate.

Non-Extension Overtime: All overtime hours worked that are outside of the first four clock hours after the classification's normal quitting time will be at two times the employees’ basic rate.

Regular Day Off: Overtime hours worked on a regular day off will be paid at two times the employee's basic rate.

7.0 TRAVELLING TIME TO AND FROM THE JOB

Maintenance Trades employees shall travel from their headquarters to and from the job on Company time. The word "headquarters" shall be for the purpose of this item "where the employee normally reports for work".
8.0 Operation of the Niagara Queen

8.1 Boat Captain

Captain of the Niagara Queen are Band 3 duties and attract a supervisory premium in accordance with Article 8.8.2.

During normal scheduled hours, if an employee is called upon to perform the duties of Boat Captain of the Niagara Queen, he/she shall be paid a minimum of four hours at the Band 3 supervisory rate, or actual hours worked, whichever is the greater.

8.2 Engine Room Watchkeeper and Deckhand

Engine Room Watchkeeper and Deckhand of the Niagara Queen and operation of a boat 7.92 m (26 feet) in length or more are Band 2 duties.

All Band 1 employees performing relief as Engine Room Watchkeeper and Deckhand shall be paid the appropriate Band 2 relief rate for a fully scheduled day.

9.0 APPRENTICES/TRAINEEES

Upon completion of 2 years of service, Apprentices/Trainees shall be entitled to all the benefits afforded a regular employee as outlined in Part A, Item 23.0.

Effective April 1st, 2009 OPG will require Apprentices/Trainees to register with the Ministry of Training, Colleges and Universities (MTCU). However, the completion of the C of A and C of Q is the responsibility of the Apprentice/Trainee. Apprentices/Trainees will be reimbursed for the registration fee charged by the MTCU. Apprentices/Trainees will be reimbursed for the examination fee and paid at their basic rate, for the time required to write each examination once, up to the maximum number of hours established by the appropriate Agency/Ministry for each examination.

10.0 MANAGERIAL DUTIES

A management supervisors' normal duties are supervisory in nature. Under normal circumstances they must not take the place of skilled workers. In the event that an emergency work condition arises, skilled help should be called in. Where suitable skilled help is not available at the required time, supervisors are expected to perform whatever duties are necessary. The foregoing is not intended to prohibit the management supervisor from carrying out appropriate training.
11.0 PAYMENT FOR TEMPORARY SUPERVISION

11.1 Tradesperson Responsibilities

A tradesperson is required to exercise judgment and control over his/her own actions so that the assigned work may be performed safely, efficiently, and effectively, and with consideration of its effect on others.

In a work situation, a journeyperson will be responsible only for his/her own work and the work and training of one apprentice or helper. However, for the purposes of training, a journeyperson may be required to teach trade skills of a specific task to more than one apprentice or journeyperson at one time. During such a teaching situation, the journeyperson is responsible, only, for the demonstration of trade skills and not for the work of the apprentices or journeyperson involved.

Where a group of employees are working at a location on jobs which are independent of one another and planned by a supervisor so that no coordination of their activities is required, additional supervision will not be required.

Where the job is being performed by three or more employees, one of them shall be appointed and paid as a trades supervisor in accordance with Article 8 and Part A, item 43.

11.2 Level of Supervision

While in receipt of 5% for supervision a tradesperson shall perform supervision for up to 3 days without face to face contact with his/her Union Trades Supervisor. Less frequent contact requires the 10% supervisory payment.

12.0 ADVERSE WEATHER

When in the Company's opinion the weather is unduly adverse, employees shall not normally be required to work outside and the following shall apply:

12.1 Regular Employees

Regular employees shall within normal scheduled hours be provided with inside work.

12.2 Regular-Seasonal Employees

Employees who have attained regular-seasonal status in accordance with Part A, Item 2.0, and continue to be employed on a seasonal basis shall be entitled to a half day's pay per day or pay for actual hours worked or held whichever is the greater, providing the employee reports for work.

12.3 Temporary Employees

Two hours' pay will be allowed when a temporary employee reports and is prepared to remain for two hours at his/her place of work and is prevented from working due to unduly adverse weather.
If a temporary employee is required to remain at his/her place of work longer than two hours, he/she shall be paid for all the time he/she is required to stay on the job.

13.0 CLOTHING

13.1 Uniforms

The Company shall supply uniforms, where they are required to be worn, at no cost to the employee.

13.2 Stocking of Overalls and Associated Smocks

The Company will stock bib-type overalls, coveralls and associated smocks in Central Stores which will be available for purchase by employees on the basis of a cash sale.

13.3 Laundering and/or Supplying Clothing

When the supervisor in charge of a work crew deems a specific job dirty for the particular trade function, he/she shall either:

1. Authorize laundering of the employee’s work clothing, or

2. Issue coveralls or other suitable clothing during the period in which this job is being performed.

13.4 Hydroelectric

1. Management will supply and clean coveralls or overalls. Replacement will be up to 2 pairs per 24 months if condition warrants.

2. Management will supply employees with two sets of 100% cotton or natural fibre shirts and pants every 24 months. Employees will be responsible for cleaning.

3. The company will supply a parka and insulated bib-overalls or insulated coveralls every 36 months to employees required to work periods outdoors. The company will attempt to bulk supply appropriate type parkas if it is more cost effective.

4. The Company will supply seasonal appropriate outdoor clothing, one spring/fall jacket every thirty-six (36) months.

Clothing supplies shall be jointly reviewed at the local level to ensure adequate supply and cost effectiveness.

Employees must exercise reasonable care in the use of the clothing supplied.
13.5 Facilities Maintenance Trade Employees

Along with the daily uniform, the appropriate outerwear shall be supplied. Replacement of the outdoor clothing shall be done once every thirty-six (36) months.

14.0 ACTING IN VACANCIES

All acting positions are to be limited to 90 days unless extensions are agreed to by the Company and the Union Chief Steward. Pending the arrival of the successful applicant and his/her assuming of the normal duties, the acting incumbent who is performing the normal duties and responsibilities of an "acting" position shall receive the rate for the position.

15.0 ON-CALL

Employees may be placed on-call, as required, outside of their regular working hours. On-Call depending on the nature of the anticipated work as follows:

15.1 On-Call

On-Call is the term used to cover trouble call service performed by station maintenance personnel and facilities maintenance trades (mechanics and electricians) who, because of their limited numbers and the resultant increased frequency with which they are required to perform service duty, are allowed up to a maximum of two hours between the time they are called and the time when they report for work. The rates of payment for on-call shall be computed at one half (1/2) hour at the employees basic hourly rate per day except for Saturdays, Sundays and statutory holidays when the rate will be one (1) hour at the employee’s basic hourly rate per day. This rate includes payment for the use of the employee’s telephone. An employee who is required to report to work while on-call shall be paid for his/her working time in accordance with regulations governing overtime work, including the regulation governing work performed on a “short call” basis.

Staff will be assigned to on-call only if sufficient volunteers cannot be obtained. The assignment to on-call will be limited to two weeks in a four week period for any employee.

15.2 Provisions for Telephones

Telephone service to such designated employees deemed necessary by the Company shall be in accordance with Negotiated Policies and Practices Number 1.

15.3 When an employee is on service duty or on-call a paging device will be supplied where such service is available and experience in that area has proven it will provide a reliable service.
16.0 HEADQUARTERS

Headquarters, as referred to herein, means the building or point designated by the Company at which the employees are expected to report for work or to assemble for preparation for leaving for work at outside points. Employees moving from point to point, may have temporary headquarters established at some hotel or boarding place or some garage at which the truck is kept and at which the employees are to assemble.

17.0 SHIFT WORK - PRINTING SERVICES DEPARTMENT

The provisions of this Agreement shall apply to those employees hired after April 1st, 1982, designated by the Company as being required to work shift work to operate printing services.

1. Employees hired prior to April 1st, 1982, will have their day status protected until such time as they apply for and are accepted to a position requiring shift work.

2. Day status employees may volunteer for a trial period of shift work after which time they may either apply for a shift position when vacant or retain their day status as in 1. above.

The following item will apply to the shift staff of Printing Services Department:

1. Hours of Work "Day Work": Employees covered by this arrangement may be required to work on "day work". When shift employees are transferred to or from day work, a minimum of seven days' personal notice shall be given. Failure to provide the required notice shall result in the payment of double time for all full shifts worked until the notice period has elapsed.

2. When working "day work" the provisions of Part B Maintenance Trades shall apply.

17.1 Working Conditions

Hours of Work - Specific: The normal hours of work will be eight hours per day, 40 hours per week on a Monday to Friday basis.

The non-rotating shift work hours shall be as follows:

<table>
<thead>
<tr>
<th>Shift</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afternoon</td>
<td>1600 - 2400</td>
</tr>
<tr>
<td>Nights</td>
<td>0000 - 0800</td>
</tr>
</tbody>
</table>

Employees on shift work shall eat their meals during the shift hours as conditions permit.

Shift Differential: The appropriate shift differential as described in Part B, Item 2.0 will apply.

Shift work will not be scheduled on statutory holidays.
18.0 ASSIGNMENT OF OPERATOR AGENTS

For new operator agent assignments, management retains the right to determine the number and appropriate trades classification for each site. Assignment priority will be:

a) Maintenance Trades employees who are former Electrical Operators.
b) Senior Mechanical/Electrical volunteers.
c) If no volunteers, junior Mechanical/Electrical will be assigned.
PART C

HYDROELECTRIC OPERATORS
# TABLE OF CONTENTS

**PART C**

**HYDROELECTRIC OPERATORS**

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>HOURS OF WORK</td>
</tr>
<tr>
<td>2.0</td>
<td>FORTY-FOUR PER WEEK OPERATORS</td>
</tr>
<tr>
<td>3.0</td>
<td>SELECTION TO/ACTING IN VACANCIES</td>
</tr>
<tr>
<td>4.0</td>
<td>DIFFERENTIAL FOR SHIFT WORK</td>
</tr>
<tr>
<td>5.0</td>
<td>VACATIONS</td>
</tr>
<tr>
<td>6.0</td>
<td>RELIEF WORK</td>
</tr>
<tr>
<td>7.0</td>
<td>OVERTIME</td>
</tr>
<tr>
<td>8.0</td>
<td>PREMIUM PAYMENTS</td>
</tr>
<tr>
<td>9.0</td>
<td>OPERATORS' ORGANIZATIONAL STRUCTURE</td>
</tr>
<tr>
<td>10.0</td>
<td>JOINT COMMITTEES</td>
</tr>
<tr>
<td>11.0</td>
<td>MANAGERIAL DUTIES</td>
</tr>
<tr>
<td>12.0</td>
<td>PROVISION OF MEALS</td>
</tr>
</tbody>
</table>
PART C

HYDROELECTRIC OPERATORS

Specific Matters of Agreement

1.0 HOURS OF WORK

The content, preparation, posting and administration of shift schedules is the sole responsibility of the Company.

1.1 Regular Operators

1.1.1 Master Work Schedule

A six-month master work schedule, averaging 40 hours per week, posted one month in advance, will be prepared and posted for every station, indicating the days, hours of work (shift) and operating position for each operator in that station. The master work schedule will provide a minimum of 16 hours off between eight hour shifts.

Twelve hour shift provisions may be scheduled as per Mid-Term R-107-4.

1.1.2 Time Balance

1. The master work schedule shall have the time balance adjusted for each operator to zero on June 30 and December 31. Statutory holidays occurring and vacation allowances taken during the respective periods shall be included when computing time balances.

2. Plus time balances on the above dates shall be paid for at double time. At the time of layoff all positive time balances will be paid out at 2X.

3. Minus time balances which occur as a result of implementing the provisions of 1.1.3(1.), (4.), 1.3.4 and 1.3.5 shall be worked off in the master work schedule in which they occur or the two-month period immediately following the establishment of the minus time, whichever is the greater.

1.1.3 Revisions to Master Work Schedule

Revisions to master work schedules should be done in a manner that mutually meets the needs of both the employee and the Company.

It is the Company’s intent to minimize the impact of revisions to master work schedules on the affected employees consistent with good business practices.
This shall be accomplished by open discussion with all potentially affected employees to ensure:

- the impact of disruption to the employee’s previously scheduled time off is considered
- that employees understand the impact of the changes on the cost to the Company.

Master work schedules may be subject to revisions as follows:

1. Individual operators may be changed within the master work schedule for strengthening of shifts providing a minimum of seven days’ personal notice is given. The intention is that such changes shall normally be of a permanent nature.

   In the case of illness, which would result in a staff shortage, four (4) days’ advance notice will be given when placing an employee on shift.

2. Supernumerary hours of work may be changed within a calendar day to supply relief providing a minimum notice of 16 non-working hours is given before the start of the first affected shift. If sufficient notice cannot be provided, this change will not be made.

3. With a minimum of four days’ notice, supernumerary days of work may be interchanged with scheduled days off for purposes of relief, meetings (excluding meetings involving Union), interviews, short leaves of absence, familiarization trips, training programs and for additional help during heavy workload periods. If more than four weeks separates a scheduled supernumerary day from a scheduled day off or four days’ notice cannot be given then these may not be interchanged.

4. Once per schedule per operator and with a minimum of four days’ notice an individual operator may be temporarily transferred from his/her master work schedule to the master work schedule of an operator who will be absent for at least ten working days. Seven days' notice will apply for subsequent temporary transfers. Such transfers shall be for the purpose of supplying relief for staff shortages due to transfers, leaves of absence or the absence of an operator involved in training as outlined in 1.4.5. An operator so transferred shall be required to assume the schedule of the absent operator and two days' notice shall be given when returning to his/her normal master work schedule.

   A maximum of two additional regular operators may be temporarily transferred to fill in behind the relieving operator and their moves shall be governed by the foregoing of this item.

5. An individual operator's schedule on a master shift schedule may be changed without penalty, as a result of his/her request for an extension of his/her vacation as outlined in 5.0(2.)(d).

   **NOTE**

In the above revisions every effort will be made by the Company to maintain the minimum of 16 hours off between shifts. However, where it is necessary to do so and with the appropriate notice, less than 16 hours off between shifts may be scheduled. These short changes will be limited to two changes per operator for a posted master schedule.
NOTE

Personal notice means the employee will be contacted personally, face to face or by telephone. The contact must be made with the employee, no messages. Personal notice will be followed up within 72 hours with posted notice which will list the time and date the employee was personally contacted. If the notice is not posted within 72 hours, management will pay 4 hours at straight time to the person who was shift changed.

1.1.4 Penalties

1. Failure to comply with one month’s advance posting, as indicated in 1.1.1 shall require the payment of double time for work performed under the new schedule for which one month’s advance posting has not been provided.

2. Failure to give the required notice, as indicated in 1.1.3(1.) and (4.) shall require the payment of double time until the notice period has elapsed.

1.2 Operator Trainees

1.2.1 Work Schedule

When supernumerary, operator trainees shall be given a four-week schedule, averaging 40 hours per week, posted one week in advance, showing days and hours of work. Once they have completed two (2) years of training, trainees will be placed on the master schedule the next time a master schedule is posted.

1.2.2 Revisions to Work Schedule

While adherence to the supernumerary schedule is desirable, flexible utilization of trainees' working time will, on occasion, necessitate change in days of work on 24 hours’ notice and hours of work on 16 hours’ notice.

1.2.3 Transfers between Work Schedule and Master Work Schedule

1. When transferring from a supernumerary schedule to the schedule of a regular operating position and also when returning to their supernumerary schedule they shall be given one day’s notice providing the transfer involves a change in the hours of work.

2. Plus time that has accumulated as a result of having worked in master work schedules shall be scheduled as time off during the four-week period following the operators’ return to their supernumerary schedules. Failure to schedule this time off as outlined above, or a cancellation of such scheduled time off, shall require the payment of all remaining plus time at double time.

3. When occupying a regular operating position they shall be subject to the provisions governing regular operators as detailed in 1.0.
1.2.4 Penalties

Failure to comply with the one week's advance posting, as indicated in 1.2.1 shall require the payment of double time for work performed under the new schedule for which one week's advance posting has not been provided.

Failure to give the required notice, as indicated in 1.2.2 and 1.2.3 shall require the payment of double time until the notice period has elapsed.

1.3 Miscellaneous Scheduling Provisions

1.3.1 Administration

Although the content, preparation, posting and administration of shift schedules is the sole responsibility of the Company, the preference of the majority of operators at each station for a particular basic type of schedule will be adopted. Such preferences will be made known to the Company prior to commencement of preparation of new schedule.

However, if in the Company’s opinion, the efficiency of the station or the health of an operator could be detrimentally affected by the chosen schedule, then the Company will provide the Union (chief steward) with reasons or medical opinions why the desired schedule cannot be implemented.

The preference of individual operators regarding vacation periods will be considered, providing such preferences are made known prior to commencement of preparation of new schedules.

Operating positions identified on the Master Work Schedule will normally be filled.

During periods of destaffing of positions, discussions will be held with the local Chief Steward and Management to decide when positions filled in relief by operator trainees will be discontinued.

1.3.2 Changing Positions on a Shift

Changing of positions on a given shift shall not involve premium rates of pay.

1.3.3 Definition

Notice as referred to in this item shall be defined as per the following example: One day's notice shall mean 24 hours prior to the start of the first affected shift. Also, the notice period shall be deemed to commence coincident with the posting of the revised schedule.

1.3.4 Location Transfer or Promotion Within a Station

On transfer to a new location or promotion within a station, the individual operator is required to assume the existing schedule for the new position without notice or penalty. His/her time balance shall, unless special circumstances prevent, be adjusted before taking over his/her position on the master work schedule, and in any case before the zero balance date of the existing schedule.
1.3.5 Training

Operators may be temporarily transferred from their work schedules for purposes of job related training and development at the stations with Hydroelectric Operating Supervisors and at other locations where planned operator training is provided. Seven days’ personal notice shall be given to all participating operators except in the event of a late cancellation in which case an alternate operator may be selected and he/she may waive the notice period.

Failure to provide the required notice period will result in the payment of double time until the required notice period has elapsed.

1.3.6 Floating Statutory Holiday

A floating holiday may be interchanged with a supernumerary day or with a day where step-up relief can be provided. Floating holidays may be taken in the 12 month period from January 1st to December 31st.

2.0 FORTY-HOUR PER WEEK OPERATORS

2.1 Non-shift Day Operators

The normal work week for these positions shall be 40 hours per week, consisting of five days of eight hours each, Monday to Friday, inclusive, statutory holidays excepted. The standard hours of work shall be 0800 to 1200 hours and 1300 to 1700 hours, except where non-shift day operators are part of a shift complement, in which case their hours of work shall be 0800 to 1600 hours.

With local agreement between the Plant Group Manager and the local Chief Steward, a change to the standard hours can be made. However, the hours of work shall be between 0700 and 1700 hours.

Where in the Plant Group Manager’s opinion, the change in standard hours is not meeting operational needs, the non-shift day operator(s) will revert back to the standard hours of work.

Operators filling such positions shall not be required to accept service duty or on-call duty.

3.0 SELECTION TO/ACTING IN VACANCIES

Selection to vacancies to be made within 90 days after the vacancy is created providing there is a suitable applicant.

Pending the arrival of the successful applicant, and his/her assuming of the normal duties, the acting incumbent who is performing the normal duties and responsibilities of an acting position shall receive the appropriate rate in accordance with Article 8, Part A, Item 43 and Item 6.0 herein.
4.0 DIFFERENTIAL FOR SHIFT WORK

Shift differentials shall apply to employees required to work on a three-shift schedule or a two-shift schedule. The first part of a three-shift or a two-shift schedule shall begin at normal starting time.

Regular part-time and temporary part-time employees will not be eligible for shift differential when the shift starts and ends between the hours of 0700 and 1800.
1. A shift differential of 65 cents per hour shall be paid to employees who are scheduled to work between the hours of 1600 and 2400.
2. A shift differential of 85 cents per hour shall be paid to employees who are scheduled to work between the hours of 0000 and 0800.

The appropriate shift differential shall be paid for the first eight hours of each scheduled shift on any regular scheduled day of work and shall not apply for any overtime hours. When premium time is involved for payment of shift work, the premium rate shall be computed on the standard basic rate, excluding shift differential. Operator Trainees will be paid this shift differential when they are working shift work.

5.0 VACATIONS

Vacations for operators will be governed by the following:

1. The 12-month period in which vacation is actually taken shall be from January 1st to December 31st.
2. Subject to exceptions resulting from unforeseen or emergent conditions, arrangements will be made to provide vacations as under-noted:
   (a) Fourteen consecutive days\(^1\) off within the period May 1st to September 30th (summer schedule) to all regular operators.
   (b) If desired by the operator and he/she makes this known to the Company prior to the preparation of the master work schedule, 21 consecutive days\(^1\) off including three weekends within the period May 1st to October 31st (summer schedule) to all regular operators who qualify for three or more weeks' vacation.
   (c) Where mutually convenient to the Company and the employees, if individual operators so request, all or part of the vacation allowance may be taken outside the period May 1st to October 31st.
   (d) A request by an individual operator for an extension of his/her vacation period may be granted at the Company’s discretion by interchanging his/her scheduled vacation days or

\(^1\) The consecutive days referred to would normally include other than vacation entitlement.
unused vacation entitlement with days of work, providing qualified relief (reserve operators, surplus operators, operators-in-training) is available at the location.

3. If it becomes necessary to cancel the additional extension as outlined in this item, the operator granted the extension will be required to return to his/her original schedule without penalty to the Company.

4. If, in any instance and due to unforeseen circumstances, vacation schedules are adversely affected, the Company will use available relief so as to reduce the abnormal period to a minimum. See also Part A, Item 6.0.

6.0 RELIEF WORK

1. Operator Trainees may be used to supply relief in any position excepting a Hydroelectric Operating Supervisor.

2. In each instance where an Operator or Operator Trainee falls sick while relieving in a higher-rated position, his/her sick benefits will be calculated at the higher relief rate for that specific period of time up to the first point on the schedule where he/she would have normally returned to his/her basic rate. From this point onward sick benefits during this illness will be based on his/her basic classification rate.

3. The entitlement of an Operator or Operator Trainee for payment of vacation days at a relief rate will be determined by the amount of relief provided during the period from May 1st to April 30th each year. If relief has been provided for 50 percent (50%) or more of this time in a higher position, all vacation days taken during this same period will be paid at the higher rate. Time worked after a permanent promotion to a higher position will not be counted towards the 50 percent (50%) credit.

4. Operator Trainees in Band II step 0 & 3 who are required to upgrade to an Operator position will be placed on Band II step 5 for the time they are filling a full time Operator position on the schedule.

5. When Operators or Operator Trainees relieve in a higher-rated position and he/she acquires a lieu day (statutory holiday), the lieu day shall be paid at the higher rate.

6. When relieving in a higher rated position during his/her normally scheduled hours of work, Operators or Operator Trainees shall be paid a minimum of four hours' pay at the appropriate relief rate, or the actual hours worked, whichever is greater.
7.0  OVERTIME

Due to the nature of the Company’s operations, some employees will be required to work overtime. Overtime will be minimized and managed within the limits of corporate effectiveness and customer impact. In recognition of employee well-being and inconvenience, an effort shall be made to equitably distribute overtime amongst all qualified employees. Overtime, as used herein, means that part of the actual working time which is outside the normal scheduled hours and is, therefore, subject to compensation at premium rates.

Overtime, as used herein, means that part of the actual working time outside of an Operator’s or Operator Trainee’s schedule (subject to provisions of 1.0 to 1.3).

7.1  Definitions

Emergency Overtime: Work outside normal scheduled hours for which there has been no prearrangement.

Prearranged Overtime: Work performed outside of normal scheduled hours for which notification must be given a minimum of 24 hours in advance, for which time shall be counted from the time the operator arrives at his/her regular work headquarters until he/she finishes work at that headquarters. Where this advance notice is not given, overtime shall be considered as emergency overtime.

Extension Overtime: Work performed outside of normal scheduled hours as an extension of the normal shift (either immediately preceding or following the scheduled shift) for which time shall be counted from the time an operator reports for work until normal starting time (in the case of extension overtime preceding a scheduled shift) or from normal quitting time until an operator finishes work (in the case of extension overtime following a scheduled shift). Extension overtime will not be used where relief is required for a complete shift and an operator in the same or lower position is available.

7.2  Minimum Payments

7.2.1  Emergency Overtime

All emergency overtime worked shall receive a minimum payment of three hours’ straight time pay or the actual time worked at the appropriate premium rates, whichever is the greater providing short emergency calls are not repeated within one hour of the completion of a previous call, for which the three hours’ minimum (three hours at straight time) was paid.

In addition to the payment for emergency overtime or minimum payment as outlined above, one hour (straight time) shall be paid to the operator as compensation for travelling from his/her home to his/her place of work and return.

7.2.2  Prearranged Overtime

All prearranged work outside of normal hours performed or reported for due to lack of notice of cancellation on a scheduled day of work shall receive a minimum of two hours’ straight time pay or the actual time worked at the appropriate premium rate, whichever is the greater.
All prearranged work performed or reported for due to lack of notice of cancellation on a scheduled day off shall receive a minimum of four hours’ straight time pay or the actual time worked at the appropriate premium rate, whichever is the greater.

All prearranged overtime work cancelled within 24 hours of the designated work commencement time shall require payment of two hours at the basic rate to all affected operators.

One hour at straight time will be paid in lieu of time spent travelling when an employee is called in to work overtime and an extra trip is involved.

7.3 Special Provisions Concerning Overtime

An employee who is required to work continuously for more than 16 hours shall be entitled to an eight-hour rest period. Time spent for meals may be deducted from the total elapsed time but is not to be considered as breaking the continuity of the hours worked.

If the rest period extends into the employee's normal scheduled hours of work he/she shall be paid at straight time rates for the portion of the rest period which extends into the normal scheduled hours. This is in addition to the overtime worked.

Should he/she be required to continue working beyond 16 hours he/she shall be paid two times his/her normal basic rate until an eight-hour rest period is granted.

Should an employee be released before 16 hours have elapsed, he/she will not be entitled to an eight-hour rest period.

7.3.1 Equivalent Time Off Without Pay

See Part A, Item 10.2.

7.4 Overtime - Regular Part-Time And Temporary Part-Time Employees

Overtime is defined as: (1) hours worked which are in excess of the normal daily hours of the classification; or (2) hours worked in excess of 24 in a week; or (3) hours worked on a regular day off.

Premium Payment for Overtime:

Extension Overtime: Overtime hours worked within the first four clock hours will be at one and one-half times the employee's basic rate unless the employee works more than 28 hours in a week in which case the hours in excess of 28 will be paid at two times the employee's basic rate.

Non-Extension Overtime: All overtime hours worked that are outside of the first four clock hours after the classification's normal quitting time will be at two times the employees' basic rate.
8.0 PREMIUM PAYMENTS

The following premium payments shall apply to Operators and Operator Trainees

8.1 Payment for Overtime

Overtime, as used herein, means that part of the actual working time which is outside the normal scheduled hours, and is therefore, subject to compensation at premium rates.

Premium payment for overtime shall be as follows:

1. One and one-half times the employee's basic rate shall be paid for all work performed during the first four clock hours after normal quitting time, Monday to Friday inclusive.

2. Two times the employee's basic rate shall be paid for:
   - all work performed outside of the first four hours after normal quitting time, Monday to Friday inclusive,
   - all overtime work performed on an unscheduled day of work, on Saturdays, Sundays and statutory holidays which occur Monday to Friday.

3. Two and one-half times the employee's basic rate shall be paid for all overtime hours worked on a statutory holiday which occurs on Saturday.

8.2 Scheduled Work

1. One and one-half times the employee's basic rate shall be paid for scheduled work performed on Saturdays and Sundays.

2. Two times the employee’s basic rate shall be paid for:
   (a) Scheduled work performed on a statutory holiday which occurs on Monday to Friday. An additional day off will be scheduled in lieu of the statutory holiday within six months of the end of the posted schedule.
   (b) Scheduled work performed on a statutory holiday which occurs on a Saturday. The premium for scheduled Saturday in 1. above shall not apply.

8.3 Cancelled Vacation Days

When an employee's vacation is cancelled by the Company, the employee shall receive the appropriate premium rate for all normal hours worked on cancelled vacation days for which seven calendar days' notice has not been given up to a maximum of seven calendar days. If more than seven calendar days' notice has been given, the employee shall receive straight time for all normal hours worked.
Where possible, and where it is mutually agreeable, cancelled vacation days shall be rescheduled during the current or succeeding six months' schedule. If this is not possible, the cancelled vacation shall be included in the employee's time balance at the end of the schedule in which it occurred.

When an operator's vacation is postponed owing to his/her illness, this postponed vacation will be rescheduled at a mutually agreeable time during the current or succeeding six months' schedule. If this is not possible, the cancelled vacation will be paid for at straight time rates.

NOTE

Operators shall receive entitlement for the same number of statutory holidays as Part B employees. Therefore, when a statutory holiday falls on a Saturday, statutory holiday credit shall not apply.

9.0 OPERATORS' ORGANIZATIONAL STRUCTURE

9.1 Two Level Structure

9.1.1 Definitions

Supervising Operator

1. Operators in the senior position in multi-position stations.

Operator

1. Operators in one-person per shift stations that exercise operating control of generating stations or control/regulate water flows.

2. Subordinate operators who directly assist in the operation of multi-position stations.

9.2 Interpretation of Special Terms

Operating Control: The operator has the authority to perform, direct or authorize the operation of all devices under his/her control. He/she need not have remote or supervisory control of the equipment.

Directly Assist: The operator must work directly with the supervising operator and fully share in the supervising operators’ responsibilities for directing, coordinating and controlling operations in his/her assigned jurisdiction. The operator may or may not spend part of his/her time in a travelling capacity.

Multi-position: The station coverage must normally comprise a supervising operator and one or more operators on at least one shift a day, for a minimum of two days each week.
9.3 Application of Operators’ Organizational Structure

Where it is mutually recognized that a problem or problems exist regarding the application of the operators’ organizational structure, a meeting of the Union and the Company will be called to resolve these specific problems. However, individual problems regarding the interpretation and application of the method will be initially dealt with in the field between the employee and his/her supervisor.

10.0 JOINT COMMITTEES

The Operators’ Consultative Committee, established in 1954, shall continue to act under the following terms:

10.1 Personnel

Maximum of three appointees from each party.

10.2 Function

To act as a liaison between the Company and the employees in the field for the purpose of exchanging information relating to changing conditions as they affect operators.

To discuss mutual operating problems of a general nature which arise from time to time.

Any program developed by the Company to establish standards of qualifications for operating positions will be a matter of Union advisement as to progress and discussion.

The committee may be convened at approximately three-month intervals to deal with agenda submitted by either the Union or the Company and acceptable to both parties as being within the scope of the committee’s function.

10.3 Limits of Authority

It is understood that this committee will meet to discuss general operating problems of common interest to the Union and the Company and shall not have bargaining power or authority to amend existing policy, or interpret collective agreements. Any recommendations which arise as a result of discussions shall be presented separately to the Union and to the Company by their respective members.

11.0 MANAGERIAL DUTIES

A management supervisors’ normal duties are supervisory in nature. Under normal circumstances they must not take the place of skilled workers. In the event that an emergency work condition arises, skilled help must be called in. Where suitable skilled help is not available at the required time, supervisors are expected to perform whatever duties are necessary. The foregoing is not intended to prohibit the management supervisor from carrying out appropriate training.
12.0 PROVISION OF MEALS

In recognition of the importance of regular meals to an individual's health and effectiveness on the job, the Company will supply meals as outlined below and when required, will assign an employee to secure the meals.

(a) Employees provide their own meals on regular days of work.

(b) When an employee works overtime on a regular day off, he/she will be expected to provide one meal if 23 hours notice has been given.

(c) When an employee works extension overtime before or after normal scheduled hours, all required meals will be provided by the Company. The first meal (or meal allowance) will be provided when two (2) hours of overtime are worked. Subsequent meals or meal allowances will be provided every four (4) hours of overtime worked thereafter.

(d) When meals cannot be reasonably obtained, an allowance of $15.00 per meal will be paid.

12.1 Meal Periods

(a) Employees on day work shall take a meal period designated by the Company and shall not be paid for this time (unless otherwise provided for in the Collective Agreement).

(b) Employees on shift work shall eat their meals during the shift hours as conditions permit.

(c) When an employee works extension overtime, no time shall be deducted for eating such meals where the employee eats the meal on the job and in a minimum of time.

2 'Reasonably obtained' is to be defined locally by Union and Management.
PART D

CLERICAL/TECHNICAL
TABLE OF CONTENTS

PART D

CLERICAL/TECHNICAL

1.0 WAGES
2.0 HOURS OF WORK - GENERAL
3.0 SHIFT DIFFERENTIAL AND SHIFT WORK
4.0 OVERTIME
5.0 PROVISION OF MEALS
6.0 A PRINCIPLES RE RESOURCING FOR RELIEF, ACTING & TEMPORARY ASSIGNMENTS (Nuclear)
6.0 B PRINCIPLES RE RESOURCING FOR RELIEF, ACTING & TEMPORARY ASSIGNMENTS (Non-Nuclear)
7.0 POSTING OF VACANCIES
8.0 POSITIONS EXCLUDED AS PER ARTICLE 1 - CLERICAL/TECHNICAL (CLERICAL AND TECHNICAL)
9.0 SHIFT WORK - INFORMATION MANAGEMENT FACILITIES
10.0 TEMPORARY GUIDES
11.0 HEALTH PHYSICS TECHNICIANS - HEALTH AND SAFETY DIVISION
12.0 SHIFT WORK - TECHNICAL STAFF (Inspection and Maintenance Technician)
13.0 SHIFT WORK - TECHNICAL STAFF (Instructor)
PART D

CLERICAL / TECHNICAL

Specific Matters of Agreement

1.0 WAGES

The wage rates for all employees covered by this section of the Collective Agreement shall be in accordance with, Part A, Item 43 and Article 8.

2.0 HOURS OF WORK - GENERAL

1. Clerical/technical employees whose basic hours of work are 35 hours per week may be periodically required to change their work location and to work 40 hours per week or the same hours as field staff. All hours in excess of seven hours per day, Monday to Friday, are to be paid at the appropriate premium rate.

2. Certain technician classifications which have been established on a 40-hour week basis shall continue to work normal hours of 40 hours per week but when on field work may be required to work the same hours as the field staff.

3. The normal work week of all clerical/technical employees of the Corporate Mailing Section shall be 35 hours per week consisting of five days of seven hours per day, Monday to Friday inclusive. Such employees shall normally be free to select variable working hours within the period 7:30 am to 5:30 pm in accordance with Subsection 1.1.1.

Where, in the opinion of the Company, such selections fail to maintain an effective mail service, the Company may establish hours of work between 7:30 am and 4:30 pm for all employees on the basis of weekly work schedules which shall be posted in the work location seven days in advance of their application. Early starting times shall be rotated equitably among the staff.

2.1 Hours of Work - Specific

With the exception of shift work, head office hours shall be a 35-hour week subject to Article 8.12

8:30 am - 12:00 noon (Monday through Friday)
1:00 pm - 4:30 pm (Monday through Friday)

2.1.1 Variable Working Hours in Head Office (Nuclear)

The governing policy of variable working hours at head office is to improve business performance, employee and customer satisfaction by offering flexibility in start and stop times and lunch periods for employees.

The work week will consist of five, seven/eight hour days, Monday to Friday. The hours of work selected must be in accordance with the observation of core working hours of 9:00 a.m. to 11:45 and 1:15 p.m to 2:30 p.m.
Each month employees may select their standard work period for the following month. Employees may select a starting time which is not earlier than 7:00 a.m. and not later than 10:00 a.m. or at 1/4 hour intervals prior to that. Their finishing time will not be earlier than 2:30 p.m. They may select a 30, 45, 60, 75 or 90 minute lunch period to be taken between 11:45 a.m. and 1:15 p.m.

The hours of work selected are subject to the supervisor's approval. The supervisor may, if necessary, restrict some employees to the hours of 8:30 am to 4:30 pm (for 35 hour per week employees), if, for example, the hours of work selected reduce the level of service provided by the employee to members of the employee's team, the employee’s supervisor, the Business Unit or the customers of the Business Unit. The supervisor may not assign 35 hour per week employees to hours of work outside of 8:30 am to 4:30 pm, except as provided for in Part D, Item 4.0 - Overtime.

Where in the Company’s opinion, a work unit cannot be operated satisfactorily under variable working hours, they will not be implemented in that unit. Individual deviation from selected work schedules will require the supervisor's prior approval.

2.1.2 Variable Working Hours in Head Office (Non-Nuclear)

Employees will be requested each month to select their standard work period for the following month. The work week will consist of five, seven-hour days, or eight hour days Monday to Friday. The hours of work selected must be in accordance with the observation of core working hours of 10:00am to 2:30pm.

Employees may select a starting time which is not earlier than 6:30 a.m. and not later than 10:00 a.m. or at 1/4 hour intervals prior to that. Their finishing time will not be earlier than 2:30 p.m. They may select either a 30, 45, 60, 75 or 90 minute lunch period commence within 3 to 5 hours of their start time.

The hours of work selected are subject to the supervisor's approval. The supervisor may, if necessary, restrict some employees to the hours of 8:30 am to 4:30 pm (for 35 hour per week employees). The supervisor may not assign 35 hour per week employees to hours of work outside of 8:30 am to 4:30 pm, except as provided for in Part D, Item 3.0 - Overtime.

Where in the Company’s opinion, a work unit cannot be operated satisfactorily under variable working hours, they will not be implemented in that unit.

Individual deviation from selected work schedules will require the supervisor's prior approval.

2.2 Hours of Work - Outside Head Office

Hours of work (including variable hours of work) in locations other than head office shall be negotiated by the Company and the Sector Vice President or Delegate of the Union.

Where in the Company’s opinion, a work unit cannot be operated satisfactorily under variable working hours, they will not be implemented in that unit.
2.3 Compressed Work Week (Non-Nuclear ONLY)

The parties agree that there may be instances in which there is a benefit to both the employee and the company of entering into a compressed work week arrangement. Either party can initiate discussions with respect to such arrangements but it will only be implemented upon attaining joint agreement. The benefits of a compressed work week must be demonstrated or the arrangement may be cancelled by either party upon the giving of appropriate notice. The details of the arrangement must be in writing and signed off by the parties.

Failure to agree to a compressed work week or the cancellation of same is not a matter subject to the grievance/arbitration process.

Details of this provision as well as the administrative/time keeping issues are included in a Joint Bargaining intent document dated July 19th, 2001.

2.4 On-Call (Non-Nuclear ONLY)

On-call is the term used to cover after hours service performed by various Part D employees. They will be allowed two hours to report from the time that they are called. The rates for on-call shall be computed at one half (1/2) hour at the employee’s basic hourly rate per day, except for Saturday, Sunday and statutory holidays when the rate will be one (1) hour at the employees basic hourly rate per day. An employee who is required to report to work while on-call shall be paid overtime rates as per Part D, Item 4.0.

When an employee is on-call, management will endeavor to provide the employee with either a cellular phone or a pager in order to facilitate contact.

On-call will be managed on a voluntary basis among qualified employees.

It is not the intent of this item to schedule employees on-call to avoid staffing on-going positions.

3.0 SHIFT DIFFERENTIAL AND SHIFT WORK

It is recognized that from time to time it may be necessary, due to the nature of the Company’s operations, to place certain clerical/technical day working employees on shift work. Where this occurs, the following provisions will apply:

1. Shift work shall not be implemented for a period of three working days or less. If the working period is three days or less, the appropriate premium rate will be paid for the minimum three-day period.

2. The Company will provide 72 hours’ (three calendar days) posted notice of the commencement and termination of a shift. Failure to provide such notice will require a penalty payment of double time for all changed hours of work within the notice period.

Note

For Non-Nuclear such notice will be personal notice as defined in the Collective Agreement.
3. Such a placing on shift work shall not deprive an employee of his/her total number of normal scheduled weekly hours.

4. Revision to the work schedule shall provide for a minimum of 15 hours off between shifts. Failure to provide such time off will require the penalty payment for the first affected shift.

5. Shift differential shall apply to employees required to work on a three-shift schedule or a two-shift schedule and shall not apply for overtime hours.

6. Shift work will be scheduled on a Monday to Friday basis.

7. Work in excess of the total number of normal daily hours will be paid at the appropriate overtime rates.

8. The following shift differentials shall apply:

   (a) Sixty-five cents per hour to employees scheduled to work between the hours of 1600 and 2400.

   (b) Eighty-five cents per hour to employees scheduled to work between the hours of 0000 and 0800.

9. Regular part-time and temporary part-time employees will not be eligible for shift differential when the shift starts and ends between the hours of 07:00 and 18:00.

4.0 OVERTIME

Due to the nature of the Company’s operations, some employees will be required to work overtime. Overtime will be minimized and managed within the limits of corporate effectiveness and customer impact. In recognition of employee well-being and inconvenience, an effort shall be made to equitably distribute overtime amongst all qualified employees. Overtime, as used herein, means that part of the actual working time, which is outside the normal scheduled hours and is, therefore, subject to compensation at premium rates.

4.1 Overtime Definitions

Prearranged Overtime: Work performed outside the normal scheduled hours for which notification must be given a minimum of 24 hours in advance. Time shall be counted from the time the employee reports for work until the employee finishes work.

Emergency Overtime: Work performed outside the normal scheduled hours, which is neither prearranged nor extension overtime. Time shall be counted from the time the employee reports for work until the employee finishes work.

Extension Overtime: Work performed outside the normal scheduled hours as an extension of the normal scheduled hours (either immediately preceding or following the normal scheduled hours). Time shall be counted from the time the employee reports for work until normal starting time or from normal quitting time until the employee finishes work.
4.2 Payment For Overtime

Overtime, as used herein, means that part of the actual working time, which is outside the normal scheduled hours, and is therefore, subject to compensation at premium rates.

Premium payment for overtime shall be as follows:

1. One and one-half times the employee's basic rate shall be paid for all work performed during the first four clock hours after normal quitting time, Monday to Friday inclusive.

2. Two times the employee's basic rate shall be paid for:
   - All work performed outside of the first four hours after normal quitting time, Monday to Friday inclusive.
   - All work performed on a regular day off, on Saturdays, Sundays and statutory holidays which occur Monday to Friday.

4.3 Overtime - Miscellaneous Provisions

1. In order to alleviate excessive inconvenience, an effort shall be made to equitably distribute overtime amongst all qualified employees. Where employees feel they have been assigned abnormal amounts of overtime, consideration of such cases shall be considered fit matter for discussion at the local level.

2. The Company agrees to control excessive authorized overtime by restricting actual overtime to not more than 12 hours per week, excluding travelling time. Under extraordinary circumstances, the Union will consider waiving the restrictive features of this clause.

3. A travelling allowance up to a maximum of one hour shall be paid at the appropriate overtime rate when an employee is called in to work overtime and an extra trip is involved. See also Section 4.4.

4. Because an employee was required to work overtime or because he/she lost time in changing shifts, he/she shall not be prevented from working his/her total number of normal daily hours in any normal scheduled day of work. If the employee cannot be supplied with the work required to make up the normal daily hours of work in that day, his/her pay shall be adjusted to provide a minimum of his/her normal weekly hours of work.

5. If an employee who has worked overtime and is physically capable and the group of which he/she is ordinarily a member is at work, he/she shall not be deprived of the opportunity of working his/her normal scheduled hours in addition to the overtime he/she may have worked.

6. An employee who has accumulated overtime hours shall receive this in earnings, calculated at the appropriate premium rate and cannot be required to take time off in lieu of payment.

7. An employee who is required to work continuously for more than 16 hours or an employee who accumulates 16 hours of working time in any 24 hour period without a minimum five hour
continuous break between 23:00 and 07:00 hours shall be entitled to an eight-hour rest period. Time spent for meals may be deducted from the total elapsed time but is not to be considered as breaking the continuity of the hours worked.

If the rest period extends into the employee’s normal scheduled hours of work, he/she shall be paid at straight time rates for the portion of the rest period, which extends into the normal scheduled hours. This is in addition to the overtime worked.

Should he/she be required to continue working beyond 16 hours he/she shall be paid two times his/her normal basic rate until an eight-hour rest period is granted. Should an employee be released before 16 hours have elapsed, he/she will not be entitled to an eight-hour rest period, and his/her right to continue work at straight time will be governed by Item 4.3(5.).


4.4 Minimum Payments - Overtime

All Part D clerical/technical employees who are called out to work overtime with or without notice shall receive the following:

When minimum payments apply no travel allowance will be paid.

1. All prearranged overtime performed or reported for due to lack of notice of cancellation, Monday to Friday inclusive, shall receive a minimum of two hours at straight time or the actual time worked at the appropriate premium rates, whichever is the greater.

2. All prearranged overtime cancelled with 48 hours of the designated time of work commencement shall require payment of two hours at straight time.

3. All prearranged overtime performed or reported for due to lack of notice of cancellation on Saturdays, Sundays and statutory holidays shall receive a minimum payment of four hours at straight time or the actual time worked at the appropriate premium rates, whichever is the greater.

4. This shall not apply where the overtime period commences on a Saturday, Sunday or statutory holiday, as part of a longer overtime period continuing into the next calendar day.

5. All emergency overtime work shall receive a minimum payment of four hours at straight time or the actual time worked at the appropriate premium rate, whichever is the greater, providing short emergency calls are not repeated within one hour of the completion of a previous call for which the four-hour minimum was paid.

If the call-out occurs less than two hours before the commencement of normal starting time, the minimum will not apply and the appropriate premium rate will be paid continuously from the call-out time until normal starting time.
4.5 Overtime - Regular Part-Time and Temporary Part-Time Employees

Overtime is defined as: (1) hours worked which are in excess of the normal daily hours of the classification; or (2) hours worked in excess of 24 in a week; or (3) hours worked on a regular day off.

Premium Payment for Overtime:

Extension Overtime: Overtime hours worked within the first four clock hours will be at one and one-half times the employee’s basic rate unless the employee works more than 28 hours in a week in which case the hours in excess of 28 will be paid at two times the employee’s basic rate.

Non-Extension Overtime: All overtime hours worked that are outside of the first four clock hours after the classification's normal quitting time will be at two times the employees’ basic rate.

Regular Day Off: Overtime hours worked on a regular day off will be paid at two times the employee's basic rate.

5.0 PROVISION OF MEALS

In recognition of the importance of regular meals to an individual's health and effectiveness on the job, the Company will supply meals as outlined below and when required, will assign an employee to secure the meals.

(a) Employees provide their own meals on regular days of work.

(b) When an employee works overtime on a regular day off, he/she will be expected to provide one meal if 23 hours notice has been given.

(c) When an employee works extension overtime before or after normal scheduled hours, all required meals will be provided by the Company. The first meal (or meal allowance) will be provided when two (2) hours of overtime are worked. Subsequent meals or meal allowances will be provided every four (4) hours of overtime worked thereafter.

(d) When meals cannot be reasonably obtained\(^1\), an allowance of $15.00 per meal will be paid.

5.1 Meal Periods

(a) Employees on day work shall take a meal period designated by the Company and shall not be paid for this time (unless otherwise provided for in the Collective Agreement).

(b) Employees on shift work shall eat their meals during the shift hours as conditions permit.

(c) When an employee works extension overtime, no time shall be deducted for eating such meals where the employee eats the meal on the job and in a minimum of time.

\(^1\) ‘Reasonably obtained’ is to be defined locally by Union and Management.
6.0 A PRINCIPLES RE RESOURCING FOR RELIEF, ACTING & TEMPORARY ASSIGNMENTS
(Nuclear)

Recognizing that relief, acting and temporary assignments contribute to the development of personnel and contribute to the work being done effectively, the following will be considered when resourcing these assignments:

Sound business management while meeting the intent of the collective agreement with regards to:

- Selection for step-up
- Duration of step-up opportunity
- Equitable distribution of step-up opportunities

Supervision

For supervisory positions primary consideration will be given to personal qualities such as leadership and the understanding and display of the practice of good human relations.

Definitions

Relief: Replacement of an incumbent who is absent.
Temporary: Where there is additional work a temporary nature, without an incumbent
Acting: There is a vacancy in a position, i.e. no incumbent and the work needs to be done during posting selection process.

Relief/Temporary/Assignments of greater than 25 days duration.

As per Part D, Item 6.1, step-up opportunities are rotated within the job family:

- By Seniority
- Site-Wide
- Employed for a minimum of 6 months in his/her base position
- Not already on assignment
- An employee will not be refused twice due to a lack of the same qualification

Regular employees shall be given step up opportunities over temporary employees.

6.1 A Relief Work

Intent

The assignment of relief is a Management right and increased duties must be assigned not assumed. Compensation for relief assignments shall be in accordance with Article 8.

1. The Company shall notify the employee in writing, in advance where possible, of the requirement to perform relief, of the general nature of the major duties to be performed, and the rate to be paid during the relief period.
2. Notification of the Chief Steward is required when the employee is required to relieve for a period of two working days or more.

3. Statutory holidays will not affect the continuity if they occur between the first and second days.

Payment for a statutory holiday shall be at the relief rate if it occurs during the relief period and at the normal rate if it occurs at the beginning or the end of the relief period.

6.2 A Acting in a Vacant Position

An employee may act in an existing job in which a vacancy is created, pending the arrival of a successful applicant to the vacancy. When an employee is to be placed in an acting position, the Company shall notify the employee and the chief steward in writing setting out:

1. The reason for the acting position.
2. The general nature of the major duties to be performed.
3. The rate to be paid for the acting position.
4. The expected duration.

The duration of the acting period shall not exceed 90 days from the date the employee is placed in the acting capacity, unless an extension is agreed to by the Company and the Sector Board Chairperson of the Union. Pending the arrival of the successful applicant and his/her assuming the normal duties, the acting incumbent who is performing the normal duties and responsibilities of an acting position shall receive the appropriate rate in accordance with Article 8 and Part A, Item 43.

6.3 A New Personnel Development (Training and Experience)

The benefits of personnel development to the Company and to the individual are recognized.

Also recognized is the emphasis placed on personnel development, when determining qualifications, for promotion purposes. The need for equitable development opportunities and treatment of individuals and groups is clear. Therefore, it is agreed that:

1. Individuals and groups should receive equitable development opportunities and treatment.
2. Disruptions to training will be minimized. Where the work situation, unavoidably, precipitates an inequality of development opportunity and treatment, such inequity will be recognized and will not be allowed to work to the disadvantage of that individual or group.
3. Employees shall receive 100% of approved reimbursable costs, paid for external training which:
   - creates or maintains an employee’s capability related to current job performance,
   - creates an employee’s capability for a position identified in a succession, retraining or redeployment plan.
Employees shall receive 75% of registration/tuition fees and learning material costs for external training activities which create employee’s capability for future jobs within the Company and provided such training is outside working hours.

6.0 B PRINCIPLES RE RESOURCING FOR RELIEF, ACTING & TEMPORARY ASSIGNMENTS (Non-Nuclear)

Recognizing that relief, acting and temporary assignments contribute to the development of personnel and contribute to the work being done effectively, the following will be considered when resourcing these assignments:

- the more senior employees will be given preference;
- assignments may be split between employees;
- specific qualifications/knowledge required for the position will be taken into consideration;
- for supervisory positions primary consideration will be given to personal qualities such as leadership and the understanding and display of the practice of good human relations;
- employee development;
- Employment Equity objectives discussed in advance with the Union shall be considered;
- amount of notice and duration of assignment will be considered.

These assignments will be distributed as equitably as possible, over time, once the above conditions have been considered.

The format for utilization of the above in a Business Unit (or smaller unit) will be a joint responsibility.

Item 6.0 shall not be subject to the grievance/arbitration procedure.

Disputes will be resolved locally and may be referred to the Sector Vice President or Delegate and the Local Manager.

Circumstances which negate consideration of the above conditions will normally be discussed in advance with the Union.

6.1 B Relief Work

The assignment of relief is a Management right and increased duties must be assigned not assumed. Compensation for relief assignments shall be in accordance with Article 8.

1. The Company shall notify the employee in writing, in advance where possible, of the requirement to perform relief, of the general nature of the major duties to be performed, and the rate to be paid during the relief period.
2. Notification of the Chief Steward is required when the employee is required to relieve for a period of two working days or more.

3. Statutory holidays will not affect the continuity if they occur between the first and second days.

   Payment for a statutory holiday shall be at the relief rate if it occurs during the relief period and at the normal rate if it occurs at the beginning or the end of the relief period.

6.2 B Acting in a Vacant Position

An employee may act in an existing job in which a vacancy is created, pending the arrival of a successful applicant to the vacancy. When an employee is to be placed in an acting position, the Company shall notify the employee and the chief steward in writing setting out:

1. The reason for the acting position.
2. The general nature of the major duties to be performed.
3. The rate to be paid for the acting position.
4. The expected duration.

The duration of the acting period shall not exceed 90 days from the date the employee is placed in the acting capacity, unless an extension is agreed to by the Company and the Sector Vice President or delegate of the Union. Pending the arrival of the successful applicant and his/her assuming the normal duties, the acting incumbent who is performing the normal duties and responsibilities of an acting position shall receive the appropriate rate in accordance with Article 8 and Part A, Item 43 of this Agreement.

7.0 POSTING OF VACANCIES

All vacancies as set out in Article 10.1 and as covered by this section of the agreement will be posted when they become vacant with the following exceptions:

1. A change to the job duties which results in an upward change of the pay bands shall not be considered to create a vacancy, if there is in the Company’s opinion, an employee at the location who is the only one qualified to perform the resulting job. If there is a more senior employee in the same pay band in the same job family at the location who was not appointed to the resulting job, s/he shall have the right to seek redress under Article 2 grievance procedure.

2. Changes to jobs which result in a surplus in staff complement of the work group shall not be considered to create a vacancy in the resulting job(s).

7.1 Posting Procedures

A notice of vacancy referring to Clerical-Technical positions shall be based on the job description and shall be posted province wide. Nothing contained in the notice of vacancy shall contravene the information contained in the job documents. No important information (subject to space limitations) shall be omitted.

Refer to Part A, Item 17.2 - Notification to Applicants.
8.0 POSITIONS EXCLUDED AS PER ARTICLE 1
- CLERICAL/TECHNICAL

Incumbents in positions excluded under Article 1 perform certain inherent work functions, which are part of their normal duties. It is also recognized, however, that such work functions will not be performed for the purpose of reducing staff requirements or deliberately to avoid overtime for employees represented by the Union. If the Union believes that this provision is being abused, it may lodge a grievance under Article 2 of the Collective Agreement.

9.0 SHIFT WORK - INFORMATION MANAGEMENT FACILITIES

It is recognized that Information Management Facilities shift working employees at head office must undergo conditions not normally experienced by other clerical/technical employees.

9.1 Rate of Pay

The basic rate of these employees shall be by Article 8 and Part A, Item 43. Calculation of all premiums shall be made on this basic rate. An increment of seven and one-half percent (7.5%) shall be added to the basic rate of each classification when such classification is designated as being two- or three-shift and six- or seven-day operation. Classifications designated as two- or three-shift, five-day, Monday to Friday operation, will be paid at the basic rate. When an employee is to be placed on or taken off shift work, the Union’s chief steward will be notified of such changes in writing.

9.2 Hours of Work

Shift working personnel shall work an average of 35 hours per week over a period of approximately one year. Employees will be informed of their time balance in June. Each employee's time will be balanced at the end of one of the five fiscal weeks immediately preceding December 16th. Payment of plus time balances existing on the time balancing date shall be paid before December 31st at the rate of two times the employee's classification basic rate in effect at the time balancing date. At the time of layoff all positive time balances will be paid out at 2X.

NOTE

The Company will not be required to balance time for employees who have been hired or transferred from non-shift work to shift work in the five fiscal weeks immediately preceding December 16th until a period of approximately one year following the employee's appointment to the new position has elapsed.

Minus time balances which occur as a result of promotion of a shift working employee within the five fiscal weeks immediately preceding December 16th shall be worked off within the two-month period immediately following the establishment of the minus time.
9.3 Scheduling Provisions

The Company will be responsible for the preparation, content and administration of shift schedules averaging 35 hours per week over approximately a one-year period. These schedules shall cover a nine-week period, posted two weeks in advance, showing the days, hours of work (shift), and position of each employee. Any reserve employees and their hours of work (shift) shall be shown on the schedule. The schedule will provide for a minimum of two shifts (16 hours) off between shifts. Failure to comply with two weeks’ advance posting as stated herein shall require payment of two times the employee's basic rate for work performed under the new schedule until the notice period has elapsed.

Although the content, preparation, posting, revision and administration of shift schedules is the sole responsibility of the Company, the preference of the staff regarding the type of schedule to be worked and the preferences of individual employees regarding vacation periods will be considered, providing such preferences are made known prior to commencement of preparation of new schedules. Where employees feel they have been assigned unreasonable schedules, such schedules shall be considered fit matter for discussion at local level.

NOTE

The cycling of schedules, allowing for holidays and sickness, may create a reserve of employees over and above the complement required for any shift. Whenever an employee in the normal course of his/her rotation of the schedule becomes supernumerary, he/she will be known as a "reserve employee".

Schedules will be posted two weeks in advance to cover one, two or three shifts per day for five-, six- or seven-day coverage with eight working hours per shift.

The day a shift begins will dictate the shift hours, and the specific hours of work for all Information Management Facilities classifications designated as being two or three shift and six or seven days a week operation will be as follows:

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<table>
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<tr>
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<tbody>
<tr>
<td>Days</td>
<td>0800 to 1600</td>
</tr>
<tr>
<td>Evenings</td>
<td>1600 to 2400</td>
</tr>
<tr>
<td>Nights</td>
<td>2400 to 0800</td>
</tr>
</tbody>
</table>

All shift workers will eat their meals on duty. On day shift, Monday to Friday, the employee can opt for a normal, unpaid lunch period.

9.4 Schedule Alterations

A minimum of seven days' notice shall be given when an employee's hours of work as shown on the schedule are to be changed, with the following exceptions:

1. Reserve hours of work may be changed within a calendar day, providing a minimum of two non-working shifts' (16 hours) notice is given before the start of the first affected shift.
2. With four days' notice, reserve days of work may be interchanged with scheduled days off, within the posted schedule. Such interchange will not be used for an employee while attending meetings involving the Union.

3. In the case of illness, which would result in a staff shortage, four (4) days' advance notice will be given when placing an employee on shift.

9.4.1 Penalties

Failure to give the required notice, stated in Subsection 9.4, shall result in the payment of two times the employee's classification basic rate until the notice period has elapsed.

9.5 Shift Differential

Sixty-five cents per hour shall be paid for scheduled hours worked on the evening shift. Eighty-five cents per hour shall be paid for scheduled hours worked on the night shift.

The appropriate shift differential shall be paid for the first eight hours of each scheduled shift on any day and shall not apply for overtime hours. When premium time is involved for payment of shift worked, the premium rate shall be computed on the standard basic rate, excluding shift differential.

Regular part-time and temporary part-time employees will not be eligible for shift differential when the shift starts and ends between the hours of 07:00 and 18:00.

9.6 Special Payment Provisions

One and one-half times the employee's classification basic rate shall be paid for scheduled shift work performed on Sundays, and statutory holidays.

NOTE

Shift workers shall receive entitlement for the same number of statutory holidays as Monday-Friday, day-working clerical/technical employees. Therefore, when a statutory holiday falls on a Saturday, statutory holiday credit shall not apply. See chart at end of this section.

9.7 Overtime

Overtime for shift workers shall be paid at the appropriate overtime rate for all hours worked outside of the posted shift schedule as per Part D, Item 4.2, paragraphs 1 and 2.

9.7.1 Minimum Payments - Overtime

Minimum payments for overtime shall be in accordance with Part D, Item 4.4.

Payment for overtime shall be made not later than on the second pay day following the pay period during which the overtime was performed.
The Company agrees to control excessive authorized overtime by restricting actual overtime to total not more than two shifts (16 hours) in any given pay week.

9.8 Definition of Notice

Notice: as referred to in this section shall be defined as per the following example:

One day's notice shall mean three shifts (24 hours and not an individual employee's shift) prior to the start of the first affected shift. Also, the notice period shall be deemed to commence coincident with the posting of the revised schedule. A reasonable effort will be made to contact the employee affected by the change.

9.9 The following items will be credited, for pay purposes, on an hour-for-hour basis.

1. Personal time off.

2. Travelling time outside normal working hours.

3. Payment for temporary supervision.

4. Time charges and expenses - employee union representative.

When the following items apply a "day" will be the scheduled hours of work for that day:

1. Jury duty.

2. Funerals.

3. Moving day.

The basic statutory and special time off provisions remain unchanged in that the time off and pay entitlements will continue to be calculated on a seven-hour basis. However, employees eligible for Remembrance Day and scheduled to work will get the normally scheduled hours off with pay.

9.10 When employees are on vacation or sick leave, their time for these particular days is to be credited with only seven hours and no positive time balance of one hour.

10.0 TEMPORARY GUIDES

The normal hours of work of a temporary guide will be up to a maximum of 35 hours per week, which may be scheduled on any day of the week with an average of two days off per week. Temporary guides are not eligible for the payment of shift differential. Overtime shall be paid for all hours worked in excess of 35 hours per week as per Part D, Item 4.2, paragraphs 1 and 2.

NOTE

The payment for scheduled work performed on a statutory holiday will be one and one-half times the employee's basic rate plus a lieu day.
The Company will provide a suitable uniform and bear the cost of cleaning at intervals decided upon by the Company.

Transportation provisions will be in accordance with Mid-Term Agreement entitled "Transportation for Employees to Outlying Stations". In addition, the Company will bear the cost of transportation for female employees required to travel during periods of darkness in those locations where appropriate public transportation is not available.

11.0 HEALTH PHYSICS TECHNICIANS - HEALTH AND SAFETY

11.1 Hours of Work - Health Physics Technicians

The parties agree to develop a schedule covering seven days per week for a period of not less than 3 months to be posted 30 days in advance, providing an average of 35 hours per week.

The following are the recognized criteria for developing an acceptable shift schedule:

1. The schedule should equitably rotate among all employees.
2. The schedule should follow a repeating pattern so that it is easily understood.
3. The majority of employees in each location must agree to the schedule.
4. The schedule may provide flexibility in the work day and work week.
5. The schedule must provide for time balancing.

NOTE

In the event that the parties fail to develop an agreed to shift schedule, the provisions of Part D, Item 4.0 will apply.

11.2 Method of Payment

11.2.1 Scheduled Hours

Payment at straight time, Monday to Friday.

Payment at time and one-half for all scheduled hours worked on Saturdays and Sundays.

11.2.2 Overtime

Payment for all work performed outside of scheduled hours to be made in accordance with the overtime provisions of Part D, Item 4.0.
11.2.3 Statutory Holidays - Scheduled Hours

Time and one-half for all scheduled hours worked on a statutory holiday, plus statutory holiday credit.

11.2.4 Statutory Holidays - Overtime

Double time for all non-scheduled hours worked on a statutory holiday, plus statutory holiday credit.

12.0 SHIFT WORK – TECHNICAL STAFF (Inspection and Maintenance Technicians – Nuclear ONLY)

12.1 Applicability

This section applies to Inspection and Maintenance Technicians I/II/III.

12.2 Intent

I&M technicians are primarily day workers. However operational requirements mean that these employees will be required to work shift from time to time. The Company may select and assign I&M Technicians to shift work for up to eight (8) months in total per annum per employee.

12.3 Implementation

Although the content, preparation, posting and administration of the shift schedule is the responsibility of the Company, an annual province wide secret ballot vote by I&M Technicians will determine whether the shift schedule will be composed of 8 or 12 hour shifts. The choice of a simple majority of those voting will prevail. Shift preferences will be made known to the Company prior to the commencement of the new schedule. A province wide 12 month I&M schedule will be posted 30 days prior to its starting date.

12.4 Duration of Shifts

Shift work employees will work 8 or 12 hour shifts determined in accordance with 12.3. The design of shift schedules may be time balanced to greater than base hours (35 hours per week). The design of the schedule shall provide for a minimum of 16 hours off between shifts when working on an 8 hour shift schedule and 12 hours off between shifts when working on a 12 hour shift schedule.

12.5 Scheduling Provisions When on Shift

12.5.1 A minimum of seven (7) days’ notice will be given when an employee’s shift schedule is changed or when an employee is put on shift with the following exceptions:

(a) Three (3) days’ notice if a forced unit outage occurs for reasons of equipment failure or for a safety reason. Refer to Mid-term Agreement R-7 for definition of unit outage.

The applicability of the three (3) day notice period in this clause is dependent upon a shift change notice being issued to the affected employees within 48 hours of the occurrence of the forced unit outage.
In the case of illness, four days’ notice will be given.

Failure to provide the above notice will require the payment of double time for work performed during the notice period. For purposes of clarification Part D, Item 3.0(1) and Part D, Item 3.0(2) do not apply.

12.5.2 An employee will not receive less pay on average as a result of being placed on shift work than he would have received as compensation for working regular day hours. This item overrides Part D, Item 3.0(3).

12.5.3 Revision to the work schedule shall provide for a minimum 15 hours off between shifts. Failure to provide such time off will require the penalty for the first affected shift.

12.5.4 Shift Differential

Shift differentials shall apply to employees required to work on a three-shift schedule or a two-shift schedule. The first part of a three-shift or a two-shift schedule shall begin at normal starting time.

Regular part-time and temporary part-time employees will not be eligible for shift differential when the shift starts and ends between the hours of 0700 and 1800.

12.5.4.1 Eight Hour Shifts

A shift differential of 65 cents per hour shall be paid to employees who are scheduled to work between the hours of 1600 and 2400.

A shift differential of 85 cents per hour shall be paid to employees who are scheduled to work between the hours of 0000 to 0800.

12.5.4.2 Twelve Hour Shifts

A shift differential will be paid for the night shift only.

The shift differential will be the sum of the differentials in 12.5.4.1 above multiplied by 8/12.

12.5.4.3 The appropriate shift differential shall be paid for the first eight/twelve hours of each scheduled shift on any regular scheduled day of work and shall not apply for overtime hours. When premium time is involved for payment of shift work, the premium rate shall be computed on the standard basic rate, excluding shift differential.

12.5.5 Work in excess of the total number of normal scheduled hours will be paid at the appropriate overtime rates.
12.5.6  Premium Payments

The computing of hourly rates for overtime shall be in accordance with the following:

The basic hourly rate of each employee’s classification as set out in Part A, Item 43 without any increments, premiums or bonuses.

Premium payment, for the undemoted, shall be as follows:

12.5.6.1  Shift Workers

12.5.6.2  Scheduled Work

1. One and one-half times the employee’s basic rate shall be paid for scheduled work performed on Saturdays and Sundays.

2. Two times the employee’s basic rate shall be paid for:

   (a) Scheduled work performed on a statutory holiday, which occurs on Monday to Friday. An additional day off will be scheduled in lieu of the statutory holiday within six months of the end of the posted schedule.

   (b) Scheduled work performed on a statutory holiday, which occurs on a Saturday. The premium for scheduled Saturday in 1. above shall not apply.

12.5.7  When these employees are required to work 12 hour shifts 12.5.3 will not apply. For purposes of clarification, this Item overrides Item 3.04.

12.5.8  Scheduled hours worked in pay periods involving shift work will be credited to a time bank. An amount equal to base hours for the pay period worked on shift will be paid and deducted from the time bank. Plus time balances which still exist as of the last day of the year shall be paid at double time, or where it is mutually agreeable all or a portion thereof may be taken off at premium rates. Plus time balances, which still exist as of the last day of the regular schedule shall be paid for at double time. At the time of layoff all positive time balances will be paid out at 2X. Minus time balances, which occur as a result of changes to the regular schedule shall be worked off within two fiscal months of the end of the schedule month in which the minus balance occurs unless it is mutually agreed to between the employee and his/her supervisor to extend this period. Minus balances not worked off within this two month period will be written off (unless it has been agreed to extend this period).

12.5.9  Shift work may be scheduled on any day of the week. Overtime for those assigned to shift will be paid for hours worked in excess of the scheduled shift hours with applicable premiums. For purposes of clarification, Part D, Items 3.0(6) and 3.0(7) have no application.

Overtime beyond scheduled hours of work may be taken off at mutually agreed upon times calculated in accordance with the applicable premium rates. Where there is no agreement, overtime shall be paid at the applicable premium rates.
12.5.10  When scheduling 8 or 12 hour shifts the shift will consist of 5 consecutive 8 hour shifts or 4 consecutive 12 hour shifts. The shift schedule shall provide for at least 48 hours off between sequence of shifts.

12.5.11  **Shift Schedule Pay Provisions**

When an employee is scheduled to work an 8-hour shift, the following will apply:

(a) In determining credits used for vacations, floating holidays and sick leave, one and one-seventh days will be deducted.

(b) In determining pay treatment for

(i) travelling time outside normal working hours
(ii) payment for temporary supervision
(iii) time charges and expenses - employee union representative

Calculations will be made on an hour-for-hour basis to a maximum of 8 hours except for (i) where the maximum will be 7 hours.

(c) In determining pay treatment for the following items a day will be considered to be 8 hours:

(i) Leave of Absence with Pay - Part A, Item 10.1
(ii) Moving Days

(d) In determining pay treatment for

(i) Statutory Holidays
(ii) Special Time Off

A day will continue to mean seven hours. However, employees eligible for Remembrance Day and scheduled to work will get the normally scheduled hours off with pay.

When an employee is scheduled to work a 12 hour shift, the following will apply:

(a) In determining credits used for vacations, floating holidays and sick leave, one and five-sevenths days will be deducted.

(b) In determining pay treatment for

(i) travelling time outside normal working hours
(ii) payment for temporary supervision
(iii) time charges and expenses - employee union representative

Calculations will be made on an hour-for-hour basis to a maximum of 12 hours except for (i) where the maximum will be 7 hours.

(c) In determining pay treatment for the following items a day will be considered to be 12 hours:
(i) Leave of Absence with Pay - Part A, Item 10.1
(ii) Moving Days

(d) In determining pay treatment for

(i) Statutory Holidays
(ii) Special Time Off

a day will continue to mean seven hours. However, employees eligible for Remembrance Day and scheduled to work will get the normally scheduled hours off with pay.

12.6 Deleted Provisions When on Shift

When an individual is assigned a shift and the provisions of 12.4 are in effect, the following provisions of Part D will not apply.

1. Item 2.0 - Hours of Work - General
2. Item 2.1 - Hours of Work - Specific
3. Item 2.2 - Hours of Work - Outside Head Office

12.7 The I&M Technician Schedule at Bruce has start and stop times which do not align with the regularly scheduled bus services, then the company will supply buses for each shift or pay travel expenses as per PW-8.

12.8 Compensation for travel and travel time shall be in accordance with the relevant sections of Part A of the Collective Agreement.

12.9 Personal Property

Reimbursement by the Company for losses of the employee's personal property as a result of radioactive contamination shall be considered and assessed on the individual merits of each case.

12.9.1 Access to Radiation Records

Each employee shall have access to his/her personal radiation dose records.

12.9.2 Ionizing Radiation

The Union Office will be supplied with one copy of the Radiation Protection Requirements and one copy of the Radiation Protection Procedures Manual, and all revisions to these Requirements and Procedures.

12.9.3 Radiation Limits

Employees performing their normal work, who exceed radiological limits requiring them to be removed from certain work locations, shall be given suitable work elsewhere at not less than their basic rate of pay.
12.9.4 Pregnant Nuclear Energy Workers

Every reasonable effort shall be made to assign a pregnant Nuclear Energy Worker to a location where there is no expected recordable radiation dose above natural background. In relocations of pregnant Nuclear Energy Workers, the normal base rate of pay will be maintained. The relocation period will be extended for a reasonable period of time for female Nuclear Energy Workers who indicate they intend to continue to breast-feed their babies after they return to work.

12.9.5 Female Nuclear Energy Workers Wishing to Conceive

Every reasonable effort shall be made to re-assign a female Nuclear Energy Worker, at her request, to a location where there is no expected measurable radiation dose while she is attempting to conceive. The purpose of the reassignment is to ensure that the embryo/fetus is not exposed to radiation during the period between conception and confirmation of pregnancy.

The re-assigned female Nuclear Energy Worker shall have her wages maintained under the following conditions:

(a) the re-assignment is six months or less, and

(b) the employee will have no more than three such re-assignments, and

(c) Exceptions to the above may be granted at the discretion of The Company’s Chief Physician.

12.9.6 Although every effort shall be made to minimize disruption to the continued training and development of the employee in her chosen career, it is recognized that re-assignment to a non-related work area may interrupt the training program. In the case where it is interrupted, progression through the training program will be frozen for the duration of the reassignment.

12.9.7 Dose Limits

The Company is committed to excellence in radiological safety performance. All radiation exposures shall be kept as low as reasonably achievable, consistent with sound operating practices, and with due regard for employee concerns.

The Company will pursue a policy of controlling radiation doses to its employees such that individual doses will not exceed 10 mSv (1 rem) per year averaged over any five (5) year period, provided the total collective dose does not increase as a result.

Each facility shall jointly develop annual targets and implementation plans which will strive to improve on this standard and eliminate unnecessary radiation exposure.

The Grievance process is not intended to apply to Part D, Item 12.9.7, however, instances where annual targets have been exceeded will be reviewed by the Joint Health and Safety Committee of that facility. Such instances may also be fit matter for discussion by the Joint Committee on Radiation Protection.
13.0 SHIFT WORK - TECHNICAL STAFF (Instructor – Nuclear ONLY)

13.1 Applicability

This section covers the following classification: Instructor.

13.2 Intent

The intent of this section is to provide a framework within which employees in the above named classifications may be assigned to shift work on a Monday to Friday basis for limited periods of time. The "limited period" is to be less than three months in each year for each employee unless the employee involved specifically consents to an extension.

13.3 Implementation

When shift work is required, management will solicit preferences for shift work from the employees in the required classifications. If employees with the required skill, knowledge, experience, etc., indicate a preference for shift work, management will select from among these employees. If insufficient qualified volunteers are available, management will assign the shift work to qualified employees, endeavouring to minimize personal inconvenience.

13.4 Duration of Shift Hours

The employees who may be required to work shifts under this section include both 35 and 40 hour per week positions. They will work a time balanced schedule.

Forty hour per week employees when assigned to shift work will work the same hours as regular shift workers on shift.

Thirty-five hour per week employees when assigned to shift work will normally work seven-hour shifts. This may, at management’s discretion, be increased to eight-hour shifts.

13.5 Special Provisions When on Shift

1. Shift work shall not be implemented for a period of three working days or less. If the working period is three days or less, the appropriate premium rate will be paid for the minimum three-day period.

2. The Company will provide 72 hours’ (three calendar days) posted notice of the commencement and termination of a shift. Failure to provide such notice will require a penalty payment of double time for all changed hours of work within the notice period.

3. Such a placing on shift work shall not deprive an employee of his/her total number of normally scheduled weekly hours.

4. Revision to the work schedule shall provide for a minimum of 15 hours off between shifts. Failure to provide such time off will require the penalty payment for the first affected shift.
5. Shift differential shall apply to employees required to work on a three-shift schedule or a two-shift schedule and shall not apply for overtime hours. Regular part-time and temporary part-time employees will not be eligible for shift differential when the shift starts and ends between 0700 and 1800.

6. Work in excess of the total number of normal daily hours will be paid at the appropriate overtime rates.

13.6 Deleted Provisions When on Shift

When an individual is assigned a shift and the provisions of 13.5 are in effect, the following provisions of Part D will not apply:

1. Item 2.0: Hours of Work - General
2. Item 2.1: Hours of Work - Specific
3. Item 2.2: Hours of Work - Outside Head Office
PART E

CONSTRUCTION
TECHNICAL
TABLE OF CONTENTS

PART E

CONSTRUCTION
TECHNICAL

The provisions of the Articles of the Agreement as well as the provisions of Part A General Items are applicable to the employees covered by Part E. Specific matters referred to in Part E do not conflict with any item covered under the Articles or Part A General Items of the Agreement.

1.0 HOURS OF WORK
2.0 POSTED VACANCIES
3.0 NEW GENERATION PROJECTS
4.0 MEMBERSHIP LISTS
5.0 POSITIONS EXCLUDED AS PER ARTICLE 1
6.0 CHRISTMAS SHUTDOWN
7.0 SHIFT DIFFERENTIAL AND SHIFT WORK
8.0 BOARD AND LODGING AND SPECIAL ALLOWANCE RECEIPTS
9.0 PROVISION OF MEALS
10.0 NOTICE OF TRANSFER
11.0 RESIDENCE HEADQUARTERS
12.0 OVERTIME
13.0 ACTING POSITIONS
14.0 REST PERIOD
15.0 PERSONAL DEVELOPMENT (TRAINING AND EXPERIENCE)
The following provisions apply to Construction Technical employees.

1.0 HOURS OF WORK

The normal work week for employees shall be 37½ hours per week consisting of eight hours per day Monday through Thursday, and five and one-half hours on Friday.

All hours worked in excess of normal daily hours will be paid for at appropriate overtime rate.

For alternate hours of work arrangements refer to the Bargaining Memorandum of Understanding 1992.

2.0 POSTED VACANCIES

2.1 Posting and Transfer - General

Employees in the construction field forces covered by this Agreement are eligible to apply for vacancies as per Article 10.0.

When a technician vacancy within the construction field forces occurs and additional staff is required, the Company agrees to post such vacancies providing the job will exist for a period of one year or more. Selection to be made or the vacancy cancelled within four months after the posting date of the advertisement.

Application for lateral transfers or voluntary demotions will be considered on the same basis as for other employees (See Article 10).

One copy of the compiled list of applicants for all advertised vacancies will be forwarded to the Union Office.

On request, the Company will explain in writing to any unsuccessful applicant for an advertised position the reason why he/she was not selected for the position. The Union will advise its membership of the particular difficulties involved in this undertaking in order that the delay in complying with the request will be understood.

Within 60 days from the date of selection the successful applicant will be transferred or paid the rate of pay for the new position.

2.2 Notification to Applicants

1. If the decision has been made within five weeks of the closing date of the advertisement, then at that time, the supervisor with the vacancy or his/her human resources manager will be responsible for:

Advising all applicants who have been interviewed of the decision in writing.
Supplying Human Resources with the list of successful applicants for publication. The published list will be considered appropriate notification for those applicants who were not interviewed.

2. If the decision has not been made within five weeks of the closing date of the advertisement, then at that time, the supervisor with the vacancy or his/her human resources manager will be responsible for:

Ensuring that all applicants who do not possess the necessary qualifications are notified that their applications have been considered and they were not successful.

Ensuring that all remaining applicants are informed of the delay, the status of their application and when a decision is likely to be made.

3. When a final decision has been made, the supervisor or his/her human resources manager will ensure that:

The unsuccessful applicants not yet informed are notified of the final decision as soon as possible. The name of the successful applicant should be given.

The successful applicant and his/her supervisor is notified.

Notify Human Resources of the name of the successful applicant for publication.

2.3 Similar Vacancies

When a similar vacancy occurs beyond four months after the posting date of the advertisement, it must be re-posted and considered separately.

3.0 NEW GENERATION PROJECTS

A pre-job meeting will be arranged by the Company with the Union as far in advance as possible of construction of a new generation project to outline plans of the construction operation and to discuss and review general conditions that may pertain to the new project.

4.0 MEMBERSHIP LISTS

Chief stewards in the construction field forces will be supplied with a semi-annual list of all Union members in their jurisdiction and a monthly list of additions and deletions to the membership. In order to facilitate this, the Union agrees to keep construction management supplied with an up-to-date list of chief stewards and stewards every third month showing the limits of their jurisdiction.
5.0 POSITIONS EXCLUDED AS PER ARTICLE 1

Incumbents in positions excluded under Article 1 perform certain inherent work functions which are part of their normal duties. It is also recognized, however, that such work functions will not be performed for the purpose of reducing staff requirements or deliberately to avoid overtime for employees represented by the Union. If the Union believes that this provision is being abused, it may lodge a grievance under Article 2 of the Collective Agreement.

6.0 CHRISTMAS SHUTDOWN

It is recognized that the Company shall retain the right to designate those positions which require coverage during the shutdown. When a Christmas shutdown is declared by the Company, eligible technical employees shall have the option of repayment by:

1. Applying unused vacation credits from the present year (when a Christmas shutdown period extends into the next calendar year, an employee will have the right to use his/her unused vacation from the previous year).

2. Applying next year's vacation entitlement (restricted to shutdown days only).

3. Requesting time off without pay (restricted to shutdown days only).

4. The use of make-up time at straight time.

The Company will maintain salaries of technical employees who elect to work make-up time. The employee will work make-up time within the following periods:

<table>
<thead>
<tr>
<th>Shutdown Period</th>
<th>Make-up Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 working days or less</td>
<td>October 15th to February 1st</td>
</tr>
<tr>
<td>More than 4 working days</td>
<td>October 1st to March 31st</td>
</tr>
</tbody>
</table>

5. The use of banked overtime hours as per Item 12.2(6.) The selection of option 4. above precludes the use of this option during the make-up period.

Unpaid overtime worked shall be paid to the employee at the appropriate premium rate in the event of his/her transfer or termination prior to receiving the time off with pay during the shutdown period.

The employee will indicate to his/her supervisor his/her selection of the above options prior to the commencement of the make-up period. The employee may change his/her options at any time provided the employee's supervisor authorizes the change.
7.0 SHIFT DIFFERENTIAL AND SHIFT WORK

It is recognized that from time to time it may be necessary, due to the nature of the Company's operations, to place day working employees on shift work. Where this occurs, the following provisions will apply:

1. The Company will normally provide an individual with seven (7) days’ notice of a change from day work to shift work or between shifts with the following exception:

   72 hours’ notice is acceptable when:

   (a) an individual is transferred from shift work to day work,
   (b) shift is required to support critical path work in a planned outage and
   (c) in emergency situations such as a forced outage, equipment failures or safety reasons.

   Notice will include the following:

   i. Date of the shift change notice
   ii. Reason for the shift change notice
   iii. Details of changed hours of work

   All lack of notice penalty payments to be paid at premium rate (2x).

2. Such a placing on shift work shall not deprive an employee of his/her normal scheduled weekly total hours of work.

3. All employees on a two- or three-shift per day operation shall be paid time and one-seventh for all standard shift hours worked on the second shift of a two- or three-shift schedule and time and one-fifth for the third shift of a three-shift schedule.

4. The shift differential in 3. above shall not apply to overtime hours.

5. When shifts commence during the following hours, the shift differential rates shall be:

   0700 to 1000 - no shift differential
   1000 to 1800 - time and one-seventh
   1800 to 0700 - time and one-fifth

   Regular part-time and temporary part-time employees will not be eligible for shift differential when the shift starts and ends between the hours of 0700 and 1630.

6. A minimum period for a shift is four days. An employee who is required to work shift work shall be entitled to an eight-hour rest period prior to returning to normal scheduled hours. If the rest period extends into the employee's normal scheduled hours of work, he/she shall be paid at straight time rates for the portion of the rest period which extends into the normal scheduled hours. This is in addition to the shift hours worked.
7. In the case of illness, which would result in a staff shortage, four (4) days’ advance notice will be given when placing an employee on shift.

8. All positive time balances to be paid out at 2X.

8.0 BOARD AND LODGING AND SPECIAL ALLOWANCE RECEIPTS

When entitled to relief under the Income Tax Act, a yearly statement shall be provided to each regular employee of the construction field forces upon request, for all board and lodging or special allowances given or paid to such employees.

9.0 PROVISION OF MEALS

In recognition of the importance of regular meals to an individual's health and effectiveness on the job, the Company will supply meals as outlined below and when required, will assign an employee to secure the meals.

(a) Employees provide their own meals on regular days of work.

(b) When an employee works overtime on a regular day off, he/she will be expected to provide one meal if 23 hours’ notice has been given.

(c) When an employee works extension overtime before or after normal scheduled hours, all required meals will be provided by the Company. The first meal (or meal allowance) will be provided when two (2) hours of overtime are worked. Subsequent meals or meal allowances will be provided every four (4) hours of overtime worked thereafter.

(d) When meals cannot be reasonably obtained\(^1\), an allowance of $15.00 per meal will be paid.

9.1 Meal Periods

(a) Employees on day work shall take a meal period designated by the Company and shall not be paid for this time (unless otherwise provided for in the Collective Agreement).

(b) Employees on shift work shall eat their meals during the shift hours as conditions permit.

(c) When an employee works extension overtime, no time shall be deducted for eating such meals where the employee eats the meal on the job and in a minimum of time.

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\(^1\) 'Reasonably obtained' is to be defined locally by Union and Management.
10.0 NOTICE OF TRANSFER

10.1 Transfer

When employees with more than one month's service are transferred and a change of residence headquarters is involved, a minimum of one month's notice shall be given and where possible two months' notice shall be provided. This shall not apply in the case of an employee being transferred as a result of an advertised vacancy or as a result of the Worksite/Location Redeployment clause of Article 11.0.

When the Company considers a preliminary trip to the new location is necessary for interview of employee or for him/her to seek a house, the time, board and lodging and travelling expenses of the employee may be paid.

Notwithstanding the preceding paragraph where a change in residence headquarters will be greater than 100 km a preliminary trip will be provided and the time, board and lodging and travelling expenses of the employee will be paid.

Following an employee's move to his/her new residence headquarters, and while awaiting the transfer of his/her family, time off may be required in order for him/her to seek a house. For such purposes reasonable time off without loss of earnings may be granted at the Company's discretion. This allowance would normally be expected to supplement efforts made by the employee during non-working hours and as such would not normally exceed a total of one full working day.

10.2 Transfer Other than Change of Residence Headquarters

On a change of work headquarters employees shall be given five days' prior notice of transfer.

This shall apply in all cases except when, due to the lack of prior knowledge by the employee's immediate supervisor, such notification is impossible.

Failure to provide the required notice period will result in double time being paid until the notice period has expired.

10.3 In either 10.1 or 10.2 above, the Company shall continue to transfer employees without partiality.

11.0 RESIDENCE HEADQUARTERS

For those employees who are entitled to moving expenses, where there is a minimum of six months work foreseeable for an employee at an established work headquarters or on a special project, a suitable location or locations at or near that work headquarters or special project will be designated as residence headquarters. In order to seek the Union's input, the Company will advise and meet with the Union to discuss as far in advance as possible the proposed residence headquarters. Following such a meeting, the Company will designate the residence headquarters.

Where the Company deems it appropriate and the employee concurs the assignment of temporary work headquarters may be extended beyond six months (all subsequent changes to work or residence headquarters will be as detailed in Item 11.0). The employee may cancel his/her concurrence to the extension to a temporary headquarters transfer providing he/she gives the Company three months' prior notice in writing.
The employee will then be entitled to a maximum of four months' board allowance (if eligible) on a transfer of residence headquarters.

11.1 Definition of Residence Headquarters

Residence headquarters will be that location or those locations within which or adjacent to which the employee is expected to reside or is assumed by the Company to reside for the purpose of payment of allowances. The residence headquarters may or may not be the same location as the work headquarters.

Establishment of a suitable location or locations for residence headquarters will be dependent upon presence of adequate living facilities at that location or those locations.

Residence headquarters for employees with no spouse or dependents may be any location where there are boarding facilities either the Company or privately owned.

Residence headquarters for employees with a spouse and/or dependents may be any location where there is housing accommodation whether it be the Company or privately owned.

12.0 OVERTIME

Due to the nature of the Company operations, some employees will be required to work overtime. Overtime will be minimized and managed within the limits of corporate effectiveness and customer impact. In recognition of employee well-being and inconvenience, an effort shall be made to equitably distribute overtime amongst all qualified employees. Overtime, as used herein, means that part of the actual working time which is outside the normal scheduled hours and is, therefore, subject to compensation at premium rates.

12.1 Overtime Payments

1. Beyond eight hours/day Monday through Thursday, and beyond five and one-half hours on Friday.

Overtime shall be paid at one and one-half times the employee's basic rate during the first four clock hours after normal quitting time Monday to Friday inclusive.

All work performed outside of the first four clock hours after normal quitting time, and all work performed on a regular day off, Saturdays, Sundays and recognized holidays shall be paid at two times the employee's basic rate.

12.2 Overtime Miscellaneous Provisions

1. In order to alleviate excessive inconvenience, an effort shall be made to equitably distribute overtime amongst all qualified employees. Where employees feel they have been assigned abnormal amounts of overtime, consideration of such cases shall be considered fit matter for discussion at local level.

2. The Company agrees to control excessive authorized overtime by restricting the actual overtime to not more than 12 hours per week, excluding travelling time. Under extraordinary circumstances the Union will consider waiving the restrictive features of this clause.
3. A travelling allowance up to a maximum of one hour shall be paid at the appropriate overtime rate when an employee is called in to work overtime and an extra trip is involved. See also Item 12.3.

4. Because an employee was required to work overtime or because he/she lost time in changing shifts, he/she shall not be prevented from working his/her total number of normal daily hours in any normal scheduled day of work. If the employee cannot be supplied with the work required to make up the eight hours' work in that day, his/her pay shall be adjusted to provide a minimum of eight hours' work.

5. If an employee who has worked overtime and is physically capable and the group of which he/she is ordinarily a member is at work, he/she shall not be deprived of the opportunity of working his/her normal scheduled hours in addition to the overtime he/she may have worked.

6. An employee who has accumulated overtime hours shall receive this, in earnings, calculated at the appropriate premium rate and cannot be required to take time off in lieu of payment. However, the employee may elect to bank one hour for each overtime hour worked for application to the Christmas shutdown. The maximum number of hours that can be banked is equal to the duration of the Christmas shutdown. The premium portion of the overtime worked shall be received in earnings the following pay period.

7. An employee who is required to work continuously for more than 16 hours shall be entitled to an eight hour rest period. Time spent for meals may be deducted from the total elapsed time but is not to be considered as breaking the continuity of the hours worked.

If the rest period extends into the employee's normal scheduled hours of work, he/she shall be paid at straight time rates for the portion of the rest period which extends into the normal scheduled hours. This is in addition to the overtime worked.

Should he/she be required to continue working beyond 16 hours he/she shall be paid two times his/her normal basic rate until an eight hour rest period is granted. Should an employee be released before 16 hours have elapsed, he/she will not be entitled to an eight-hour rest period, and his/her right to continue work at straight time will be governed by Item 12.2 (5.) above.

8. Equivalent time off without pay see Part A, Item 10.2.

12.3 Minimum Payments - Overtime

All overtime arranged for within the employee's shift and performed as an extension of that same shift requires no minimum payment. All other overtime performed or reported for due to lack of notice of cancellation shall receive a minimum payment of two hours at straight time or the actual time worked at the appropriate premium rate, whichever is the greater.

All overtime arranged for and cancelled within the employee's same shift requires no minimum payment.

All other overtime cancelled within 24 hours of the designated time of work commencement shall require payment of two hours at straight time.
12.4 Overtime - Regular Part-Time and Temporary Part-Time Employees

Overtime is defined as:

(a) Hours worked which are in excess of the normal daily hours of the classification. The premium payment for such work is one and one-half times the employee's basic rate for all work performed during the first four clock hours after the normal quitting time of the classification, and two times the employee's basic rate for all work performed outside of the first four clock hours after the classification's normal quitting time.

and/or

(b) Hours worked in excess of 24 in a week. The premium payment for such work is one and one-half times the employee's basic rate for the first four hours worked in a day. Two times the employee's basic rate for all work performed in excess of four hours in a day.

and/or

(c) Unscheduled hours worked on Saturday and Sunday. The premium payment for unscheduled hours worked on Saturday and Sunday is two times the employee's basic rate.

13.0 ACTING POSITIONS

Due to the fluctuating workload resulting in constantly changing staff requirements on construction projects it is permissible to assign employees to a higher classified job for a temporary period, not to exceed six months' accumulative duration in a three-year period, on any given project, during which time the higher salary classification will apply. The Union's Sector Board Chairperson may agree to an extension of an acting position. Acting positions will not be used to circumvent the posting of vacancies.

When an acting position is established, the Company shall notify the Union setting out the reason for the acting position and expected duration. In filling such positions preference will be given to the qualified senior employee within the work group reporting to the first line management Supervisor.

On completion of the temporary assignment and the employee returns to his/her former job (or equivalent classification) he/she will immediately revert to his/her former wage rate.

14.0 REST PERIOD

Each employee shall be entitled to a 10 minute rest-period in the first half and second half of each scheduled work day at a time designated by the Company. When working with construction trades employees, rest periods shall be extended to 15 minutes.
15.0 PERSONNEL DEVELOPMENT (TRAINING AND EXPERIENCE)

The benefits of personnel development to the Company and to the individual are recognized.

Also recognized is the emphasis placed on personnel development, when determining qualifications, for promotion purposes. The need for equitable development opportunities and treatment of individuals and groups is clear. Therefore, it is agreed that:

1. Individuals and groups should receive equitable development opportunities and treatment.

2. Disruptions to training will be minimized. Where the work situation, unavoidably, precipitates an inequality of development opportunity and treatment, such inequity will be recognized and will not be allowed to work to the disadvantage of that individual or group.

3. Employees shall receive 100% of approved reimbursable costs, paid for external training which:
   - creates or maintains employee’s capability related to current job performance,
   - creates employee’s capability for a position identified in a succession, retraining or redeployment plan.

Employees shall receive 75% of registration/tuition fees and learning material costs for external training activities which create employee’s capability for future jobs within the Company and provided such training is outside working hours.
PART F

THERMAL GENERATING STATIONS

At the present time, this section will apply to employees included in Part F at Lakeview, Thunder Bay, Lambton, J.C. Keith Generating Station, Nanticoke Generating Station, Lennox Generating Station, Atikokan Generating Station, and R.L. Hearn Generating Station. It shall also apply to Security Guards identified in Article 1 as set out in Section 16.0. When other Thermal generating stations are established, these provisions will not automatically apply but will require review and possible modification at that time.

The provisions of the Articles of the Agreement as well as the provisions of Part A, General Items are applicable to the employees covered by Part F.

The provisions contained in Parts B, C, D, E and G, of the Collective Agreement do not apply to the above employees, except as noted in Section 16.0 herein.
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>HOURS OF WORK</td>
</tr>
<tr>
<td>2.0</td>
<td>PROGRESSIONS - OPERATOR POSITIONS</td>
</tr>
<tr>
<td>3.0</td>
<td>OVERTIME</td>
</tr>
<tr>
<td>4.0</td>
<td>PREMIUM PAYMENTS</td>
</tr>
<tr>
<td>5.0</td>
<td>ON-CALL</td>
</tr>
<tr>
<td>6.0</td>
<td>MANAGERIAL DUTIES</td>
</tr>
<tr>
<td>7.0</td>
<td>PAYMENT FOR TEMPORARY SUPERVISION</td>
</tr>
<tr>
<td>8.0</td>
<td>RELIEVING IN HIGHER-RATED POSITIONS</td>
</tr>
<tr>
<td>9.0</td>
<td>ACTING IN VACANCIES</td>
</tr>
<tr>
<td>10.0</td>
<td>VACATIONS - MINIMUM VACATION PERIOD</td>
</tr>
<tr>
<td>11.0</td>
<td>CLOTHING</td>
</tr>
<tr>
<td>12.0</td>
<td>PROVISION OF MEALS</td>
</tr>
<tr>
<td>13.0</td>
<td>CERTIFICATION - OPERATORS AND ENVIRONMENT, CHEMICAL AND SAFETY TECHNICIAN/TECHNOLOGIST</td>
</tr>
<tr>
<td>14.0</td>
<td>TEMPORARY TRANSFERS FOR SHIFT MAINTENANCE PERSONNEL TO NUCLEAR STATIONS</td>
</tr>
<tr>
<td>15.0</td>
<td>EMERGENCY RESPONSE TEAM</td>
</tr>
<tr>
<td>16.0</td>
<td>THERMAL SECURITY GUARDS</td>
</tr>
<tr>
<td>17.0</td>
<td>APPRENTICES/TRAINNEES</td>
</tr>
</tbody>
</table>
1.0 HOURS OF WORK

Employees will be assigned by management to either Day Work or Shift Work as per the following conditions:

Note: See item 1.2.3 last paragraph with respect to Security Guard shift change times.

1.1 Day Work

Hours: The normal hours of work are 40 hours per week made up of five days of eight hours each performed between the hours of 7:00 am and 6:00 pm, Monday to Friday, inclusive.

Meal Periods: One unpaid meal period designated by the Company will be provided. The duration will be subject to the approval of the supervisor.

Notice Period: Day workers' hours of work may be changed to the appropriate shift conditions in Items 1.2.1, 1.2.2 and 1.2.3.

A minimum of seven (7) days' personal notice shall be given when the employee's hours of work are to be changed.

1.2 Shift Work

Regular part-time and temporary part-time employees will not be eligible for shift differential when the shift starts and ends between the hours of 0700 and 1800.

1.2.1 Eight-Hour Shifts

Applicable to: Fossil Operating Technicians (FOTs), Coal Plant Equipment Operators (CPEOs) and Shift Maintenance Personnel.

Shifts: The normal hours of work for non-time balanced eight hour shifts are 40 per pay week. Shifts may be performed in one, two or three shifts per day, Monday to Sunday, inclusive.

<table>
<thead>
<tr>
<th>Shift</th>
<th>Time Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st shift</td>
<td>0000 hrs to 0800 hrs</td>
</tr>
<tr>
<td>2nd shift</td>
<td>0800 hrs to 1600 hrs</td>
</tr>
<tr>
<td>3rd shift</td>
<td>1600 hrs to 2400 hrs</td>
</tr>
</tbody>
</table>

The above shift start and stop times may be changed by local agreement between the Station Manager and the Chief Steward.
Shift Differential:

1st shift - 85 cents per hour
2nd shift - no shift differential
3rd shift - 65 cents per hour

Meal Periods: One paid meal period will be included within each shift as conditions permit.

Time Balance: Eight (8) hour shifts may be subject to the time balance provisions of Item 2.7 if these shifts are used in conjunction with ten (10) and/or twelve (12) hour time balance shifts.

Notice Period: A minimum of seven (7) days’ personal notice shall be given when an employee’s hours of work are to be changed.

In the case of illness, which would result in a staff shortage, four (4) days’ advance notice will be given when placing an employee on shift.

**1.2.2 Ten-Hour Shifts**

Applicable to: CPEOs and Shift Maintenance Personnel.

Shifts: The normal hours of work for non-time balanced ten hour shifts are 40 per pay week. Shifts may be performed in one or two shifts per day, Monday to Sunday, inclusive, and may be performed within the following shift windows:

1st shift - 0600 hrs to 1800 hrs
2nd shift - 1400 hrs to 0200 hrs

Shift Differential:

1st shift - no shift differential
2nd shift - 70 cents per hour

Meal Periods: One paid meal period will be included within each shift.

Time Balance: Ten (10) hour shifts may be subject to the time balance provisions of Item 1.7.

Notice Period: A minimum of seven (7) days’ personal notice shall be given when an employee’s hours of work are to be changed.

In the case of illness, which would result in a staff shortage, four (4) days’ advance notice will be given when placing an employee on shift.

Shift start/stop times and/or shift windows can be changed by local agreement between the Station Manager and the Chief Steward.
1.2.3 Twelve-Hour Shifts

Applicable to: FOTs, CPEOs and Shift Maintenance Personnel.

Shifts: Shifts may be performed in one or two shifts per day, Monday to Sunday, inclusive, and may be performed within the following shift windows:

- 1st shift - 1800 hrs to 0800 hrs
- 2nd shift - 0600 hrs to 2000 hrs

Shift Differential:

- 1st shift - $1.00 per hour
- 2nd shift - no shift differential

Meal Periods: Two paid meal periods will be included within each shift as conditions permit.

Time Balance: Twelve (12) hour shifts will be subject to the time balance provisions of Item 1.7.

Notice Period: A minimum of seven (7) days' personal notice shall be given when an employee's hours of work are to be changed.

In the case of illness, which would result in a staff shortage, four (4) days' advance notice will be given when placing an employee on shift.

It is recognized that Security Guard shift change times should not be at the same time as the plant personnel. Should the shift change time for plant personnel change during the posted shift schedule of Security Guards, then that would trigger an immediate review of the Security Guard schedule with the Chief Steward to ensure appropriateness of shift change overlap. Should the hours of work for Security Guards change due to the review of the shift schedule, then seven (7) days' personal notice will be given.

Shift start/stop times and/or shift windows can be changed by local agreement between the Station Manager and the Chief Steward.

1.3 Work Schedules

The Company will post a work schedule for shift workers showing days, hours of work, position and work headquarters of each employee. The design of the work schedule shall provide for a minimum of sixteen (16) hours off between shifts for eight (8) hour shifts, twelve (12) hours off between shifts for ten (10) and twelve (12) hour shifts. Failure to provide the minimum time off between shifts shall require premium rates to be paid for the first affected shift. Without specific commitment, the Company acknowledges the responsibility that such work schedules shall be posted as far in advance as is practicable and subject to the penalty indicated in Subsection 1.4.4. Until a new work schedule is posted, the existing posted work schedule will remain in effect.
Although the content, preparation, posting and administration of shift schedules is the sole responsibility of the Company, the preference of the majority of shift workers at each station for a particular basic type of schedule will be adopted. Such preferences will be made known to the Company prior to commencement of preparation of a new schedule. However, if in the Company’s opinion, the efficiency of the station or the health of a shift worker could be detrimentally affected by the chosen work schedule, then the Company will provide the Union (chief steward) with reasons or medical opinions why the desired schedule cannot be implemented.

The preference of individual shift workers regarding vacation periods will be considered, providing such preferences are made known prior to commencement of preparation of new schedules.

The following are the recognized criteria of an acceptable shift schedule:

(a) The schedule should equitably rotate among all crews.

(b) The schedule should follow a repeating pattern so that it is easily understood.

Ten-hour non-time balanced shift schedules will be assigned as follows:

- a minimum duration of 4 weeks and;
- a maximum of 5 days of 1st shifts in a row and;
- a maximum of 4 days of 2nd shifts in a row.

1.4 Special Provisions Concerning Notice of Transfer to a Different Work Schedule or Work Headquarters

One day of notice in this item is defined as 24 hours prior to the start of the first affected shift.

1.4.1 When an employee’s hours of work or work headquarters are to be changed, seven (7) days' personal notice will be provided.

1.4.2 When a shift employee is being changed back to his/her normal schedule, he/she shall be given two (2) days' notice if returning to normal schedule within fifteen (15) days of the original change and seven (7) days' notice if returning to normal schedule fifteen (15) days or more after the original change.

1.4.3 Fossil Operator Technicians in Training (FOTITs) and Trades Trainees in Steps 0 and 1 may be changed within a calendar day for training purposes, provided that a notice period of 16 non-working hours is given before the start of the first affected shift.

1.4.4 Failure to provide the required notice period will result in double time being paid until the required notice period has elapsed.
NOTE

Personal notice means the employee will be contacted personally, face to face or by telephone. The contact must be made with the employee, no messages. Personal notice will be followed up within 72 hours with posted notice which will list the time and date the employee was personally contacted. If the notice is not posted within 72 hours, management will pay 4 hours at straight time to the person who was shift changed.

1.5 Special Provisions Concerning Shift Differential

The appropriate shift differential shall be paid for regular shift hours only in accordance with Items 1.2.1, 1.2.2, and 1.2.3 and shall not apply for overtime hours. When premium time is involved for payment of shift work, the premium rate shall be computed on the standard base rate, excluding shift differential.

1.6 Calendar Day for Shift Workers

Premium payments for a regular continuous shift shall be recorded and treated as if they occurred during the calendar day in which the majority of the regular hours are worked.

1.7 Provisions Concerning Time Balance Shift

1.7.1 Time Balance Work Schedules

A current six-month time balance schedule may not be terminated. Either eight-hour, ten-hour or twelve-hour time balance shift work which is in effect for any work group may be terminated by the Sector Vice President / delegate or the Station Manager upon two months' written notice from one authority to the other prior to the end of a current six-month schedule. When the Sector Vice President / delegate has exercised the right to opt out of time balance schedules for any group of employees, no new time balance schedule may be introduced for those employees without mutual agreement of management and the Union.

Time balance shift schedules will only be introduced at any work location providing seventy percent (70%) or more of all eligible employees so desire and vote in favour. That vote will be as determined by a secret ballot, scrutineered jointly by management and the Union.

A six (6) month master work schedule will be posted thirty (30) days prior to its starting date. The time balance period of the six (6) month schedule may be less than six months. The six month schedule may include day work outside the time balance shift period. The schedule will average forty (40) hours per week using either eight, ten or twelve (8, 10 or 12) hour shifts, or any combination of the three. The schedule will indicate the days, hours of work (shifts) and position for each employee. The schedules will end on the last day of the shift cycle closest to April 30th and October 31st or as otherwise agreed to by the Chief Steward.

The hours of work for each employee, as shown on a work schedule, must balance to zero at the end of the shift cycle.

The zero time balance date must be indicated on each posted schedule.
The posted master work schedule should never be far off balance and should reasonably approximate the
time off provisions of day work. It follows then that such a schedule should not leave long sequences of work
without time off, nor long sequences of time off.

1.7.2 Plus Time Balance

Plus time balances which exists on the time balance date will be paid for at double time. At the time of layoff
all positive time balances will be paid out at 2X.

1.7.3 Minus Time Balance

Minus time balances which occur as a result of changes to the master work schedule shall be worked off
within two fiscal months of the end of the fiscal month in which the minus balance occurs. Minus balances not
worked off within this two-month period will be written off.

1.7.4 Lieu Days

When scheduled work is performed on a statutory holiday, a day off will be scheduled in lieu of the statutory
holiday. This lieu day shall be identified on the schedule and will be included when computing time balances.
When workload permits, the employee may request that the lieu day be interchanged with another scheduled
working day after the statutory holiday.

1.7.5 Provisions Concerning Time Off

(a) The following items will be credited for pay purposes on an hour-for-hour basis. In the application
of undernoted Items - 1, 2, 3 and 4, a reference under the appropriate contract provision to "days"
entitlement will mean eight (8) hours. Therefore a twelve (12) hour shift will constitute one and
one-half (1.5) days deducted from credits and a ten (10) hour shift will constitute one and a
quarter (1.25) days deducted from credits.

(1) Vacation
(2) Floating Holiday
(3) Sick Leave
(4) Leave of Absence
(5) Travelling Time Outside Normal Working Hours
(6) Payment for Temporary Supervision
(7) Time Charges and Expenses for employee Union Representatives

(b) When an employee is scheduled to work a ten (10) or twelve (12) hour shift and one of the
undernoted conditions occurs, a "day" will be considered to be 10 or 12 hours respectively:

(1) Jury Duty
(2) Funerals
(3) Moving Day
1.7.6 Statutory Holidays and Special Time Off

The basic Statutory Holiday and Special Time Off provisions remain unchanged in that the time off will be calculated on an eight (8) hour basis. However, employees eligible for Remembrance Day and scheduled to work will get the normally scheduled hours off with pay.

1.7.7 Assignment to Day Work or Eight Hour Shifts

Shift workers with a plus (+) or a minus (-) time balance assigned to day work or eight hour shifts for an indeterminate period of time may be required to take off, or work a four (4) hour period respectively.

1.7.8 Minimum Available Requirement (MAR) List

Applicable to FOTs, CPEOs and Environment, Chemical and Safety Technicians/Technologists.

In order that a sufficient number of shift employees are on duty to maintain and ensure a continuous operation at any location utilizing eight or twelve hour shifts, the following will apply.

A minimum number of physically capable employees, by job classification and qualifications, will be determined by management. Employees will volunteer their willingness to be called in to work, in this situation, by placing their name on the MAR List under the day(s) they wish to be called. Once an employee’s name appears on the MAR List, he/she agrees to be prepared to report for work on short notice. During the Required Availability Period (RAP), he/she shall be required to wear and respond to a pager where such service is available and proven reliable. RAP will be the period of time commencing two hours prior to, and one hour after each shift change. An employee will not be placed on the MAR List if scheduled to work an adjoining shift.

It is expected that under normal conditions, there would be sufficient volunteer names on the MAR List to ensure that the supervisor would be able to obtain staff on short notice to keep the plant(s) operating. However, there may be occasions when there are insufficient volunteers on the MAR List. In those cases, the supervisor will assign names from each classification to make up the minimum for that classification. The supervisor will ensure that the employee is verbally notified that his/her name has been assigned to the MAR List before the end of his/her last shift.

If an employee assigned by the supervisor to the MAR List cannot be available for the specific RAP period, the employee must arrange to have another employee of the same classification and qualifications substitute for him/her. The substitute employee must accept this change list in place of the original employee.

Volunteering or being assigned to the MAR List for RAP periods does not entitle the employee to any compensation, i.e., on-call pay, etc, nor does it guarantee that overtime will result.
2.0 RELIEF - OPERATOR POSITIONS

2.1

FOTITs in Band II step 0 & 3 who are required to upgrade to an Operator position will be placed on Band II step 5 for the time they are filling a full time Operator position on the schedule.

2.2

Fossil Operating Technicians and Fossil Operating Technicians in Training will require a valid 3rd class stationary engineers ticket in order to progress beyond band III step 5.

2.3

Employees who were SSS’s or SUS’s prior to January 1st, 2002 when relieving for the normal duties of a PSO will receive an additional 5% in recognition of the additional TSSA responsibilities for the operation of the station. The 15% maximum as referenced in Article 8.8.3 will not apply in this case.

3.0 OVERTIME

Due to the nature of the Company’s operations, some employees will be required to work overtime. Overtime will be minimized and managed within the limits of corporate effectiveness and customer impact. In recognition of employee well-being and inconvenience, an effort shall be made to equitably distribute overtime amongst all qualified employees. Overtime, as used herein, means that part of the actual working time which is outside the normal scheduled hours and is, therefore, subject to compensation at premium rates.

3.1 Pay Entitlement

3.1.1 Monday to Friday inclusive

1. Scheduled Day of Work

   (a) One and one-half the employee’s basic rate for all overtime work performed during the first four clock hours after normal quitting time.

   (b) Two times the employee’s basic rate for all overtime work performed outside the first four clock hours.

2. Unscheduled Day of Work

   (a) Two times the employee’s basic rate.

3.1.2 Saturday and Sunday

Two times the employee’s basic rate for all overtime work performed.
3.1.3 **Statutory Holidays Monday to Friday**

Two times the employee's basic rate for all overtime work performed.

3.1.4 **Statutory Holidays Occurring on a Saturday**

Two and one-half times the employee's basic rate for all overtime work performed.

3.2 **Overtime Cancellation Payments**

All overtime cancelled within 44 hours of its scheduled commencement shall result in a cancellation payment of two hours at straight time except in the following circumstances:

1. Overtime arranged during normal scheduled hours as an extension to those normal scheduled hours requires no cancellation payments.

2. Overtime arranged as an extension before the normal hours of work requires no cancellation payment if cancelled with more than 12 hours' notice prior to its commencement.

3.3 **Overtime Minimum Payments**

All overtime performed or reported for due to lack of notice of cancellation, shall result in a minimum payment of four hours at the appropriate premium rate, except in the following circumstance:

Overtime arranged during normal working hours and worked as an extension before and/or after the employee's normal hours of work requires no minimum payment.

3.4 **Special Provisions Concerning Overtime**

3.4.1 Time shall be counted from the time the employee reports for overtime work until he/she finishes overtime work at the Station or until his/her normal scheduled hours begin.

3.4.2 When less than 48 hours' notice has been provided and an extra trip to the work location has been made to work overtime, one hour at straight time will be paid for each extra trip.

3.4.3 Because an employee was required to work overtime or because he/she lost time in changing shifts, he/she shall not be prevented from working his/her total number of normal daily hours in any normal scheduled day of work. If the employee cannot be supplied with the work required to make up the eight hours work in that day, his/her pay shall be adjusted to provide a minimum of eight hours' work.

3.4.4 If an employee who has worked overtime and is physically capable and the gang of which he/she is ordinarily a member is at work, he/she shall not be deprived of the opportunity of working his/her normal scheduled hours in addition to the overtime he/she may have worked.
3.4.5 An employee who has accumulated overtime hours shall receive this, in earnings, calculated at the appropriate premium rate and cannot be required to take time off in lieu of payment.

A day worker who has worked overtime on a statutory holiday may elect to defer the statutory holiday portion of the payment (eight hours at straight time) as equivalent time off with pay. The day off will be scheduled at a mutually agreeable time.

3.4.6 An employee who is required to work continuously for more than 16 hours or has accumulated 16 hours working time in any 24-hour period, shall be entitled to an eight-hour rest period. Time spent for meals may be deducted from the total elapsed time but is not to be considered as breaking the continuity of the hours worked.

If the rest period extends into the employee's normal scheduled hours of work he/she shall be paid at straight time rates for the portion of the rest period which extends into the normal scheduled hours. This is in addition to the overtime worked. Should he/she be required to continue working beyond 16 hours he/she shall be paid two times his/her normal basic rate until an eight-hour rest period is granted. Should an employee be released before 16 hours have elapsed, he/she will not be entitled to an eight-hour rest period, and his/her right to continue work at straight time will be governed by Item 3.4.4 above.

3.4.7 An employee assigned to day work or on day shift who has worked overtime during the 8-hour period preceding his/her normal hours of work shall be entitled to an 8-hour rest period starting at the end of the overtime except when:

(i) An employee has worked 4 hours or less of overtime immediately preceding normal hours of work.

(ii) An employee has worked one hour or less of non-extension overtime outside the hours of 01:00 and 06:00.

Any portion of the rest period which extends into the normal scheduled hours of work will be paid at straight time rates.

3.4.8 Equivalent time off without pay - see Part A, Item 10.2.

3.4.9 When overtime is performed at two times the employee's basic rate and the overtime period extends into the following calendar day containing his/her scheduled day off, the employee shall remain at two times until an eight-hour rest period is granted.

3.4.10 CPEOs will wash up during their normal shift hours. If there is a need to have continuous belt operation and it is necessary for CPEOs to remain at their work station until relieved, they will be paid 10 minutes at time and one-half his/her basic rate.
3.4.11 Overtime - Regular Part-Time and Temporary Part-Time Employees

Overtime is defined as: (1) hours worked which are in excess of the normal daily hours of the classification; or (2) hours worked in excess of 24 in a week; or (3) hours worked on a regular day off.

Premium Payment for Overtime:

Extension Overtime: Overtime hours worked within the first four clock hours will be at one and one-half times the employee's basic rate unless the employee works more than 28 hours in a week in which case the hours in excess of 28 will be paid at two times the employee's basic rate.

Non-Extension Overtime: All overtime hours worked that are outside of the first four clock hours after the classification's normal quitting time will be at two times the employees basic rate.

Regular Day Off: Overtime hours worked on a regular day off will be paid at two times the employees' basic rate.

4.0 PREMIUM PAYMENTS

4.1 Normal Scheduled Hours

1. One and one-half times the employee's basic rate shall be paid for normal scheduled hours of work performed on Saturdays and Sundays.

2. Two times the employee's basic rate shall be paid for normal scheduled hours of work performed on a statutory holiday which occurs on a Monday to Friday. A day off in lieu of this worked holiday shall be scheduled within the following six months. The employee will advise the Company of his/her preferred day off within 30 days after the holiday is worked. If mutual agreement cannot be reached within 30 days of the worked holiday, management may, on seven days' notice, schedule the lieu day off.

3. Two times the employee's basic rate shall be paid for normal scheduled hours of work performed on a statutory holiday which occurs on a Saturday. There is no entitlement to a day off in lieu of this worked holiday.

4. If mutually agreeable, three times the employee's basic rate shall be paid for normal scheduled hours worked on a statutory holiday occurring on a Monday to Friday. No lieu day would be granted.
4.2 Statutory Holidays

4.2.1 Rescheduling Statutory Holidays - Supernumerary

With a minimum of seven days' notice, employees designated as supernumerary may request to observe a statutory holiday which falls on a scheduled day of work on any other scheduled day of work within the same pay period. For pay purposes, the observed day will be considered as the statutory holiday.

4.2.2 Entitlement for Operating Shift Employees

Operating shift employees shall receive entitlement for the same number of statutory holidays as day workers. Therefore, when a statutory holiday falls on a Saturday, statutory holiday credit shall not apply.

5.0 ON-CALL

When an employee is placed "on-call" by his/her supervisor, he/she shall keep him/herself available to report for work within two hours. In addition to any time worked, payments for on-call will be:

1. One half (1/2) hour per day will be paid at the employee’s basic hourly rate on a scheduled day of work and one (1) hour will be paid at the employee’s basic hourly rate on an unscheduled day of work.

NOTE

It is not the intent of this clause to schedule employees on-call for the purpose of providing shift coverage.

It is expected management will ask for volunteers before arbitrarily selecting people for on-call.

Management will provide a pool of pagers, cell phones or other electronic devices at each station to be used by employees who are placed on-call provided such service is available and proven reliable.

6.0 MANAGERIAL DUTIES

A management supervisors’ normal duties are supervisory in nature. Under normal circumstances they must not take the place of skilled workers. In the event that an emergency work condition arises, skilled help should be called in. Where suitable skilled help is not available at the required time, supervisors are expected to perform whatever duties are necessary. The foregoing is not intended to prohibit the management supervisor from carrying out appropriate training.
7.0 PAYMENT FOR TEMPORARY SUPERVISION

Supervisory payments are established in Article 8.

Where a group of employees are working at a location on jobs which are independent of one another and planned by a supervisor so that no coordination of their activities is required, additional supervision will not be required.

Where the job requires more than one day to complete or is not pre-planned, or is being performed by four or more employees one of them shall be appointed and paid as a trades supervisor in accordance with Article 8. In such cases if he/she supervises for more than two hours in a day he/she shall be paid the supervisory rate for a minimum of four hours or the actual hours he/she supervises, whichever is greater.

7.1 Level of Supervision

While in receipt of 5% for supervision a tradesperson shall perform supervision for up to 3 days without face to face contact with his/her Union Trades Supervisor. Less frequent contact requires the 10% supervisory payment.

8.0 RELIEVING IN HIGHER-RATED POSITIONS

8.1

Relief in a higher rate position is established in Article 8.

8.2

When an employee acquires a lieu day while relieving or stepped-up in a higher rated classification, the lieu day shall be paid at the relief or stepped-up rate.

Payment for a statutory holiday shall be at the relief rate if it occurs during the specified relief period.

When an employee provides relief in higher-rated classification(s) for more than 50% of the vacation year, he/she shall receive for their full vacation period, the relief rate for the higher-rated position, in which the majority of vacation allowance was earned.

9.0 ACTING IN VACANCIES

All acting positions are to be limited to 90 days unless extensions are agreed to by the Company and the local Chief Steward of the union. Pending the arrival of the successful applicant and his/her assuming of the normal duties, the acting incumbent who is performing the normal duties and responsibilities of an "acting" position shall receive the rate for the position.
10.0 VACATIONS - MINIMUM VACATION PERIOD

Subject to extensions resulting from unforeseen or abnormal conditions, arrangements will be made to provide those shift workers, who are entitled to at least two weeks’ vacation, a minimum vacation period of 14 consecutive days within the period May 1st to September 30th.

11.0 CLOTHING

The Company agrees to supply and launder coveralls or shirts and pants for all employees in the following occupations:

- Coal Plant Equipment Operator
- Electrical & Control Tech’n/Technologist
- Fossil Operating Technician
- General Tradesperson
- General Tradesperson Supervisor
- Mechanical Maintainer Journeyperson
- Mechanical Technician/Technologist
- Service Trades Maintainer
- Service Trades Supervisor
- TWE Technician

The amount and system for providing personal clothes shall be determined at the location.

For the following classifications, the Company agrees to supply coveralls or shirts and pants to the following occupations. The above provision is at the rate of 4 sets in a 24-month period:

- Coal Plant Equipment Supervisor
- FGD Supervisor
- Fossil Operating Supervisor
- Materials Support Worker
- Shift Maintenance Personnel

The Company will supply a parka or insulated coveralls every 24 months to employees required to work periods outdoors. The Company will attempt to bulk supply appropriate type parkas if it is more cost effective.

Clothing supply shall be jointly reviewed at the local level to ensure adequate supply and cost effectiveness.

Employees must exercise reasonable care in the use of clothing so supplied.
12.0 PROVISION OF MEALS

In recognition of the importance of regular meals to an individual's health and effectiveness on the job, the Company will supply meals as outlined below and when required, will assign an employee to secure the meals.

(a) Employees provide their own meals on regular days of work.

(b) When an employee works overtime on a regular day off, he/she will be expected to provide one meal if 23 hours notice has been given.

(c) An employee working a 10 hour shift schedule who works a 10 hour overtime shift will be provided with one meal period.

(d) When an employee works extension overtime before or after normal scheduled hours, all required meals will be provided by the Company. The first meal (or meal allowance) will be provided when two (2) hours of overtime are worked. Subsequent meals or meal allowances will be provided every four (4) hours of overtime worked thereafter.

(e) When meals cannot be reasonably obtained\(^1\), an allowance of $15.00 per meal will be paid.

12.1 Meal Periods

(a) Employees on day work shall take a meal period designated by the Company and shall not be paid for this time (unless otherwise provided for in the Collective Agreement).

(b) Employees on shift work shall eat their meals during the shift hours as conditions permit.

(c) When an employee works extension overtime, no time shall be deducted for eating such meals where the employee eats the meal on the job and in a minimum of time.

13.0 CERTIFICATION – FOSSIL OPERATING TECHNICIANS AND ENVIRONMENT, CHEMICAL AND SAFETY TECHNICIANS/TECHNOLOGISTS

13.1 Examinations

Fossil Operating Technicians and Environment, Chemical and Safety Technicians/Technologists will be paid at their basic rate, for the time required to write each examination once, up to the maximum number of hours as established by the appropriate Agency/Ministry for each examination.

Fossil Operating Technicians and Environment, Chemical and Safety Technicians/Technologists will write these examinations on an unscheduled day of work. Requests for payment or time off will be made when all examinations for a particular class of certificate have been attempted.

\(^1\) 'Reasonably obtained' is to be defined locally by Union and Management.
13.2 Certificate Renewals

Fossil Operating Technicians and Environment, Chemical and Safety Technicians/Technologists who are required by the Company to renew their certificate with the Ministry of Commercial and Consumer Relations or Environment and Energy Ministry, will have the cost of such renewal reimbursed.

14.0 TEMPORARY TRANSFERS FOR SHIFT MAINTENANCE PERSONNEL TO NUCLEAR STATIONS

Employees temporarily transferred to Ontario Power Generation Nuclear will adopt the work schedules and associated work schedule provisions of the location to which they have been transferred.

Employees returning to their regular work headquarters will assume the same time balance as their crew. Any minus time balances created due to working at the temporary location will be written off and any plus time balance shall be paid for at double time; however, by mutual agreement, the employee may choose time off on an hour-for-hour basis without pay to be taken within six months.

The following items will apply under the above conditions:

1. Part G, Items 2.1.1, 2.1.3, 2.1.4, 2.1.5, 5.0, 11.0, 14.1 and 14.4 as contained in the Ontario Power Generation Inc. Collective Agreement.

2. The transfer must be to an established nuclear schedule.

3. The employee will be given the schedule before the transfer showing the days, hours of work (shift) and position for each employee.

4. Notification of transfer between a Thermal schedule and a nuclear schedule will require seven days' notice.

5. Failure to give the required notice as indicated in (4.) above shall require the payment at double time for work performed until the notice period has expired.

6. The Company will supply the tools for employees while on temporary transfers.

15.0 EMERGENCY RESPONSE TEAM

15.1 As part of their normal duties, all employees may be required at times to take action in response to emergencies.

15.2 (a) Qualified designated members of the Emergency Response Team shall receive $1350.00 annually on their anniversary of becoming a member of the Emergency Response Team, plus one 8-hour day off to be taken at a mutually agreed upon time within the next 12 months.
(b) Emergency Response Team captains who are not in a supervisory position shall receive an allowance of $1.00/hour for each paid hour.

(c) Acting captains who are not in a supervisory position shall receive an allowance of $1.00/hour for each paid hour while acting in the captains position.

15.3 Although membership of the Emergency Response Team is voluntary, the Company reserves the right to appoint members if sufficient volunteers are not available.

15.4 Qualified in 15.2 above means trained in the disciplines of search and rescue, victim stabilization, fire and spill.

16.0 THERMAL SECURITY GUARDS

Note: See Item 1.2.3 last paragraph with respect to Security Guard shift change times.

16.1

The following sections of Parts F and D apply to Thermal Security Guards only. All other sections in Part F or D not referenced below do not apply.

Part F Items:

1.0 Hours of Work
3.0 Overtime
4.0 Premium Payments
5.0 On-Call
10.0 Vacations - Minimum Vacation Period
12.0 Provision of Meals
15.0 Emergency Response Team

Part D Items:

6.2 B Acting in a Vacant Position
7.0 Posting of Vacancies

16.2 Clothing - Security Guards

Where uniform appearance is required, uniforms will be provided. Security staff required to wear uniforms will be reimbursed for two (2) pairs of CSA approved safety footwear per calendar year with a dollar maximum of $125 each. Where uniform appearance is not required, Part A, Item 33.2 will apply.
17.0 Apprentices/Trainees

Effective April 1, 2009 OPG will require Apprentices/Trainees to register with the Ministry of Training, Colleges and Universities (MTCU). However, the completion of the C of A and C of Q is the responsibility of the Apprentice/Trainee. Apprentices/Trainees will be reimbursed for the registration fee charged by the MTCU. Apprentices/Trainees will be reimbursed for the examination fee and paid at their basic rate, for the time required to write each examination once, up to the maximum number of hours established by the appropriate Agency/Ministry for each examination.
PART G

NUCLEAR GENERATING STATIONS

This section shall only apply to Operating and Maintenance Employees and, Control, Chemical, Radiation Control, Planning, and Training Technicians, Regular Guides, Public Education Officers, Technical Inspectors, and Nuclear Technologists (as noted in Items 21.0, 22.0, 23.0, and 24.0) in Ontario Power Generation Inc. (Nuclear). It shall also apply to Security Guards identified in Article 1 as set out in Item 25.0. When other nuclear stations are established, these provisions will not automatically apply, but will require review and possible modification at that time.

The provisions of the Articles of the Agreement as well as the provisions of Part A, General Items are applicable to the employees covered by Part G, Nuclear Generating Stations. The provisions contained in Parts, B, C, D, E and F of the Collective Agreement do not apply to the above employees, except as noted in Sections 22.0, 23.0, 24.0 and 25.0 herein.
TABLE OF CONTENTS

PART G

NUCLEAR GENERATING STATIONS

1.0 WAGES
2.0 HOURS OF WORK
3.0 SHIFT DIFFERENTIAL
4.0 OVERTIME
5.0 PREMIUM PAYMENTS
6.0 VACATIONS - SHIFT WORKERS
7.0 POSITIONS EXCLUDED AS PER ARTICLE 1
8.0 SUPERVISORY RESPONSIBILITIES
9.0 PAYMENT FOR TEMPORARY SUPERVISION
10.0 RELIEF WORK
11.0 SPECIAL CLOTHING
12.0 STAFFING
13.0 PROVISION OF MEALS
14.0 RADIATION
15.0 PERSONNEL DEVELOPMENT (TRAINING AND EXPERIENCE)
16.0 RESIDENCE HEADQUARTERS FOR PICKERING NGS, DARLINGTON NGS AND ASSOCIATED WORK HEADQUARTERS
17.0 TEMPORARY TRANSFERS OF PART 'G' EMPLOYEES TO PART 'F' THERMAL GENERATING STATIONS
18.0 EMERGENCY RESPONSE TEAMS
19.0 AUTHORIZED NUCLEAR OPERATORS IN TRAINING
20.0 MAINTENANCE ASSESSING
21.0 CONTROL TECHNICIANS
22.0 SHIFT WORK - RADIATION CONTROL TECHNICIANS, SHIFT RADIATION PROTECTION & SAFETY TECHNICIAN, PLANNING COST AND CONTROL TECHNICIANS, TRAINING TECHNICIANS AND NUCLEAR TECHNOLOGISTS
23.0 CHEMICAL TECHNICIANS / FLMA RADIATION CONTROL AND RADIATION TECHNICIAN IIS
24.0 REGULAR GUIDES AND ASSISTANT PUBLIC EDUCATION OFFICERS
25.0 NUCLEAR SECURITY OFFICERS
26.0 PROJECT CREWS
27.0 APPRENTICE HIRING AND PLACEMENT
28.0 OPG NUCLEAR APPRENTICE HIRING & JOINT APPRENTICESHIP COMMITTEE
29.0 NUCLEAR OPERATORS COMMITTEE
30.0 JANITOR WAGE RATES
31.0 COMMERCIAL AND INSPECTION MAINTENANCE DIVERS
PART G
NUCLEAR GENERATING STATIONS

Specific Matters of Agreement

1.0 WAGES

The wage rates for all employees covered by this section of the Collective Agreement shall be in accordance with Part A, Item 43 and Article 8.

2.0 HOURS OF WORK

2.1 Shift Workers

2.1.1 8, 10 and 12 hour Master Shift Schedule

1. A 12-month schedule will be posted 30 days prior to its starting date. The schedule will average 40 hours per week and will indicate the days, hours of work (shift) and position for each employee. The schedule will end on the last day of the fiscal month of December. The design of the regular schedule shall provide for a minimum of 16 hours off between shifts when working on an eight-hour shift schedule and 12 hours off between shifts when working on a 12-hour shift schedule.

2. The regular schedule will be prepared so that each employee's time is balanced to zero in the case of an eight-hour shift schedule or plus or minus four hours in the case of a 12-hour shift schedule (in this case the plus or minus time will be carried into the next schedule) as of the last day of the schedule.

3. Where it is agreed that the basic type of schedule will continue for the following year the Company will provide it to the Union by June 1\textsuperscript{st} each year. The Union will provide the company with any issues (RDO change etc.) by July 1\textsuperscript{st}.

4. Where a schedule change is required, the content, preparation, posting and administration of the shift schedule is the sole responsibility of the company, the preference of the majority of shift workers at each station for a particular basic type of schedule will be adopted. Such preferences will be made known to the company prior to commencement of preparation of the new schedule. The final schedule will be mutually agreed to with the Sector Representative, unless in the company's opinion, the efficiency of the station or the health of a shift worker could be detrimentally affected by the chosen schedule, then the company will provide the Sector Vice President or delegate with reasons or medical opinions why the desired schedule cannot be implemented.
The preference of individual shift workers regarding vacation periods will be considered, providing such preferences are made known prior to commencement of preparation of new schedules.

The following are the recognized criteria of an acceptable shift schedule:

(a) The schedule should equitably rotate among all crews.

(b) The schedule should follow a repeating pattern so that it is easily understood.

(c) The schedule should never be far off balance and should reasonably approximate the time off provisions of day work. It follows then that a schedule should not leave long sequences of work without time off, nor long sequences of time off. In the case of 12-hour shift schedules, time balances should cycle between +/-36 hours with an additional +/-4 hours as an exception.

(d) Supernumerary shifts shall be indicated on the regular schedule as Monday to Friday day shifts (0800 - 1600 hours) only. Supernumerary shifts for security staff at Pickering may be scheduled as 12 hour day shifts on Monday to Friday provided that such scheduling is the preference of a majority of affected staff.

(e) When scheduling 12-hour shifts, the maximum number of night shifts to be worked in sequence would be three and the maximum number of days to be worked in a sequence would be four.

(f) The 12-hour shift schedule shall provide for at least 48 hours off between each sequence of shifts and at least two regular days off will be scheduled in each week (pay period).

(g) Shifts for security staff at Pickering may be scheduled to start 1/2 hour before the corresponding shifts for the rest of the shift workers.

(h) At least two consecutive regular days off will be scheduled in each week.

(i) Shifts for Nuclear Operations crews at Pickering and Darlington may be scheduled to start ½ hour before the normal A-E shifts start time (i.e. 07:30 and 19:30)

5. **10 Hour Shifts**

Management will identify the criteria for a type of shift schedule required e.g. 5, 6, 7 day coverage, 10 or 20 hours per day, preferred location of double coverage days, etc. and give the affected employees the opportunity to present shift schedules that meet the criteria.
2.1.2 Revisions to the Regular Schedule

A minimum of seven days' notice shall be given when an employee's hours of work, as shown on the regular schedule, are to be changed, with the following exceptions:

1. No shift change notice is required when an employee:
   
   (a) is working supernumery days or day work (Part G, Item 2.1.3); and
   (b) is assigned to training (0800 – 1600 hrs) at a location that is within 5 km (radius) of his/her work headquarters, or vice versa; and
   (c) works the same or fewer hours in a day; and
   (d) does not have their start time varied in excess of 60 minutes; and
   (e) is provided a written/electronic notification at least one (1) month in advance of the scheduled change.

   The training hours for a full day of training will constitute the employee's full shift for that specific day.

2. With three days' notice an employee's hours of work may be changed if a forced unit outage occurs for reasons of equipment failure, or for a safety reason. Refer to Mid-Term Agreement R-7 for definition of unit outage.

   The applicability of the three-day notice period in this clause is dependent upon a shift change notice being issued to the affected employees within 48 hours of the occurrence of the forced unit outage.

3. In the case of illness, which would result in a staff shortage, four (4) days' advance notice will be given when placing an employee on shift.

4. For 12 hour shifts, when work load permits, a supernumerary day may be interchanged with a regular day off at the employee's request.

   When work load permits, regular days off scheduled to correct a plus time balance resulting from a revision to his/her regular schedule may be rescheduled at the employee's request.

   When scheduled work is performed on a statutory holiday, an additional day off will be scheduled in lieu of the statutory holiday. This lieu day shall be identified on the schedule. When work load permits it may be interchanged with another scheduled working day after the statutory holiday at the employee's request.

5. Revisions to the regular schedule will provide the following minimum hours off between shifts:
   
   (a) Shift change notices between 12-hour shifts will provide at least 12 hours off.
(b) Shift change notices from a 12-hour shift to an eight-hour shift will provide at least 12 hours off.

(c) Shift change notices from an eight-hour shift to a 12-hour shift will provide at least 15 hours off.

(d) Shift change notices between eight-hour shifts will provide at least 15 hours off.

(e) Shift change notices between 10-hour shifts will provide at least 12 hours off.

(f) Shift change notices from a 10-hour shift to a 12-hour shift or vice versa will provide at least 12 hours off.

(g) Shift change notices from a 10-hour shift to an 8-hour shift or vice versa will provide at least 15 hours off.

Failure to provide the above-noted minimum hours off will require that premium rates be paid for the first affected shift.

6. Revisions to the regular schedule while working a 12-hour shift schedule will not result in an employee working more than three night shifts in a row and must provide at least two periods of 24 hours off in a week (pay period). Notwithstanding the foregoing, an additional 12-hour period of work may be worked for MAR coverage (see Mid-Term R-98 Twelve Hour Shifts - Special Conditions OHN).

7. Shift workers with a plus or minus four hours time balance assigned to day work or shift for an indeterminate period of time may be required to take off or work a four-hour period respectively, but no payments, premium or otherwise will apply to such time worked as an extension of a normal eight-hour day to resolve a minus time balance.

8. Plus time balances which still exist as of the last day of the regular schedule shall be paid for at double time. At the time of layoff all positive time balances will be paid out at 2X.

Minus time balances which occur as a result of changes to the regular schedule shall be worked off within two fiscal months of the end of the schedule month in which the minus balance occurs unless it is mutually agreed to between the employee and his/her supervisor to extend this period. Minus balances not worked off within this two-month period will be written off (unless it has been agreed to extend this period).

9. An employee who commences Maternity/Parental leave, or training in excess of 5 weeks may have her/his plus or minus time balance corrected in advance, where mutually agreeable between the employee and his/her supervisor. Uncorrected time balances shall be frozen for the duration of such leave or training.
10. Revisions to the regular schedule that require individuals to be shift changed from supernumerary shifts to night shifts will be paid at two times the employee’s basic rate.

11. Revisions to the regular schedule for individuals assigned to day work that requires working a sequence of either 1, 2, or 3 night shifts will be paid at two times the employee’s basic rate.

2.1.3 Transfer to Day Work

A shift worker may be required to work on day work. In such cases the normal work week shall be 40 hours per week consisting of five days of eight hours (not before 7:00 am and not later than 6:00 pm) Monday to Friday inclusive. All work outside of normal scheduled hours shall be considered overtime and paid at the appropriate premium rate as per Section 4.0. Notification of transfer to or from day work shall be in writing with a minimum of seven days' notice.

2.1.4 Penalties

Failure to give the required notice as indicated in Subsections 2.1.1, 2.1.2 and 2.1.3 shall require the payment of double time for work performed until the notice has expired.

Revisions to Subsections 2.1.5(3)(i), (iv) and (v) of a shift change notice to correct an error which does not affect hours of work will not be considered as issuing a new shift change notice.

2.1.5 Miscellaneous Scheduling Provisions


2. All inter-crew transfers of a permanent nature will be initiated via a request for volunteers. Transfers will be based on seniority, skills and training status (senior choice / junior force).

3. Definition: Notice as referred to in this section shall be defined as per the following example. One day’s notice shall mean 24 hours prior to the start of the first affected shift.

A notice period shall be deemed to commence coincident with the signing, or verbal notification of posting, where applicable, of the shift change notice.

Verbal notification shall be given when the employee is absent from his/her regular work headquarters and he/she is not scheduled to return before the commencement of the required minimum notice period. In these situations verbal notification will be given directly to the employee in the presence of the Union Steward (where a Union Steward is present at the location) who will subsequently sign on behalf of the notified employee. The employee will be provided a copy of this notice document. The regular schedule for each employee shall be the posted schedule as per Subsection 2.1.1(1.) modified by any shift change notices in effect.
A shift change notice shall be used for all revisions to an employee’s regular schedule except in the following circumstances:

No shift change notice is required when an employee:

(a) is working supernumerary days or day work (Part G, Item 2.1.3); and
(b) is assigned to training (0800 – 1600 hrs) at a location that is within 5 km (radius) of his/her work headquarters, or vice versa; and
(c) works the same or fewer hours in a day; and
(d) does not have their start time varied in excess of 60 minutes; and
(e) is provided a written/electronic notification at least one (1) month in advance of the scheduled change.

The training hours for a full day of training will constitute the employee’s full shift for that specific day.

This shift change notice shall be a standard form containing, but not limited to, the following:

i) Reason for shift change.

ii) Details of changed hours of work.

iii) Details of time balance compared to crew.

iv) Signing or statement of verbal notification (where applicable).

v) Time of notification in signature box.

4. Permanent Location Transfer or Promotion Within a Station: On permanent transfer to a new location or promotion within a station the individual employee is required to assume the existing schedule for the new position without notice or penalty. His/her time balance shall, unless special circumstances prevent, be adjusted before taking over his/her position on the regular schedule, and in any case before the zero balance date of the existing schedule.

5. If employees at the Bruce start shifts at different times the Company will supply buses for each shift or pay travel expenses as per PW-8, subject to the continuation of the existing agreement between the Company and Bruce Power.

6. Following implementation of the 12-hour schedule, such schedule may be cancelled immediately by Management, should either the safe operation of the plant or public safety be adversely affected due to the 12-hour shift schedule.

The 12-hour schedule may be cancelled for other reasons by Management or the Union upon two months' written notice to the other party.
7. Assignment to/from Training: Normally an employee will receive his/her assignment to and from training as per Part G, Item 2.1.2.

Where mutually agreeable between the employee and his/her supervisor the employee may return to his/her regular shift without notice or penalty.

Management will make reasonable efforts to minimize personal inconvenience or hardship to employees when a change of work headquarters is necessary.

2.1.6 Conditions While Working on a 12-hour Shift Schedule

1. When a regular shift commences before midnight and continues after midnight, all hours during the continuous shift shall, for pay and time balance purposes, be recorded and treated as if they occurred during the calendar day in which the shift ends.


When an employee is scheduled to work a 12-hour shift, the following will apply:

(a) In determining credits used for vacations, floating holidays and sick leave, one and one-half days will be deducted.

(b) In determining pay treatment for

i) travelling time outside normal working hours

ii) payment for temporary supervision

iii) time charges and expenses - employee Union representative

calculations will be made on an hour-for-hour basis to a maximum of 12 hours except for (i) where the maximum will be eight hours.

(c) In determining pay treatment for the following items a day will be considered to be 12 hours:

i) Leave of Absence With Pay, Part A, Item 10.1

ii) Moving Days
(d) In determining pay treatment for

i) Statutory Holidays

ii) Special Time Off

a day will continue to mean eight hours. However, employees eligible for Remembrance Day and scheduled to work will get the normally scheduled hours off with pay.

3. Rest Periods

Each employee shall be entitled to a ten-minute rest period approximately once within every four hours at a time designated by the Company.

2.1.7 Conditions While Working on Ten Hour Shifts

Shifts

Shifts may be performed in one or two shifts per day, Monday to Sunday, inclusive, and may be performed within the following shift windows:

1st shift - 0600 hrs to 1800 hrs
2nd shift - 1400 hrs to 0200 hrs

Shift Differential

1st shift - no shift differential
2nd shift - 70 cents per hour

Meal Periods

One meal period will be included within each shift.

Lieu Days

When scheduled work is performed on a statutory holiday, an additional day off will be scheduled in lieu of the statutory holiday. This lieu day shall be identified on the schedule. When work load permits it may be interchanged with another scheduled working day after the statutory holiday at the employee's request.

 Provision Concerning Time Off

When an employee is scheduled to work a 10-hour shift, the following will apply:
(a) In determining credits used for vacations, floating holidays and sick leave, one and one-quarter days will be deducted.

(b) In determining pay treatment for

i) travelling time outside normal working hours
ii) payment for temporary supervision
iii) time charges and expenses - employee Union representative

calculations will be made on an hour-for-hour basis to a maximum of 10 hours except for (i) where the maximum will be eight hours.

(c) In determining pay treatment for the following items a day will be considered to be 10 hours:

i) Leave of Absence With Pay, Part A, Item 10.1
ii) Moving Days

(d) In determining pay treatment for

i) Statutory Holidays
ii) Special Time Off

a day will continue to mean eight hours. However, employees eligible for Remembrance Day and scheduled to work will get the normally scheduled hours off with pay.

(e) When a regular shift commences before midnight and continues after midnight, all hours during the continuous shift shall, for pay and time balance purposes, be recorded and treated as if they occurred during the calendar day in which the shift ends.

2.1.8 Change of Work Headquarters

1. In the event a shift employee is assigned to a temporary work headquarters outside his/her residence headquarters he/she shall receive a minimum of seven days notice unless no change in hours of work is required. Failure to give the required notice shall require the payment of double time for work performed at the new work headquarters until the notice period has expired. Management will provide transportation for those employees who have no reasonable transportation available to them.

2. In the event a shift employee is assigned to a temporary work headquarters within his/her residence headquarters he/she shall receive a minimum of three days notice unless:

a) No change in hours of work is required; or
b) An employee:

(a) is working supernumerary days or day work (Part G, Item 2.1.3); and
(b) is assigned to training (0800 – 1600 hrs) at a location that is within 5 km (radius) of his/her work headquarters, or vice versa; and
(c) works the same or fewer hours in a day; and
(d) does not have their start time varied in excess of 60 minutes; and
(e) is provided a written/electronic notification at least one (1) month in advance of the scheduled change.

The training hours for a full day of training will constitute the employee's full shift for that specific day.

Failure to give the required notice shall require the payment of double time for work performed at the new work headquarters until the notice period has expired. Management will provide transportation for those employees who have no reasonable transportation available to them.

3. An early return to his/her regular work headquarters initiated by Management will require a new shift change notice with the appropriate notice as stated in (1) or (2) above.

Failure to give the required notice shall require the payment of double time for work performed at his/her regular work headquarters until the notice period has expired.

4. For the purposes of Part G, Item 2.1.8 Pickering NGS and ENTC are considered one work headquarters. In addition, the Bruce site is considered one work headquarters.

5. A shift employee may be assigned to a temporary work headquarters without notice or penalty, if he/she leaves and returns to his/her work headquarters within a single shift.

2.1.9 Outage Schedules

1. Notwithstanding any other provision of the collective agreement, all classifications can volunteer to work shift in support of outages

2. Volunteers may be required to work 8, 10, or 12 hour outage shift schedules up to a maximum of 60 hours per week.

3. While working outage shift schedules all employees will be paid a weekly minimum of 40 hours per week. All hours scheduled in excess of the individual's regularly scheduled hours per week will be paid at appropriate premium overtime rates. Any outstanding time-balance will be paid out upon completion of the shift assignment at double time.
4. Outage shift schedules will be developed in consultation, in advance (in June of each year) with the Union, but the final decision on the schedules to be worked rests solely with the Company.

5. A bonus will be paid to all those employees that volunteer to work an outage shift schedule. The amount of bonus and the conditions surrounding eligibility will be determined by management and communicated prior to soliciting for volunteers.

6. The Company will solicit volunteers on a seniority basis with the requisite skills/qualifications to staff outage shift schedules.

3.0 SHIFT DIFFERENTIAL

Shift differentials shall apply to employees required to work on a three-shift schedule or a two-shift schedule. The first part of a three-shift or a two-shift schedule shall begin at normal starting time. Regular part-time and temporary part-time employees will not be eligible for shift differential when the shift starts and ends between the hours of 0700 and 1800.

3.1 Eight Hour Shifts

A shift differential of 65 cents per hour shall be paid to employees who are scheduled to work between the hours of 1600 and 2400.

A shift differential of 85 cents per hour shall be paid to employees who are scheduled to work between the hours of 0000 to 0800.

3.2 Twelve Hour Shifts

A shift differential will be paid for the night shift only.

The shift differential will be the sum of the differentials in 3.1 above multiplied by 8/12.

3.3

The appropriate shift differential shall be paid for the first eight/twelve hours of each scheduled shift on any regular scheduled day of work and shall not apply for overtime hours. When premium time is involved for payment of shift work, the premium rate shall be computed on the standard basic rate, excluding shift differential.

3.4 Joint Shift Committee

Goal

To provide a forum for communications between management and employee representatives on shift issues and to develop recommendations to senior management.
for improvements. Recommended actions will receive a written response within thirty (30) days.

Structure

Chair: The chair will rotate on a yearly basis between Management and a PWU representative.

Members:
- 5 PWU representatives
- 5 Management representatives

Functions

- Participate in the identification of problems and issues of significance to shift workers.
- Participate in the development and implementation of approved recommendations affecting shift workers
- Review Outage Schedules for the coming year.

4.0 OVERTIME

4.1

Due to the nature of the Company operations, some employees will be required to work overtime. Overtime will be minimized and managed within the limits of corporate effectiveness and customer impact. In recognition of employee well-being and inconvenience, an effort shall be made to equitably distribute overtime amongst all qualified employees. Overtime, as used herein, means that part of the actual working time which is outside the normal scheduled hours and is, therefore, subject to compensation at premium rates.

4.2 Pay Entitlement

4.2.1 Monday to Friday Inclusive

1. Scheduled Day of Work

(a) One and one-half times the employee's basic rate for all overtime work performed during the first four clock hours after normal quitting time.

(b) Two times the employee's basic rate for all overtime work performed outside the first four clock hours.
2. Unscheduled Day of Work

   (a) Two times the employee's basic rate for all overtime work performed.

4.2.2 Saturday, Sunday

Two times the employee's basic rate for all overtime work performed.

4.2.3 Statutory Holidays

1. Monday to Friday

   Two times the employee’s basic rate for all work performed plus eight hours at straight time as per Part A, Item 7.1.
   The employee may request time off without pay for the basic statutory holiday hours in addition to any overtime hours worked as per Part A, Item 10.2.

2. Saturday

   Two and one-half times the employee's basic rate for all overtime work performed.

4.2.4 Basic Rate Calculation

The basic rate is equal to the basic hourly rate of each employee’s classification as set out in Part A, Item 43 without any increments, premiums or bonuses.

4.3 Overtime Cancellation and Minimum Payments

4.3.1 Cancellation

All overtime cancelled within 44 hours of its scheduled commencement shall result in a cancellation payment of four hours at straight time except in the following circumstances:

1. Overtime arranged in the current shift as an extension of the shift, requires no cancellation payments.

2. Overtime arranged as an extension before the normal hours of work requires no cancellation payment if cancelled with more than 12 hours' notice.

4.3.2 Minimum Payments

All overtime performed or reported for due to lack of notice of cancellation shall result in a minimum payment of four hours at the appropriate premium rate except in the following circumstance:

Overtime arranged during the employee's normal working hours and worked as an extension before and/or after the employee’s normal hours of work, requires no minimum payment.
4.4 Special Provisions Concerning Overtime

1. Time shall be counted from the time the employee reports for overtime work at the station until he/she finishes overtime work at the station or until his/her normal scheduled hours of work begin subject to 5. below.

2. Because an employee was required to work overtime or because he/she lost time in changing shifts, he/she shall not be prevented from working his/her total number of normal daily hours in any normal scheduled day of work. If the employee cannot be supplied with the work required to make up the eight hours of work in that day, his/her pay shall be adjusted to provide a minimum of eight hours' work.

3. If an employee who has worked overtime and is physically capable and the gang of which he/she is ordinarily a member is at work, he/she shall not be deprived of the opportunity of working his/her normal scheduled hours in addition to the overtime he/she may have worked.

4. An employee who has accumulated overtime hours shall receive this, in earnings, calculated at the appropriate premium rate and cannot be required to take time off in lieu of payment.

5. An employee who is required to work continuously for more than 16 hours or an employee who accumulates 16 hours of working time in any 24-hour period, shall be entitled to an eight-hour rest period. Time spent for meals may be deducted from the total elapsed time but is not to be considered as breaking the continuity of the hours worked.

If the rest period extends into the employee's normal scheduled hours of work he/she shall be paid at straight time rates for the portion of the rest period which extends into the normal scheduled hours. This is in addition to the overtime worked. Should he/she be required to continue working beyond 16 hours he/she shall be paid two times his/her normal basic rate until an eight-hour rest period is granted. Should an employee be released before 16 hours have elapsed, he/she will not be entitled to an eight-hour rest period, and his/her right to continue work at straight time will be governed by Section 4.4 (3.) above.

6. An employee who is receiving double time while performing overtime work, which extends into the calendar day containing his/her scheduled day off, shall remain at double time until he/she receives an eight-hour rest period.

7. When less than 48 hours' notice of the requirement to work overtime work is given and where an extra trip is required, a traveling allowance of one hour at straight time shall be paid.

8. Equivalent time off without pay see Part A, Item 10.2.
9. At the Bruce where the provided transportation is not available, the cost of special transportation shall be provided. This provision shall be discussed for any future station.

10. Overtime - Regular Part-Time and Temporary Part-Time Employees

Overtime is defined as:

(a) Hours worked which are in excess of the normal daily hours of the classification. The premium payment for such work is one and one-half times the employee's basic rate for all work performed during the first four clock hours after the normal quitting time of the classification, and two times the employee's basic rate for all work performed outside of the first four clock hours after the classification's normal quitting time.

and/or

(b) Hours worked in excess of 24 in a week. The premium payment for such work is one and one-half times the employee's basic rate for the first four hours worked in a day. Two times the employee's basic rate for all work performed in excess of four hours in a day.

and/or

(c) Unscheduled hours worked on Saturday and Sunday. The premium payment for unscheduled hours worked on Saturday and Sunday is two times the employee's basic rate.

5.0 PREMIUM PAYMENTS

The computing of hourly rates for overtime shall be in accordance with the following: The basic rate is equal to the basic hourly rate of each employee's classification as set out in Part A, Item 43 without any increments, premiums or bonuses. Premium payment, for the under noted, shall be as follows:

5.1 Shift Workers

5.1.1 Scheduled Work

1. One and one-half times the employee's basic rate shall be paid for scheduled work performed on Saturdays and Sundays.

2. Two times the employee's basic rate shall be paid for:
(a) Scheduled work performed on a statutory holiday which occurs on Monday to Friday. An additional day off will be scheduled in lieu of the statutory holiday within six months of the end of the posted schedule.

(b) Scheduled work performed on a statutory holiday which occurs on a Saturday. The premium for scheduled Saturday in 1 above shall not apply.

5.1.2 Shift Workers - Cancelled Vacation Days

Any vacation day cancelled at the request of the Company with less than seven days' notice shall be paid for at premium rates of pay. Vacation days cancelled with seven or more days' notice shall be paid for at straight time. Cancelled vacation days will be rescheduled in accordance with Part A, Item 6.0.

Shift workers shall receive entitlement for the same number of statutory holidays as day workers.

5.2 Continuous Driving

Employees given a continuous driving assignment will be paid in accordance with the following:

In each twenty-four hour period each will be paid eight hours at the basic rate, eight hours at the appropriate premium rates and eight hours at no pay (rest period). On Saturdays, Sundays and statutory holidays the appropriate premium rates shall apply.

The total time of the trip shall be determined from the time the employees start work on the day the trip commences till the time the employees finish work on the day the trip ends. (From work headquarters and return to work headquarters.)

With less than three days' notice the appropriate rate for lack of notice shall apply to the first eight hour basic rate period.

6.0 VACATIONS - SHIFT WORKERS

Vacations will be governed by the following: The vacation year shall be from January 1st to December 31st.

Subject to exceptions resulting from unforeseen or emergent conditions, arrangements will be made to provide vacations as under noted.

1. Fourteen consecutive days off within the period May 1st to September 30th (summer schedule).

2. Sixteen consecutive days off including three weekends within the period May 1st to September 30th (summer schedule) to all who qualify for three or more weeks' vacation.
3. Where mutually convenient to the Company and the employees, if an individual so requests, all or part of the vacation allowance may be taken outside the period May 1st to September 30th.

4. A request by an individual for an extension of his/her vacation period may be granted at the Company's discretion by interchanging his/her scheduled vacation days or unused vacation entitlement with days of work, providing qualified relief is available at the location. If it becomes necessary to cancel the additional extension as outlined in this item, the employee granted the extension will be required to return to his/her original schedule without penalty to the Company. If, in any instance and due to unforeseen circumstances, vacation schedules are adversely affected, the Company will use available relief so as to reduce the abnormal period to a minimum. See also Part A, Item 6.0.

**NOTE**

The consecutive days referred to would normally include other than vacation entitlement.

7.0 **POSITIONS EXCLUDED AS PER ARTICLE 1**

It is recognized that from time to time incumbents in positions excluded under Article 1.0 will be performing work functions. It is also recognized, however, that such work functions will not be performed for the purpose of reducing staff requirements or deliberately to avoid overtime for employees represented by the Union. If the Union believes that this provision is being abused, it may lodge a grievance under Article 2 of the Collective Agreement.

8.0 **SUPERVISORY RESPONSIBILITIES**

Supervisory responsibilities are as defined in Article 8.

8.1 Tradesperson Responsibilities: A tradesperson is required to exercise judgment and control over his/her own actions so that the assigned work may be performed safely, efficiently, and effectively, and with consideration of its effect on others.

In a work situation, a journeyperson will be responsible only for his/her own work and the work and training of one apprentice or helper. However, for the purpose of training, a journeyperson may be required to teach trade skills of a specific task to more than one apprentice or journeyperson at one time. During such a teaching situation, the journeyperson is responsible only for the demonstration of trade skills and not for the work of the apprentices or journeyperson involved.

Related to the above, a "helper" is a person of lower classification than the tradesperson he/she is assisting; an "apprentice" is a person of lower than journeyperson progression in a trade.
9.0 PAYMENT FOR TEMPORARY SUPERVISION

Supervisory payments are established in Article 8.

Overall supervision of a crew is provided by a supervisor and/or trades supervisor. However, a crew may be assigned a task without a regular supervisor in attendance, in which case a temporary supervisor may be appointed. In such instances, any responsibility for supervision must be assigned, it cannot be assumed. When so assigned, the level of supervision to be performed and paid must be designated in accordance with Article 8.

Where a group of employees are working at a location on jobs which are independent of one another and planned by a supervisor so that no co-ordination of their activities is required, additional supervision will not be required. Where the job requires more than one day to complete or is not preplanned, or is being performed by four or more employees, one of them shall be appointed and paid as trades supervisor. In such cases if he/she supervises for more than two hours in a day he/she shall be paid the supervisory rate for a minimum of four hours or the actual hours he/she supervises, whichever is the greater.

NOTE

Preplanned means planning which is done away from the job site. It does not relate to on the site detailed planning.

10.0 RELIEF WORK

Payment for a statutory holiday shall be at the relief rate if it occurs during the relief period for all classifications.

When an employee acquires a lieu day while relieving in a higher-rated position, the lieu day shall be paid at the higher rate.

10.1 Operators

If an operator, relieving in a higher position falls sick, he/she will be paid sick benefits of the rate of the job in which he/she is relieving only up to the first point on the schedule where he/she would have normally returned to his/her basic rate. From this point onward, sick benefits during this illness will be based on his/her basic classification rate.

In recognition that operators are regularly required and scheduled to provide relief in higher positions, they shall receive for their full vacation period the rate of the higher position when such relief has been provided for 50 percent (50%) or more of a vacation year. Operators relieving in a higher position for less than 50 percent (50%) of the vacation year will be paid the rate of their regular classification during the full vacation period.
To take care of staff development training situations for lower classifications it is recognized that any lower classification may from time to time assume the responsibility of any higher position. This is a strict training situation and must not be used as a substitute for normal relief procedures.

Operators who are required to obtain a Ministry of Commercial and Consumer Relations (MCCR) or Environment Ministry (EEM) certificate will be paid his/her basic rate to write each examination once. Arrangements will be by mutual agreement.

The application of this clause shall not qualify an employee, who works on the day that s/he writes the examination, for premium rates and pay.

Operators who are required by the Company to renew their certificates with the Ministry of Commercial and Consumer Relations or Environment and Energy Minister, will have the cost of such renewal reimbursed.

11.0 SPECIAL CLOTHING

The Company shall supply special wearing apparel where it is required at no cost to the employee. In addition to the provisions of Part A, Item 33.0, clothing will be provided when it is not possible because of special dirt, to have clothes cleaned domestically or commercially. In this case it may be acceptable to provide the cleaning facilities and not the clothes.

Where uniform appearance is required, uniforms will be provided. Security staff required to wear a uniform will be reimbursed for two (2) pairs of CSA approved safety footwear per calendar year with a dollar maximum of $125. Where uniform appearance is not required, Part A, Item 33.2.7 will apply.

12.0 STAFFING

12.1 Selection to/Acting in Vacancies

Selection to be made within 90 days after a vacancy in an existing position occurs, and where there is a qualified applicant. Selection within 90 days is not applicable in staffing new stations.

All acting positions are to be limited to 90 days unless extensions are agreed to by the Company and the Sector Board Chairperson of the Union. Pending the arrival of the successful applicant and his/her assuming of the normal duties, the acting incumbent who is performing the normal duties and responsibilities of an “acting” position shall receive the rate for the position.

12.2 Staffing Nuclear Operator Positions

12.2.1

Supervising Nuclear Operator and Authorized Nuclear Operator vacancies will be filled using Article 10.1.3.A.
12.2.2

Operator positions will be advertised under Article 10. Positions will be advertised stating the required specialization and requisite qualifications, e.g., fuel handling, TRF, Unit 0, and units.

13.0 PROVISION OF MEALS

In recognition of the importance of regular meals to an individual’s health and effectiveness on the job, the Company will supply meals as outlined below and when required, will assign an employee to secure the meals.

(a) Employees provide their own meals on regular days of work.

(b) When an employee works overtime on a regular day off, he/she will be expected to provide one meal if 23 hours notice has been given.

(c) When an employee works extension overtime before or after normal scheduled hours, all required meals will be provided by the Company. The first meal (or meal allowance) will be provided when two (2) hours of overtime are worked. Subsequent meals or meal allowances will be provided every four (4) hours of overtime worked thereafter.

(d) When meals cannot be reasonably obtained\(^1\), an allowance of $15.00 per meal will be paid.

(e) Employees working 10 hour overtime shifts and not receiving 23 hours notice will receive one overtime meal (or meal allowance).

13.1 Meal Periods

(a) Employees on day work shall take a meal period designated by the Company and shall not be paid for this time (unless otherwise provided for in the Collective Agreement).

(b) Employees on shift work shall eat their meals during the shift hours as conditions permit.

(c) When an employee works extension overtime, no time shall be deducted for eating such meals where the employee eats the meal on the job and in a minimum of time.

\(^1\) ‘Reasonably obtained’ is to be defined locally by Union and Management.
14.0 RADIATION

14.1 Personal Property

Reimbursement by the Company for losses of the employee's personal property as a result of radioactive contamination shall be considered and assessed on the individual merits of each case.

14.2 Access to Radiation Records

Each employee shall have access to his/her personal radiation dose records.

14.3 Ionizing Radiation

The Union Office will be supplied with one copy of the Radiation Protection Requirements and one copy of the Radiation Protection Procedures Manual, and all revisions to these Requirements and Procedures.

14.4 Radiation Limits

Employees performing their normal work, who exceed radiological limits requiring them to be removed from certain work locations, shall be given suitable work elsewhere at not less than their basic rate of pay.

14.5 Pregnant Atomic Radiation Workers

Every reasonable effort shall be made to assign a pregnant Nuclear Energy Worker to a location where there is no expected recordable radiation dose above natural background. In relocations of pregnant Nuclear Energy Workers, the normal base rate of pay will be maintained. The relocation period will be extended for a reasonable period of time for female Nuclear Energy Workers who indicate they intend to continue to breast-feed their babies after they return to work.

14.6 Female Atomic Radiation Workers Wishing to Conceive

Every reasonable effort shall be made to re-assign a female Nuclear Energy Worker, at her request, to a location where there is no expected measurable radiation dose while she is attempting to conceive. The purpose of the reassignment is to ensure that the embryo/fetus is not exposed to radiation during the period between conception and confirmation of pregnancy.

The re-assigned female Nuclear Energy Worker shall have her wages maintained under the following conditions:

(a) the re-assignment is six months or less, and

(b) the employee will have no more than three such re-assignments, and

(c) Exceptions to the above may be granted at the discretion of the Company's Chief Physician.
14.7

Although every effort shall be made to minimize disruption to the continued training and development of the employee in her chosen career, it is recognized that re-assignment to a non-related work area may interrupt the training program. In the case where it is interrupted, progression through the training program will be frozen for the duration of the reassignment.

14.8 Dose Limits

The Company is committed to excellence in radiological safety performance. All radiation exposures shall be kept as low as reasonably achievable, consistent with sound operating practices, and with due regard for employee concerns.

The Company will pursue a policy of controlling radiation doses to its employees such that individual doses will not exceed 10 mSv (1 rem) per year averaged over any five (5) year period, provided the total collective dose does not increase as a result.

Each facility shall jointly develop annual targets and implementation plans which will strive to improve on this standard and eliminate unnecessary radiation exposure.

The Grievance process is not intended to apply to Part G, Item 14.8, however, instances where annual targets have been exceeded will be reviewed by the Joint Health and Safety Committee of that facility. Such instances may also be fit matter for discussion by the Joint Committee on Radiation Protection.

15.0 PERSONNEL DEVELOPMENT (TRAINING AND EXPERIENCE)

The benefits of personnel development to the Company and to the individual are recognized.

Also recognized is the emphasis placed on personnel development, when determining qualifications, for promotion purposes. The need for equitable development opportunities and treatment of individuals and groups is clear. Therefore, it is agreed that:

1. Individuals and groups should receive equitable development opportunities and treatment.

2. Disruptions to training will be minimized. Where the work situation, unavoidably, precipitates an inequality of development opportunity and treatment, such inequity will be recognized and will not be allowed to work to the disadvantage of that individual or group.

3. Employees shall receive 100% of approved reimbursable costs, paid for external training which:
   - creates or maintains employee’s capability related to current job performance,
• creates employee's capability for a position identified in a succession, retraining or redeployment plan.

Employees shall receive 75% of registration/tuition fees and learning material costs for external training activities which create employee's capability for future jobs within the Company and provided such training is outside working hours.

16.0 RESIDENCE HEADQUARTERS FOR PICKERING NGS, DARLINGTON NGS AND ASSOCIATED WORK HEADQUARTERS

1. The boundary of the residence headquarters for Pickering NGS and Darlington NGS will be determined by the perimeter of a circle of radius 30 km, centered at a point midway between Pickering NGS and Darlington NGS.

2. The residence headquarters defined in 1. will also be the residence headquarters for all work headquarters of Nuclear that are located within it.

3. An employee who is transferred between the work headquarters that are within the designated Pickering - Darlington residence headquarters will be eligible for transportation and moving expenses as per Part A, Item 23.0 of the Collective Agreement, unless the new work headquarters is within a reasonable commuting distance from his/her residence.

17.0 TEMPORARY TRANSFERS OF PART G EMPLOYEES TO PART F - THERMAL GENERATING STATIONS

Employees temporarily transferred to the Thermal Business Unit will adopt the work schedules and associated work schedule provisions of the location to which they have been transferred.

Employees returning to their regular work headquarters will assume the same time balance as their crew. Any minus time balances created due to working at the temporary location will be written off. Plus time balances shall be paid for at double time. In addition, where work load permits, the employee may request time off on an hour for hour basis without pay to be taken within six months.

The following items will apply under the above conditions:

1. Part F, Items 1.0, 1.4, 3.4.9, and 11.0 as contained in the Ontario Power Generation Inc. (Thermal/Hydroelectric) Collective Agreement.

2. The Company will supply the tools for employees while on temporary transfer.
18.0 EMERGENCY RESPONSE TEAMS

18.1

As part of their normal duties, all employees may be required at times to take action in response to emergencies.

18.2

Qualified designated members of the Emergency Response Teams shall receive $1350.00 annually on their anniversary of becoming a member of the Emergency Response Team.

18.3

Although membership of the Emergency Response Team is voluntary, the Company reserves the right to appoint members if sufficient volunteers are not available.

Persons acting as ERT Captains on either drills, training or events shall be paid $1/hr in addition to their normal pay on that shift.

19.0 AUTHORIZED NUCLEAR OPERATORS IN TRAINING

Refer to Mid-Term R-116-5.

19.1 Authorized Nuclear Operator Retention of Authorization Policy

Refer to Mid-Term R-116-5.

19.2 Authorized Nuclear Operators in Training Increasing Capability Compensation Progression Policy

Refer to Mid-Term R-169-4.

20.0 MAINTENANCE ASSESSING

Those who were Regular Maintenance Assessors prior to October 3rd, 2001 will not normally work shift.

21.0 CONTROL TECHNICIANS

The normal hours of work for all control technician positions shall be 40 hours per week.
21.1 Relief

1. Where a shift control technician is required to provide relief in the senior shift control technician position, he/she shall be paid for all such hours worked at the rate for the position as Part A, Item 43 and Article 8.

2. Where a senior shift control technician is required to relieve in a non-union supervisory position for a period of one working day or more, he/she will be paid in accordance with Part A, Item 43 and Article 8.

22.0 SHIFT WORK - RADIATION CONTROL TECHNICIANS, SHIFT RADIATION PROTECTION & SAFETY TECHNICIAN, PLANNING COST AND CONTROL TECHNICIANS, TRAINING TECHNICIANS AND NUCLEAR TECHNOLOGISTS

22.1 Applicability

This section covers the following classifications:

Radiation Control Technicians I
Shift Radiation Protection & Safety Technician
Planning Cost and Control Technicians
Training Technicians
Nuclear Technicians

22.2

The following items as set out in Part G shall apply:

(1) Item 7.0, Positions Excluded as per Article 1
(2) Item 14.1, Personal Property
(3) Item 14.2, Access to Radiation Records
(4) Item 14.3, Ionizing Radiation
(5) Item 14.4, Radiation Limits
(6) Item 15.0, Personal Development
(7) Item 18.0, Emergency Response
22.3

All of the provisions of Part D shall apply, with the following exception:

Item 8 – Positions excluded as per Article 1.

22.4 Intent

The intent of this section is to provide a framework within which: (1) employees in the Radiation Control Technician I classifications may be assigned to any of the existing shift schedules for limited periods of time; and (2) employees in the Planning Cost and Control Technician, Training Technician and Nuclear Technologist classifications may be assigned to shift work on a Monday to Friday basis for limited periods of time. The "limited period" is to be less than three months in each year for each employee unless the employee involved specifically consents to an extension.

22.5 Implementation

When shift work is required, management will solicit preferences for shift work from the employees in the required classifications. If employees with the required skill, knowledge, experience, etc., indicate a preference for shift work, management will select from among these employees. If insufficient qualified volunteers are available, management will assign the shift work to qualified employees, endeavouring to minimize personal inconvenience.

22.6 Duration of Shift

The employees who may be required to work shifts under this section include both 35 and 40 hour per week positions. They will work a time balanced schedule. Forty hour per week employees when assigned to shift work will work the same hours as regular shift workers on shift.

Thirty-five hour per week employees when assigned to shift work will normally work seven-hour shifts. This may at management discretion be increased to eight-hour shifts.

22.7 Special Provisions on Shift

1. Shift work shall not be implemented for a period of three working days or less. If the working period is three days or less, the appropriate premium rate will be paid for the minimum three-day period.

2. The Company will provide seven days posted notice of the commencement and termination of a shift. Failure to provide such notice will require a penalty payment of double time for all changed hours of work within the notice period.

   In the case of illness, which would result in a staff shortage, four (4) days' advance notice will be given when placing an employee on shift.

3. Such a placing on shift work shall not deprive an employee of his/her total number of normally scheduled weekly hours.
4. Revision to the work schedule shall provide for a minimum of 15 hours off between shifts. Failure to provide such time off will require the penalty payment for the first affected shift.

5. Shift differential shall apply to employees required to work on a three-shift schedule or a two-shift schedule and shall not apply for overtime hours.

6. Work in excess of the total number of normal daily hours will be paid at the appropriate overtime rates.

7. Premium payments for work on weekends and statutory holidays will be as shown in Part G, Item 5.0.

8. Where mutually agreeable between the employee and his/her supervisor, Training Technicians may be assigned for self development to existing shift schedules. Such time shall not exceed three (3) months in a calendar year.

9. When Radiation Control Technicians are required to work 12-hour shifts, the following sections of Item 22 will not apply: 22.6, 22.7(4), 22.7(5), 22.7(6) and 22.7(7). When Planning Cost and Control Technicians or Training Technicians or Nuclear Technologists are required to work 12-hours shifts, Part G, Items 22.6, 22.7 and 22.7.6 will not apply.

The appropriate provisions of Part G, Item 2.1, Shift Workers and Item 3.2, Shift Differential, 12-Hour Shift, will apply. The exception to this is that Part G, Item 2.1.3, Transfer to Day Work, will not apply.

22.8 Deleted Provisions When on Shift

When an individual is assigned a shift and the provisions of 22.7 are in effect, the following provisions of Part D will not apply:

1. Item 2.0: Hours of Work - General

2. Item 2.1: Hours of Work - Specific

3. Item 2.2: Hours of Work - Outside Head Office

23.0 CHEMICAL TECHNICIANS/FLMC RADIATION CONTROL AND RADIATION PROTECTION TECHNICIAN II’S

The normal hours of work for all chemical technician / FLMa radiation control and radiation protection technician II’s positions shall be 40 hours per week.
23.1

The following items as set out in Part G will not apply to the position of chemical technician / FLMa radiation control and radiation protection technician II’s:

1. Items 8.0 and 9.0 - Supervisors.
2. Item 12.1 - Selection to/Acting in Vacancies.

23.2

The following items as set out in Part D will apply to chemical technicians / FLMa radiation control and radiation protection technician II’s:

1. Item 6.0 A - Relief Work.
2. Item 7.0 - Posting of Vacancies.
3. Item 7.1 - Posting Procedures.

24.0 REGULAR GUIDES AND ASSISTANT PUBLIC EDUCATION OFFICERS

24.1

The following items as set out in Part G shall apply:

(1) Item 7, Positions Excluded as per Article 1
(2) Item 14.1, Personal Property
(3) Item 14.2, Access to Radiation Records
(4) Item 14.3, Ionizing Radiation
(5) Item 14.4, Radiation Limits.
(6) Item 15.0, Personal Development

24.2

All of the provisions of Part D shall apply, with the following exception:

Item 8.0 Positions Excluded as per Article 1.
24.3 Hours of Work

A schedule covering a period of not less than one month to be posted 30 days in advance, providing an average of five (seven-hour) days per week scheduled on any day of the week. Hours of work to be scheduled between 8:30 am and 6:00 pm, with a paid lunch period of one-half hour to be taken between 11:00 am and 2:00 pm. Failure to give the required notice shall require the payment of double time for work performed until the notice period has expired.

24.4 Method of Payment

24.4.1 Scheduled Hours

Payment at straight time, Monday to Friday.

Payment at time and one-half for all scheduled hours worked on Saturdays and Sundays.

24.4.2 Overtime

Payment for all work performed outside of scheduled hours to be made in accordance with the overtime provisions of Part D, Item 4.0.

24.4.3 Statutory Holidays - Scheduled Hours

Time and one-half for all scheduled hours worked on a statutory holiday, plus statutory holiday credit, except Saturdays.

24.4.4 Statutory Holidays - Overtime

Double time for all non-scheduled hours worked on a statutory holiday, plus statutory holiday credit.

25.0 NUCLEAR SECURITY OFFICERS

25.1 Applicable Provisions

The following Items of Part G and D apply to Nuclear Security Officers only. All other sections in Part G or D not referenced do not apply.

Part G Items:

1.0 Wages
2.0 Hours of Work
3.0 Shift Differential
4.0 Overtime (Excluding 4.4 (8))
5.0 Premium Payments
6.0 Vacation - Shift Workers
7.0 Positions Excluded as per Article 1
10.0 Relief Work
11.0 Special Clothing
12.1 Selection to/Acting in Vacancies
13.0 Provision of Meals
14.0 Radiation
15.0 Personnel Development (Training and Experience)
16.0 Residence Headquarters for Pickering NGS, Darlington NGS and Associated Work Headquarters

Part D Items:

6.0 A Principles re: Resourcing for Relief, Acting & Temporary Assignments
6.1 A Relief Work
7.0 Posting of Vacancies

25.2 Equivalent Time Off

Employees who work authorized overtime will be paid at the appropriate premium rate or may bank the time at appropriate premium rates to a maximum of forty (40) hours banked. Such banked time may be taken by mutual agreement between the employee and his/her supervisor. Employees can only book ETO after 75% of vacation and floating holidays are booked.

25.3 Shift Work - Darlington Security Officers

Part G, Item 2.0 through 2.1.7 shall not apply to the Darlington Security Officers, rather they shall work under the shift conditions as follows:

1. Eight (8) or twelve (12) hours shifts may be established on the basis of shift scheduling averaging forty (40) hours per week over approximately a one (1) year period.

2. The shift schedule is designed to average forty (40) hours per week over the duration of the schedule. The schedule will be prepared so that each employee’s time is balanced to zero plus or minus four (4) hours. Time will be carried into the next schedule. The schedule will be a twelve (12) month shift schedule and be posted as close to sixty (60) days before its start as possible.

Although the content, preparation, posting and administration of shift schedules is the sole responsibility of Ontario Power Generation Inc., the preference of the majority of shift workers for a particular basic type of schedule will be adopted. Such preferences will be made known to Ontario Power Generation Inc. prior to the commencement of the preparation of the new schedule. However, if in Ontario Power Generation Inc.’s opinion, the efficiency of the station or the health of a shift worker could be detrimentally affected by the chosen schedule, then Ontario Power
Generation Inc. will provide the Union (Chief Steward) with reasons or medical opinions why the desired schedule cannot be implemented.

The preference of individual shift workers regarding vacation periods will be considered, providing such preferences are made known to prior to commencement of preparation of new schedules.

Management will endeavor to minimize the extent to which guards must remain at a given post for extended periods of time (not normally more than 2 hours). This excludes the SMR.

Management agrees to consider employee requests in flexibility to work supernumerary shifts. (This excludes such examples as the SMR, BGG, and protected areas recognizing vulnerability issues).

The following are the recognized criteria of an acceptable shift schedule:

(a) The schedule should equitably rotate among all crews.

(b) The schedule should follow a repeating pattern so that it is easily understood.

(c) The schedule should never be far off balance and should reasonably approximate the time off provisions of day work. It follows then that a schedule should not leave long sequences of work without time off, nor long sequences of time off. In the case of 12-hour shift schedules, time balances should cycle between +/-36 hours with an additional +/-4 hours as an exception.

(d) Time balance shifts shall be indicated on the regular schedule as Monday to Friday and will be 8 or 12 hours.

(e) When scheduling 12-hour shifts, the maximum number of night shifts to be worked in sequence would be three (3) and the maximum number of days to be worked in a sequence would be four (4).

(f) The 12-hour shift schedule shall provide for at least 48 hours off between each sequence of shifts and at least two regular days off will be scheduled in each week (pay period).

3. Canadian Nuclear Safety Commission (CNSC) guidelines will be observed at all times. The parties acknowledge that the current practice of establishing shift schedules is within the CNSC regulations. However, in case of change to CNSC guidelines, Ontario Power Generation Inc. will not be penalized if it must alter the shift schedules to conform to changed CNSC requirements.
4. Management will give a minimum of seven (7) days notice for changes to an employee’s hours of work, as shown on the shift schedule, except in emergent situations or to take advantage of a developmental or training opportunity or when done in response to an employee’s request. Failure to provide the minimum notice will result in the payment of premium rates from the date of the change to the end of the notice period.

5. The minimum hours off between shifts shall be as follows:

   (a) Twelve (12) hours off when going from a twelve (12) hour shift to an eight (8) hour shift;

   (b) Fifteen (15) hours when going from an eight (8) hour shift to a twelve (12) hour shift;

   (c) Twelve (12) hours when going from an twelve (12) hour shift to a twelve (12) hour shift, or eight (8) hours when going from a twelve (12) hour shift to a twelve (12) hour shift with the consent of the employee;

   (d) Fifteen (15) hours when going from an eight (8) hour shift to a eight (8) hour shift;

6. For pay purposes, all shifts shall be recorded and treated as if they occurred during the calendar day in which the shift ends.

7. For twelve (12) hour shifts:

   (a) In determining credits used for vacations, floating holidays, and sick leave, one and one-half (1 ½) days will be deducted;

   (b) In determining pay treatment for recognized holidays a day will mean eight (8) hours;

   (c) In determining pay treatment for leaves of absences with pay, a day will mean twelve (12) hours.

8. When work load permits, a time balance day may be interchanged with a regular day off or a box day off may be interchanged with a regular scheduled work day, at the employee’s request. Box days are the official credit for a statutory holiday.

9. In meeting the required manpower complements for eight (8) hour day shifts, it may become necessary to move employees from existing twelve (12) hour shifts. When this is required, the first principle management will follow will be to move employees who volunteer for day shifts. If sufficient volunteers are not available, the required number of employees will be shift changed from their twelve (12) hour shift to day shift in reverse order of seniority (i.e. the most junior employee is shift changed
first). The Union acknowledges there may be exceptions to the reverse seniority rule. When such exceptions occur, they will be discussed with the Chief Steward.

10. Time balance shifts shall be worked Monday to Friday. Time balance shifts shall begin no earlier than 0600 hours and end not later than 1800 hours.

11. Circumstances may arise where the twelve (12) month shift schedule must be curtailed and a contingency schedule put in place. (Examples may include unplanned station/unit outages, unplanned security events, work stoppages by members of other bargaining units or during prolonged threats to Nuclear facilities within the Darlington Nuclear property). The following conditions will apply during such circumstances:

(a) Ontario Power Generation Inc. will provide, where practical, thirty (30) days notice of the requirement for a contingency schedule. Included in such notice will be the need for such a schedule and its expected duration.

(b) Where, for reasons unique to the need to implement the contingency schedule, thirty (30) days notice cannot be given, Ontario Power Generation Inc. will give as much notice as possible.

(c) Consultation will take place between Ontario Power Generation Inc. and the PWU concerning the need for implementation of the schedule and the details of the schedule.

(d) In determining the appropriate rates and conditions which would accompany the establishment of a contingency schedule, (i.e. premium rates, shift differential, special duty payments, etc.) reference will be made to other agreements made between the Corporation and the representative bodies.

(e) If consultation fails to provide agreement on either the need for the contingency schedule or its details, Ontario Power Generation Inc. reserves the right to implement the schedule.

12. Employees on shift shall eat their meals as conditions permit. Meals are to be eaten in the cafeteria, lunch rooms and other areas as agreed to between the Union and Management. Employees will be entitled to meal breaks as follows:

12 hour shifts; 2 one-half (½) hour breaks
8 hour shifts; 1 one-half (½) hour break
26.0 **PART G – PROJECT CREW**

1. Project crews will be staffed on a voluntary basis. In the event there are insufficient volunteers the Company may hire employees directly to the project crews.

Once an employee has volunteered they will only be permitted to leave the project crew by exception once a suitable replacement is available, or they have met any of the following:

   I. Employees hired as external applicants (including Appendix A) from a temporary position or regular position with less than 2 years seniority, must work a minimum of five years on the project crew.

   II. Employees hired from a regular position within the OPG-N bargaining unit, must work a minimum of two years on the project crew, unless they are below top step of the band in which case they must work a minimum of 3 years.

   III. Employees hired from a regular position within the OPG-Non Nuclear bargaining unit, with more than two years seniority, must work a minimum of three years on the project crew.\(^2\)

   IV. An employee has been selected to a promotion.

Once the above noted criteria have been met, project crew employees will have normal rights under Article 10.

2. Employees on Project Crews are considered to be regular employees with all terms and conditions and benefits as per the collective agreement, except as noted in these provisions.

3. Management will review the proposed use of the Project Crews with the PWU and solicit input on the Project Crew(s) size, composition, source of staff for the crew(s), proposed peak work times, etc.

4. Employees on the Project Crew will be entitled to the same number of yearly hours as a regular employee and be paid for those hours at straight time on the same pay basis as a non Project Crew regular employee.

5. Each employee on the Project Crew may have a different number of hours available to work, due to the application of vacation rights, floating holidays, and statutory holidays. (e.g. 2080 hrs minus statutory holidays 88 hrs, minus 3 floating holidays 24 hrs, and appropriate vacation 2/3/4/5/6 weeks).

6. Employees may be required to work days or shift work on 8/10/12 hour schedules up to 60 hours per week and a minimum of 40 hours per week.

\(^2\) Non-Nuclear employees hired to the Radiation Protection Project Crew must work a minimum of 5 years on the Project Crew.
7. Shift differential (identified in Part G, Item 3.0) and payment for scheduled work on weekends and statutory holidays (identified in Part G, Item 5.1) will be paid out on an as worked basis.

8. Management will post the project crew work schedule a minimum of 30 days in advance of its commencement for the year 2003. For each year after 2003 the schedule for the following year will be posted by September 1st. This schedule will illustrate the blocks of time when and where employees will be required to work. This work schedule may be changed by providing the affected employees a minimum of 7 days notice in advance of the change. Failure to provide this notice will result in the payment of double time for only those hours within the notice period that the employee had not previously expected to work.

Employees will be entitled to establish blocks of time when they will be unavailable for work assignment(s). This time off cannot conflict with the likely periods required for them to work.

9. The classifications required for project crews will be determined by the Company. The Company will fill vacant positions on the project crews from amongst the senior employees with the required qualifications. The Company reserves the right to restrict the number of volunteers from a work group at a site where the operation of the work group will be negatively affected.

10. The parties agree that the total number of employees in Project Crews and those in base complement shall exceed the number of employees in base complement.

27.0 Apprentice Hiring and Placement

1. Apprentices will be hired as Regular employees to a site, but shall not form part of any site complement and shall not be deemed to occupy a base position. Apprentice positions will be posted internally and externally. For every three (3) external Apprentice positions, available to external candidates only, OPG Nuclear will make one (1) internal Apprentice position available to a qualified internal candidate. If an Apprentice position is made available for an internal candidate it will count for the purposes of this paragraph whether or not the position is filled. The application of the 3:1 ratio shall be cumulative (every third (3rd) external hire shall trigger one internal vacancy regardless of the time between hiring.

2. If there are no qualified internal candidates for the internal Apprentice position(s) posted as per paragraph 1 above, OPG Nuclear may, at its discretion, fill the position(s) with an external applicant(s).

3. Journeypersons are ineligible to apply for an Apprenticeship in their own discipline.

4. Those employed as Apprentices are not eligible to apply for any other opportunities within OPG, including rotations and posted vacancies, until they have served four years in their apprenticeship. Upon completion of their fourth (4th) year of the Apprenticeship, those employees will be allocated to the site assigned in paragraph 1 and will be automatically placed in an ongoing Regular position without the necessity of a posting.
5. OPG Nuclear will offer one (1) Journeyperson position at Darlington available for transfer to a qualified Journeyperson from Nuclear for every one (1) Apprentice hired and assigned to Darlington in the same discipline. The Journeyperson position will be made available when the Apprentice successfully completes four (4) years in their Apprenticeship.

6. To count for the purposes of the ratios in paragraphs 1 and 5, OPG Nuclear will not block the senior qualified Journeyperson who elects to transfer to Darlington as per the terms of paragraph 1, 5 or 8.

7. If the application of paragraph 5 has required Darlington to make a Journeyperson position available for transfer, it will count for the purposes of paragraph 5, whether or not the position is filled.

8. If the application of paragraph 5 has required Darlington to make a Journeyperson position available for transfer, the number of Journeypersons hired at Darlington on a going forward basis from the date of this agreement will each count as a position made available for transfer in paragraph 5.

9. Co-op students who are hired into full time Apprentice positions will receive credit for their Co-op term(s) towards their Apprenticeship time, and service credit for any portion of their co-op term(s) served with OPG.

10. Requests from Darlington Mechanical Maintainers and Control Maintainers for mutual transfer(s) that arise as a result of this provision, as outlined in paragraph 5 will be accommodated by the Company. Transportation and moving expenses will not normally apply.

11. Effective April 1st, 2009 OPG will require Apprentices/Trainees to register with the Ministry of Training, Colleges and Universities (MTCU). However, the completion of the C of A and C of Q is the responsibility of the Apprentice/Trainee. Apprentices/Trainees will be reimbursed for the registration fee charged by the MTCU. Apprentices/Trainees will be reimbursed for the examination fee and paid at their basic rate, for the time required to write each examination once, up to the maximum number of hours established by the appropriate Agency/Ministry for each examination.

28.0 OPG Nuclear Apprentice Hiring & Joint Apprenticeship Committee

The purpose of the Joint Apprenticeship Committee (JAC) is to deal with issues, in the spirit of cooperation and trust, relating to staffing and training apprentices.

The JAC will be comprised of 4 OPG representatives, including the representative for staffing and training, as well as 4 PWU representatives, including a PWU Staff Officer.

The Committee will meet quarterly or as required at the request of either party.
Key Principle

The hiring and retention of Apprentices is in the best interests of both parties and both parties will strive to come to mutually acceptable ways of balancing this goal with the interests of regular employees.

- If there are major disagreements, they are to be presented to Sector Vice President PWU-Nuclear and CNO for resolution.

29.0 Nuclear Operators Committee

Goal:

To provide a forum for communications between Ontario Power Generation and the Power Workers' Union to discuss and resolve Nuclear Operator issues and concerns, and to provide consistency, wherever applicable between the sites.

Membership:

Power Workers' Union

- Operator Chief Steward (Pickering)
- Operator Chief Steward (Darlington)
- OPG Sector Representative
- PWU Staff Officer

Ontario Power Generation

- Director Operations Support Corporate, or delegate
- Manager Operations Support Pickering A,B and Darlington or delegates
- Human Resource Representative

Meeting Frequency

The committee will meet a minimum of quarterly or on an as need basis.

Function

To discuss and resolve issues that are specific to Nuclear Operators, such as, but not limited to the following: training, safety, hours of work, hiring, staff movements and assignments, issues arising under Mid-Term Nuc R-1026 etc. It is not intended to be a forum for individual grievance resolution.

The PWU and OPG will provide each other with advanced notice of all issues to be discussed at coming meetings. The committee is required to produce a record of all issues raised and discussed and the associated dispositions. This record is to be provided to the Operations Peer Team, and where a disposition is required the Operations Peer Team will provide a timely response in advance of the next quarterly meeting.
Unresolved Issues

Any unresolved issues will be escalated to the PWU Sector 1 Vice President and CNO for early resolution.

30.0 Janitor Wage Rates

<table>
<thead>
<tr>
<th>Date</th>
<th>Progression</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 1, 2015 – 1.00%</td>
<td>25.82</td>
</tr>
<tr>
<td>April 1, 2016 – 1.00%</td>
<td>26.08</td>
</tr>
<tr>
<td>April 1, 2017 – 1.00%</td>
<td>26.34</td>
</tr>
</tbody>
</table>

NOTES:

All Progressions shall be in accordance with Part A, Item 3.

Applicable to employees hired or reclassified on or after October 3rd, 2001.

31.0 Commercial and Inspection Maintenance Divers

The following terms shall be applied to incumbents in the Commercial Inspection and Maintenance Diver and Commercial Inspection and Maintenance Diver FLMa classifications:

1. Incumbents will be considered day workers, working 40 hours per week, consisting of either:

   (a) Five (5) days of eight (8) hours (not before 7 am and not later than 6 pm) Monday to Friday inclusive; or

   (b) Four (4) days of ten (10) hours (not before 6 am and not later than 6 pm) Monday to Friday inclusive.

   (c) In the event that shift work is required, the provisions in Part G, Item 2.1.2 will apply. However, no employee will be scheduled to work more than 3 months per calendar year on shift.

The company will insure the life of an employee required to dive in the amount of $10,000 during diving operations.
APPENDIX A

Nuclear ONLY
APPENDIX “A”
FOR SUPPLEMENTARY MAINTENANCE, REPAIR
AND OTHER PWU ASSIGNED WORK

1.0 Interface with Chestnut Park Accord Addendum (CPAA)

1.1 This Appendix does not alter the CPAA in any manner and all applicable provisions of the CPAA continue to apply to the determination and assignment of trades’ work. Disputes regarding the applicability of this Appendix versus the applicability of the CPAA as they may apply to the assignment of work, remittances to the appropriate BTU, and referral rights of the BTUs shall be referred to the process under Article 6 of the CPAA.

2.0 Scope

2.1 OPGN recognizes the PWU as the sole bargaining agent for all employees of OPGN who perform supplementary maintenance, repair, and other PWU assigned work save and except that work which is performed by PWU regular employees as defined in the collective agreement. All trades work shall be performed by the classifications listed below:

- Control Technician (Electrical Trades)
- Mechanical Maintainer (Mechanical Trades)
- Civil Maintainer I
- Civil Maintainer III

2.2 At the request of the OPG Vice President of Labour Relations or the PWU Vice President, the parties will meet to discuss the merits of adding any new classification(s).

The parties will consider adding a classification when:

1. Work is required in the classification and
2. Regular employees are not available to perform the work and
3. The work is not ongoing in nature.

3.0 Principles and Process

3.1 It is intended that this Appendix shall not interfere with the principle that work of a continuing nature (including the work of Project Crews where utilized by Management) be done by regular employees.

3.2 OPGN shall share with the PWU all related information for making an assignment as far in advance of the work as possible.

3.3 The designated OPGN representative and the PWU Vice President or delegate will agree upon the proposed assignment prior to the assignment being made by the Company. An agreement on the assignment of work shall not be used in a grievance to establish work of a continuing nature except where:

a) A single project/outage at a site lasts twelve (12) months or more; or
b) A series of individual projects/outages at a site last twenty-four (24) months or more without a break.
In such cases the PWU shall retain the right to grieve work of a continuing nature.

For the sake of clarity, “a site” shall be Pickering, including Pickering A and B. Darlington is also, “a site.” Similarly the OPG operations at the Bruce will be, “a site.”

3.4 Should the parties fail to agree on the assignment of work to employees hired pursuant to Appendix “A”, the issue will be referred to Mr. Martin Teplitsky, or his designate, who shall act as the sole arbitrator for expedited resolution of the dispute and shall have all the powers of the Chief Arbitrator under the Collective Agreement. This hearing will resolve both the Appendix “A” issue(s) and any issue(s) related to contracting or subcontracting of work. The arbitrator will decide whether the business case warrants the contracting or subcontracting of work.

3.5 The arbitrator will hear the dispute within three (3) days of the dispute being referred to arbitration. The arbitration may be conducted by conference call.

3.6 Briefs shall be prepared by each party, which will include a statement of facts, a brief argument, and any other information and/or documents relevant to the issue. Briefs will be exchanged by the parties and provided to the arbitrator at least twenty-four (24) hours before the arbitration hearing begins. Witnesses may be called with the leave of the arbitrator.

3.7 The decision of the arbitrator shall be final and binding.

3.8 For outage work programs of less than 50,000 person-hours, and project work less than 5,000 person hours, OPGN may hire Temporary Employees pursuant to this Appendix without seeking approval from the Union.

4.0 Employment

4.1 Referral of employees will be in accordance with the CPAA. Employees will be hired pursuant to the applicable employment provisions from the appropriate Building Trades Union as permitted by the relevant BTU Collective Agreement (e.g. name hire, recall etc).

4.2 OPGN shall have the right to transfer employees from site to site on a senior-choice, junior-force basis. Junior employees may be laid off for refusal to accept a transfer. Travel time and mileage will be paid on the first day of transfer and the last day (where a return trip occurs). No mileage will be paid where an employee qualifies for a travel allowance.

4.3 Crew supervision may be performed by regular PWU or Appendix “A” employees, and Appendix “A” employees may be intermingled with regular crews. When selecting supervisors for intermingled crews, first consideration will be given to PWU Regular Employees.

4.4 The Union may designate stewards under Appendix “A” on the basis of one steward per classification per site. The Union may designate one of these stewards per site as senior steward who shall not be laid off or transferred to another site, provided he/she is qualified to perform the remaining work. The PWU Vice President may, however, at his sole discretion consent to the transfer of a senior steward. In no case shall the employment of a senior steward be used to advance a work of a continuous nature grievance.
4.5 The Employer will provide notice to the appropriate Chief Steward when Appendix “A” employees are hired and when their employment is terminated.

5.0 Terms and Conditions of Employment

5.1 Employees under Appendix “A” shall be considered to be Temporary Employees under the PWU/OPGN collective agreement. All provisions and practices in the PWU/OPGN collective agreement with respect to Temporary Employees as of the effective date of this Appendix continue to apply save and except the provisions of Appendix “A” which include the following:

5.2 All trades work done by classifications listed in Appendix “C” of the CPAA shall be carried out by the following classifications at the following wage rates

<table>
<thead>
<tr>
<th>Classification</th>
<th>April 1/15</th>
<th>April 1/16</th>
<th>April 1/17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Tech</td>
<td>$52.76</td>
<td>$53.29</td>
<td>$53.82</td>
</tr>
<tr>
<td>Mechanical Maintainer</td>
<td>$52.03</td>
<td>$52.55</td>
<td>$53.08</td>
</tr>
<tr>
<td>Civil Maintainer I</td>
<td>$48.15</td>
<td>$48.63</td>
<td>$49.12</td>
</tr>
<tr>
<td>Civil Maintainer III</td>
<td>$30.16</td>
<td>$30.46</td>
<td>$30.76</td>
</tr>
</tbody>
</table>

Cost of Living Allowance (COLA) applicable to regular employees will also apply to Appendix “A” employees.

5.3 Remittance for retirement, benefits and Union funds shall be deducted from the total package and sent to the appropriate union on a monthly basis. Remittances shall be based on hours earned as opposed to hours worked.

5.4 PWU dues shall be established by the PWU and will be collected by OPGN and remitted to the PWU on a monthly basis.

5.5 Part A, Item 16 of the collective agreement does not apply to employees under Appendix “A”.

5.6 Part A, Item 31 (Eye Protection) and 33 (Special Clothing) will not apply to Appendix “A” employees. However, personal protective equipment and gloves, rainwear and coveralls will be provided in appropriate circumstances. In addition, where the Company does not
provide radiation safety footwear, new employees will be provided with a coupon at the time of hire-on to be redeemed for one pair of work boots for the life of the Collective Agreement (to a maximum of $150) from the boot truck.

5.7 Part G, Section 2.1.4 will not apply to Appendix “A” employees however shift arrangements that are compatible with regular crew shifts will be established. Premium rates will be paid for that part of the actual working time which is outside the normal scheduled hours.

5.8 All Appendix “A” employees shall be members of the PWU and shall maintain such membership in good standing as a condition of employment.

5.9 All Appendix “A” employees once hired by OPGN will be required to “Skill Broaden”. Employees may be required to perform additional tasks where there are no formal trades training required. The normal referral process of employees through the CPAA will not be affected.

5.10 Unless otherwise agreed to in future rounds of collective bargaining the Daily Travel Allowance and Subsistence Allowance will be increased by the same percentage and at the same times as PWU wage rates.

5.11 **Daily Travel Allowance**

The daily travel allowance will be paid by the Employer to its employees who are not living in camp or receiving a subsistence allowance as defined herein, on the following basis:

(a) If an employee lives within 40 radius kilometers of the work site no travel allowance will be paid.

(b) If an employee lives within 40-56 radius kilometers of the work site they shall receive $23.14 per day (effective April 1, 2016, $23.37, effective April 1, 2017, $23.60) as travel allowance for each day worked or reported for.

(c) If an employees lives within 56-80 radius kilometers of the work site they shall receive $27.64 per day (effective April 1, 2016, $27.92, effective April 1, 2017, $28.20) as travel allowance for each day worked or reported for.

(d) If an employee lives within 80-97 radius kilometers of the work site they shall receive $32.20 per day (effective April 1, 2016, $32.52, effective April 1, 2017, $32.85) as travel allowance for each day worked or reported for.

(e) If an employee lives greater than 97 radius kilometers from the work site and does not qualify for subsistence allowance they shall receive $37.85 per day (effective April 1, 2016, $38.23, effective April 1, 2017, $38.61) as travel allowance for each day worked or reported for.

(f) When an employee is directed to report to a work site that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distance of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement, board allowance entitlement and initial and return allowance entitlement.
(g) A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between radius kilometres and actual kilometres travelled.

5.12 Room and Board Allowance (Subsistence)

(a) The following conditions will apply for employees whose regular residence* is more than 97 radius kilometres from the work site:

(1) The Employer may supply either:

   (i) free room and board in camp or a good standard of board and lodging;

   or

   (ii) subsistence allowance; or

(2) An employee may exercise his/her option not to stay in a camp or accept free room and board. An employee who exercises this option shall receive a subsistence allowance as follows:

   **Bruce Site**

   (i) When an employee's regular residence is more than 97 radius kilometres from the work site and the employee maintains temporary accommodations at or near the Bruce work site the employee shall be paid a subsistence allowance of **$85.25** (effective April 1, 2016, **$86.10**, effective April 1, 2017, **$86.96**) per day for each day worked or reported for.

   **Sites Other Than Bruce**

   (ii) When an employee's regular residence is more than 97 radius kilometres from the work site and the employee maintains temporary accommodations at or near the work site the employee shall be paid a subsistence allowance of **$37.85** (effective April 1, 2016, **$38.23**, effective April 1, 2017, **$38.61**).

   **All Sites**

   (iii) When an employee's residence is more than 500 kilometres from the work site and the employee is working a four (4) day by ten (10) hour per day shift or working twelve (12) hour shifts, the employee will be paid one (1) additional day's subsistence allowance.

(b) An employee shall not qualify for daily travel allowance or room and board allowance as provided for in 5.11 and 5.12, Item (a) above, when such employee reports for work but does not remain at work for his/her scheduled daily hours unless excused by an authorized representative of his/her Employer. Such permission shall not be unreasonably denied.
Upon application, payment of Room and Board/Travel Allowance will be issued for the first two pay periods. Failure to provide satisfactory proof of eligibility during this period will result in cessation of payments and the recovery in two equal amounts. In the event of termination for any reason before full recovery, any balance owing will be deducted from the final pay.

*For the purpose of this Section, "regular residence" is defined as:

1. The place where the employee maintains a self-contained, domestic establishment (a dwelling house, apartment or similar place of residence where a person generally eats and sleeps and for which he/she can show proof of financial commitment). This is in contrast to a boarding house facility which is not self-contained; and

2. The employee normally resides in the residence except for those periods of time when, because of the location of the work, the employee obtains temporary accommodation for that work location.

3. For metropolitan areas (Toronto and Hamilton) the calculation of distance shall be the employee's regular residence.

4. For all other areas, the calculation of distance shall be based on the location of the city or town hall of the municipality where an employee maintains a self-contained domestic establishment described above. In those municipalities where a city or town hall does not exist, then the post office serving his/her self-contained domestic establishment will apply.

6.0 Grievance and Arbitration

The following expedited grievance and arbitration mechanism applies to employees governed by Appendix “A”.

(a) OPGN shall appoint employees beyond the jurisdiction of the Union to act as contact supervisor. Each contact supervisor shall be responsible for giving or securing a decision on any grievance submitted to him/her by a union representative on behalf of any employee or group of employees under his/her supervisor. Grievances will be referred to the contact supervisor within 30 days of the discovery of the event giving rise to the grievance. If a supervisory decision is not made by the contact supervisor within 48 hours, the union representative may, within 30 days, refer the grievance to arbitration.

(b) The referral to arbitration shall be made to one of the following single arbitrators on a rotating basis.

   a) Jules Bloch
   b) Rob Herman
   c) Louisa Davie

(c) The arbitrator shall set a hearing date to take place within ten (10) working days of the date of the referral and shall render a decision on the case within 30 days of the
completion of the hearing of the matter. The parties agree that they will facilitate to the greatest extent possible the expeditious completion of the hearing process.

(d) The decision of the arbitrator shall be final and binding on the parties. The arbitrator shall not have jurisdiction to alter or overrule this agreement or to make any decision inconsistent with this agreement.

(e) The arbitrator shall have all the power and authority of a regular arbitrator under Article 3 of the collective agreement.

(f) Maintenance of normal earnings shall be provided by OPGN for all Union representatives, attending at the grievance process, including the arbitration hearing. Arbitrator costs will be shared.
IN WITNESS THEREOF the parties hereto have caused the Agreement to be executed by their proper officers duly authorized in that behalf at Toronto, Ontario.

Jason Fitzsimmons – Vice President
Health, Safety, Employee and Labour Relations
Ontario Power Generation Inc.

Joe Fierro – Vice President
OPG Bargaining Group
The Society of Energy Professionals
# TABLE OF CONTENTS

## PART I - PREAMBLE

1. **SOCIETY AND CORPORATE INTERESTS** .......................................................... 14
   1.1 PRINCIPLES .................................................................................................. 14
   1.3 PARTNERSHIP PRINCIPLES .................................................................... 15

## PART II - RECOGNITION

2. **RECOGNITION CLAUSE** ........................................................................ 16
   2.1 PROVINCIAL JURISDICTION ................................................................. 16
   2.2 FEDERAL JURISDICTION ...................................................................... 16
   2.3 CLARITY NOTES ....................................................................................... 16
   2.4 SUPERVISORY EMPLOYEES - CODE OF ETHICS ................................. 19
   2.5 CONFLICT OF INTEREST - SECURITY STAFF .................................. 19
   2.6 EXCLUSIONS PROCESS ......................................................................... 20
   2.7 SUCCESSOR RIGHTS .............................................................................. 23

3. **EMPLOYEE CLASSIFICATIONS** ............................................................. 23
   3.1 PROBATIONARY EMPLOYEES .............................................................. 23
   3.2 REGULAR EMPLOYEES ........................................................................ 23
   3.3 TEMPORARY EMPLOYEES .................................................................... 24

4. **SERVICE CREDIT DEFINITIONS** ......................................................... 24
   4.1 ESTABLISHED COMMENCEMENT DATE (ECD) ............................... 24
   4.2 VACATION CREDIT DATE (VCD) ........................................................... 25
   4.3 EXTERNAL EXPERIENCE VALUE (EEV) ............................................. 26
   4.4 SERVICE RECOGNITION DATE (SRD) ................................................ 26
   4.5 “ELIGIBILITY SERVICE” OR “CONTINUOUS EMPLOYMENT” FOR PENSION PURPOSES ................................................................. 27

5. **TEMPORARY ASSIGNMENTS** ............................................................... 27
   5.1 EMPLOYEES TEMPORARILY EXCLUDED FROM SOCIETY JURISDICTION ................................................................. 27
   5.2 EMPLOYEES TEMPORARILY INCLUDED IN SOCIETY JURISDICTION ................................................................. 28
   5.3 GRIEVANCE ............................................................................................ 28

6. **EMPLOYEES ON TEMPORARY OUT-OF-PROVINCE ASSIGNMENT** ..... 29
   6.1 TERMS AND CONDITIONS OF EMPLOYMENT DURING ASSIGNMENT ............................................................................. 29
   6.2 FILLING THE PRE-ASSIGNMENT POSITION ....................................... 29
6.3 Redeployment Upon Completion of Assignment .......... 30
6.4 Employment Continuity During Temporary Out-of-
Province Assignment ........................................... 30
7 Mid-Term Agreements - Business Units .................... 32

PART III - VOLUNTARY RECOGNITION AGREEMENT .................. 33

8 VRA Amendments ............................................. 33
8.1 Supervisory Employees ..................................... 33

PART IV - COLLECTIVE AGREEMENT TERM - NO STRIKE/NO LOCKOUT .... 35

9 Collective Agreement Term - No Strike/No Lockout . 35
9.2 No Strike/No Lockout ......................................... 35

PART V - UNION SECURITY ............................................. 36

10 Society Membership and Dues Deduction ................. 36
10.1 Membership in the Society .................................. 36
10.2 Dues Deduction (Rand Formula) ......................... 36
10.3 Bargaining Unit Information .............................. 36

11 Principles Regarding Involvement with Respect to
Successor Rights .................................................. 36

PART VI - DISPUTE RESOLUTION PROCESSES ..................... 38

12 No Discrimination .............................................. 38
12.1 Human Rights ................................................. 38
12.2 Union Activity ................................................ 38

13 Employee Indemnification ..................................... 38

14 Voluntary Recognition Agreement Disputes ............. 39
14.1 Enforcement ..................................................... 39
14.2 Selection of Mediators and Arbitrators .................. 39

15 Collective Agreement Negotiation Disputes .............. 40

16 Complaint and Grievance/Arbitration Procedure ..... 40
16.1 Preamble and Principles of Operation ................... 40
16.2 Definitions ...................................................... 41
16.3 Scope Notes ..................................................... 42
16.4 Timeliness ....................................................... 42
iii

16.5 STEP 1: EMPLOYEE COMPLAINT ............................................. 42
16.6 STEP 2: MEETINGS OF THE JOINT GRIEVANCE RESOLUTION
   COMMITTEE ........................................................................... 43
16.7 STEP 3 - GRIEVANCE MEDIATION AND/OR ARBITRATION ...... 44
16.8 EMPLOYMENT FILE .................................................................. 45
16.9 SOCIETY REPRESENTATIVES ................................................. 45
16.10 MEDIATORS/ARBITRATORS .................................................... 45
16.11 EXPEDITING REDEPLOYMENT GRIEVANCES AND ARBITRATIONS .... 46
17 DISCIPLINE AND DISCHARGE ................................................... 48
18 PRINCIPLE AND PROCESS OF PRIOR INVOLVEMENT IN
   JURISDICTIONAL ISSUES/DISPUTES ........................................ 49
19 JOB CHALLENGES .................................................................. 50
19.1 EMPLOYEE INITIATED JOB REVIEWS ................................... 50
20 PERFORMANCE APPRAISALS AND PAY STANDING COMPLAINTS . 50
21 PERFORMANCE APPRAISAL FEEDBACK AND ADVANCED
   WARNING OF REDUCED PAY STANDING .................................. 51
21.1 PRINCIPLES ........................................................................... 51
22 ROLE OF SUPERVISORS ............................................................ 52

PART VII - SALARY ...................................................................... 53

23 SALARY SCHEDULES AND PROGRESSION ................................. 53
24 ESCALATOR CLAUSE .................................................................. 54
25 PAY AND BENEFITS TREATMENT OF MANAGEMENT AND
   PROFESSIONAL TRAINEES PAID ON STEPS 1 OR 2 OF THE MP2,
   MP3 OR MP4 BANDS ................................................................ 62
26 FM&P SALARY SCHEDULE 02 .................................................... 63
27 OFFICE SUPERVISORY AND SERVICES (OSS) SALARY
   SCHEDULE 05............................................................................ 63
28 TRADES MANAGEMENT SUPERVISORS/TRADES SUPERVISORS
   (TMS/TS) SALARY SCHEDULE 08 ............................................ 63
29 SHORT-TERM ABSENCES .......................................................... 63
30 ARTICLE 30 HAS BEEN DELETED ............................................ 63
31 JOB EVALUATION PLANS ........................................................ 64
32 RE-ERNABLE INCENTIVE PLAN ................................................. 64
33 PROGRESSION-IN-PLACE PLANS .............................................. 64
33.1 DEFINITION ........................................................................ 64
33.2 PRINCIPLES ......................................................................... 64
33.3 CONDITIONS ........................................................................ 65
33.4 STANDARD FEATURES ..................................................... 65
34 TEMPORARY EMPLOYEES ....................................................... 67
34.1 SOCIETY NOTIFICATION ................................................. 67
34.2 TEMPORARY EMPLOYEES WITH LESS THAN 12 MONTHS' SERVICE ................................................. 67
34.3 TEMPORARY EMPLOYEES WITH MORE THAN 12 MONTHS' SERVICE ................................................. 68
34.4 TEMPORARY EMPLOYEES WORKING REDUCED HOURS .......... 68

PART VIII - ABSENCE FROM WORK ................................................................. 69

35 PAID/UNPAID TIME OFF ................................................................. 69
35.1 JURY DUTY/REQUIRED ATTENDANCE AT COURT ................................................................. 69
35.2 FUNERAL LEAVE ................................................................. 69
35.3 MEDICAL AND DENTAL APPOINTMENTS ................................................................. 70
35.4 FAMILY CARE ................................................................. 70
36 EMPLOYEES HIRED AS SOCIETY STAFF ............................................. 70
37 RELEASE OF SOCIETY REPRESENTATIVES ............................................. 71
37.1 INTENT ................................................................. 71
37.2 SPECIFIC CIRCUMSTANCES ................................................................. 71
38 VACATIONS ................................................................. 72
38.1 VACATION ENTITLEMENT ................................................................. 72
38.2 LESS THAN ONE YEAR OF SERVICE BY JUNE 30 ................................................................. 72
38.3 ONE TO SEVEN YEARS OF SERVICE ................................................................. 72
38.4 FROM EIGHT TO FIFTEEN YEARS OF SERVICE ................................................................. 73
38.5 FOR SIXTEEN TO TWENTY-FOUR YEARS OF SERVICE ................................................................. 73
38.6 FOR TWENTY-FIVE OR MORE YEARS OF SERVICE ................................................................. 73
38.7 EXTERNAL EXPERIENCE CREDIT ................................................................. 73
38.8 VACATION CREDIT FOR PRIOR SERVICE ................................................................. 74
38.9 VACATION WITHOUT PAY ................................................................. 74
38.10 USE OF VACATION CREDITS OF SUCCEEDING YEAR AT CHRISTMAS ................................................................. 74
38.11 BANKED VACATION ................................................................. 74
38.12 VACATION BONUS ................................................................. 74
38.13 VACATION CARRYOVER ................................................................. 75
38.14 VACATION ENTITLEMENT ON RETIREMENT/TERRMINATION .......... 75
38.15 VACATION PAY ON RETIREMENT/TERRMINATION IS AS FOLLOWS: ................................................................. 75
38.16 DEFERMENT OR INTERRUPTION OF VACATIONS ................................................................. 76
39 STATUTORY HOLIDAYS AND FLOATING HOLIDAYS ........................................... 77
39.2 FLOATING HOLIDAYS ................. 77
39.3 REMEMBRANCE DAY ................................................................. 78
40 UNEMPLOYMENT INSURANCE COMMISSION REBATE ........................................... 79
41 PREGNANCY/PARENTAL LEAVE ................................................................. 79
41.1 PREGNANCY LEAVE ......................................................... 80
41.2 PARENTAL LEAVE ......................................................... 80
41.3 BENEFITS UNDER THE SUPPLEMENTARY UNEMPLOYMENT
  BENEFIT (SUB) PLAN............................................................ 81
42 SICK LEAVE PLAN FOR EMPLOYEES HIRED PRIOR TO JANUARY
  1, 2001 OR COVERED BY THE TRANSITION PROVISIONS IN
  ARTICLE 9.3 OF THE 2006-2010 COLLECTIVE AGREEMENT ... 83
42A SICK LEAVE PLAN (FOR EMPLOYEES HIRED ON OR AFTER
  JANUARY 1, 2001) ................................................................. 84
43 LONG TERM DISABILITY FOR EMPLOYEES HIRED PRIOR TO
  JANUARY 1, 2001 OR COVERED BY THE TRANSITION
  PROVISIONS IN ARTICLE 9.3 OF THE 2006-2010 COLLECTIVE
  AGREEMENT ........................................................................ 85
43.1 QUALIFYING PERIOD ....................................................... 85
43.2 DISABILITY PERIOD ....................................................... 85
43.3 BENEFITS ................................................................. 86
43.4 OTHER CONDITIONS ...................................................... 86
43A LONG TERM DISABILITY (FOR EMPLOYEES HIRED ON OR AFTER
  JANUARY 1, 2001) ................................................................. 87
43A.1 QUALIFYING PERIOD ..................................................... 87
43A.2 DISABILITY PERIOD ..................................................... 87
43A.3 BENEFITS ................................................................. 87
43A.4 OTHER CONDITIONS ...................................................... 87
44 WORKERS’ COMPENSATION LEAVE .................................. 88
45 REHABILITATION AND RE-EMPLOYMENT .......................... 89
45.1 APPLICATION .............................................................. 89
45.2 POLICY ................................................................. 89
45.3 REHABILITATION .......................................................... 89
45.4 RE-EMPLOYMENT .......................................................... 89
45.5 TERMINATION OF EMPLOYMENT .................................... 90

PART IX - HEALTH BENEFITS ......................................................... 91

46 EXTENDED HEALTH BENEFITS (EHB) ................................. 91
47 DENTAL PLAN .............................................................. 91
48 SEMI-PRIVATE HOSPITAL ACCOMMODATION PLAN .......... 92

PART X - PENSION AND INSURANCE ................................................. 93

49 LIFE INSURANCE ............................................................. 93
PART XI - RELOCATION ASSISTANCE ................................................................. 98

51 HOUSING ASSISTANCE PLAN ................................................................. 98
51.1 INTENT .............................................................................................. 98
51.2 PURCHASE GUARANTEE ................................................................. 98
51.3 LISTING OF PROPERTY ................................................................. 99
51.4 SALE OF PROPERTY BY OPG .......................................................... 99
51.5 ADVANCE OF EQUITY ...................................................................... 100
51.6 HOUSE EVALUATION AND GUARANTEE – ATIKOKAN THERMAL
GENERATING STATION (TGS) .............................................................. 100

52 MOVING EXPENSES .......................................................................... 100
52.1 INTENT .............................................................................................. 100
52.2 MINIMUM MOVING DISTANCE ......................................................... 101
52.3 EXPENSES FOR REIMBURSEMENT ................................................ 101
52.4 SECOND RELATED MOVE ............................................................... 105
52.5 ON RETIREMENT ............................................................................... 106

53 FINANCIAL ASSISTANCE PLAN ......................................................... 106

54 HOUSE EVALUATION AND GUARANTEE PLAN ................................ 108

55 COMPENSATION WHEN ASSIGNED TO TEMPORARY WORK
HEADQUARTERS .................................................................................. 108
55.1 INTENT .............................................................................................. 108
55.2 DEFINITIONS .................................................................................... 109
55.3 COMPENSATION WHEN REMAINING AT TEMPORARY WORK
HEADQUARTERS (TWHQ) ................................................................. 109
55.5 COMPENSATION FOR DAILY COMMUTING TO, AND FROM,
TEMPORARY WORK HEADQUARTERS ............................................. 110
55.6 EXCEPTION ....................................................................................... 111
PART XII - TIME WORKED OUTSIDE NORMAL HOURS

56 On-Call Service ................................................................. 112
  56.1 Definition ................................................................. 112
  56.2 Payment ................................................................. 112

57 Overtime ............................................................................ 113
  57.1 Day Workers ............................................................... 113
  57.2 Shift Workers .............................................................. 114
  57.3 Recording Overtime ...................................................... 115

58 Travel Time ........................................................................ 115
  58.1 General ................................................................. 115
  58.2 Excessive Travel ......................................................... 115
  58.3 Emergency Overtime Work ........................................... 115
  58.4 Attendance at Seminars, Conventions, Etc. ................. 115
  58.5 Flexibility ................................................................. 116

59 Shift Work (M&P, TMS/TS) ................................................. 116
  59.1 Definitions ................................................................. 116
  59.2 Shift Workers .............................................................. 116
  59.3 Shift Allowances (M&P, TMS/TS) ................................ 118
  59.4 Information Management Systems Division (M&P) .... 119
  59.5 Ten Hour Shifts .......................................................... 120
  59.6 Periodic Shifts for Non-Shift Workers ......................... 121
  59.7 Assignment to Shift – Non-Shift Workers .................... 122
  59.8 Time Balancing .......................................................... 122

60 Shift Work (FM&P) ............................................................... 123
  60.1 Intent ................................................................. 123
  60.2 Definitions (See Article 59) ......................................... 123
  60.3 Shift Differentials ......................................................... 124
  60.4 Shift Premiums ........................................................... 124
  60.5 Overtime ................................................................. 125
  60.6 Time Balancing .......................................................... 125
  60.7 Special Circumstances .................................................. 125

61 Compensation and Working Conditions - 12-Hour Shift

62 Shift Turnover ................................................................. 132
PART XIII - WORKING CONDITIONS ................................................................. 134

64 EMPLOYMENT CONTINUITY ................................................................. 134
64.1 SCOPE ............................................................................................. 135
64.2 PREFERENCE FOR REGULAR EMPLOYEES ..................................... 136
64.3 GRIEVABILITY/ARBITRABILITY ......................................................... 136
64.4 PREAMBLE AND PRINCIPLES OF OPERATION ............................... 136
64.5 DEFINITIONS .................................................................................. 137
64.6 NOTIFICATION AND INVOLVEMENT OF THE SOCIETY ............... 140
64.7 SET UP JOINT REDEPLOYMENT AND PLANNING TEAM ............... 141
64.8 JOINT PLANNING - RESPONSIBILITIES OF THE JRPT ................. 142
64.9 UNIT OF APPLICATION .................................................................. 143
64.10 PROCESS FOR STAFF CHANGES - MIX AND MATCH ................. 145
64.11 MIX AND MATCH RULES ............................................................... 146
64.12 AVAILABLE OPTIONS IF EMPLOYEE REFUSES A JOB OFFER .. 149
64.13 REFUSAL OF AN INCUMBENT POSITION ....................................... 149
64.14 PRE-MIX AND MATCH SURPLUS DECLARATIONS ....................... 150
64.15 IDENTIFICATION OF SURPLUS EMPLOYEES ............................... 150
64.16 DECLARED SURPLUS ................................................................. 152
64.17 DECLARED SURPLUS - SIGNIFICANT INEQUITY RIGHTS .......... 153
64.18 VOLUNTARY SURPLUS ............................................................... 155
64.19 REDEPLOYMENT TOOLS ............................................................... 156
64.20 RE-ASSIGNMENT OF DECLARED SURPLUS EMPLOYEES ....... 158
64.21 SEARCH NOTICE PERIOD ........................................................... 159
64.22 ACCEPTANCE/REJECTION OF JOB OFFERS ................................. 158
64.23 REASONABLE OFFER CHALLENGE PROCESS .............................. 162
64.24 LEGAL NOTICE OF TERMINATION OF EMPLOYMENT ............... 163
64.25 COMPENSATION ........................................................................ 163
64.26 REDUCTION IN HOURS OF WORK ............................................... 164
64.27 SEVERANCE, LUMP-SUM PAYMENTS AND VOLUNTARY
   RESIGNATION ..................................................................................... 166
64.28 PURCHASED SERVICES ................................................................ 167
64.29 TERMINATION OF EMPLOYMENT ............................................... 168
64.30 RECALL RIGHTS .......................................................................... 169
64.31 RELOCATION AND HOUSING ASSISTANCE ................................. 169

PART B NON-SURPLUS REDEPLOYMENT OF SOCIETY
   REPRESENTED STAFF ......................................................................... 170
64.32 CONDITIONS FOR EXPEDITED NON-SURPLUS REDEPLOYMENT .. 170
64.33 UNIT OF APPLICATION…………………………………….. 170
64.34 JOINT REDEPLOYMENT AND PLANNING TEAM………… 171
64.35 DISPUTE RESOLUTION…………………………………….. 171
64.36 RELOCATION ASSISTANCE………………………………… 172
64.37 RELATED AGREEMENTS…………………………………… 172
64.38 OPERATION AND FUTURE CONSIDERATION…………… 172
ATTACHMENT 1 ……………………………………………………173
PART C DECONTROL/ CHANGE OF EMPLOYER………………….. 178
64.41 SEQUENCE OF EVENTS…………………………………… 179
65 VACANCIES (RELIEF, ROTATIONS AND SELECTIONS)…… 181
65.1 INTENT ………………………………………………………. 181
65.2 DEFINITIONS ………………………………………………… 181
65.3 ADVANCE PLANNING ………………………………………… 182
65.4 RELIEF ……………………………………………………… 182
65.5 ROTATIONS WITHIN THE BARGAINING UNIT …………… 182
65.6 SELECTIONS FOR ASSIGNMENTS OTHER THAN RELIEF OR
ROTATIONS……………………………………………………….. 184
66 SALARY TREATMENT FOR PROMOTIONS, TEMPORARY
ASSIGNMENTS, LATERAL TRANSFERS AND DEMOTIONS…… 189
66.1 DEFINITIONS ………………………………………………… 189
66.2 PROMOTION ………………………………………………… 190
66.3 RECLASSIFICATION AS A RESULT OF A JOB RE-EVALUATION 190
66.4 TEMPORARY ASSIGNMENT IN A HIGHER-RATED JOB ……. 191
66.5 LATERAL TRANSFER ………………………………………… 192
66.6 DEMOTIONS ………………………………………………… 192
67 PURCHASED SERVICES AGREEMENT (PSA)………………… 192
67.1 SCOPE ……………………………………………………… 193
67.2 ASSIGNMENT OF WORK …………………………………… 193
67.3 DECISION PROCESS ………………………………………… 194
67.4 DISPUTE RESOLUTION PROCESS ………………………… 196
67.5 STRUCTURE ………………………………………………… 197
67.6 APPLICATION ……………………………………………… 198
68 HOURS OF WORK……………………………………………… 198
68.3 REDUCTION OF HOURS OF WORK………………………. 199
69 ARTICLE 69 (FORMERLY THE RWE ARTICLE) HAS BEEN
DELETED ……………………………………………………………… 199
70 ALTERNATE HOURS OF WORK ARRANGEMENTS…….. 199
70.1 PRINCIPLES……………………………………………….. 199
70.2 APPLICATION ……………………………………………… 199
70.3 DEFINITIONS ……………………………………………… 200
70.4 OVERTIME ………………………………………………….. 201
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>70.5</td>
<td>PROCESS</td>
<td>201</td>
</tr>
<tr>
<td>71</td>
<td><strong>REDUCED HOURS OF WORK (RHOW) ARRANGEMENTS</strong></td>
<td>203</td>
</tr>
<tr>
<td>71.1</td>
<td>PRINCIPLES</td>
<td>203</td>
</tr>
<tr>
<td>71.2</td>
<td>DEFINITIONS</td>
<td>203</td>
</tr>
<tr>
<td>71.3</td>
<td>GUIDELINES</td>
<td>203</td>
</tr>
<tr>
<td>71.4</td>
<td>GENERAL CONDITIONS - REDUCED HOURS ARRANGEMENTS</td>
<td>204</td>
</tr>
<tr>
<td>71.5</td>
<td>TERMINATION OF THE RHOW AGREEMENT</td>
<td>210</td>
</tr>
<tr>
<td>71.6</td>
<td>RESPONSIBILITIES</td>
<td>212</td>
</tr>
<tr>
<td>72</td>
<td><strong>PEAK DEMAND HOURS ARRANGEMENTS / PROJECT CREWS</strong></td>
<td>212</td>
</tr>
<tr>
<td>72.1</td>
<td>INTENT – PEAK DEMAND HOURS</td>
<td>212</td>
</tr>
<tr>
<td>72.2</td>
<td>INTENT - PROJECT CREWS</td>
<td>216</td>
</tr>
<tr>
<td>73</td>
<td>WORK SHARING</td>
<td>217</td>
</tr>
<tr>
<td>74</td>
<td>ARTICLE 74 HAS BEEN DELETED</td>
<td>218</td>
</tr>
<tr>
<td>75</td>
<td>TELEWORKING</td>
<td>218</td>
</tr>
<tr>
<td>75.1</td>
<td>DEFINITION OF TELEWORKING</td>
<td>218</td>
</tr>
<tr>
<td>75.2</td>
<td>COLLECTIVE AGREEMENT STANDARDS:</td>
<td>219</td>
</tr>
<tr>
<td>75.3</td>
<td>LOCAL AGREEMENTS</td>
<td>219</td>
</tr>
<tr>
<td>76</td>
<td><strong>DIRECT DEPOSIT</strong></td>
<td>219</td>
</tr>
<tr>
<td>77</td>
<td>CROSSING PICKET LINES OF OTHER UNIONS</td>
<td>220</td>
</tr>
<tr>
<td>78</td>
<td><strong>THE PROVISION OF FRENCH LANGUAGE SERVICES</strong></td>
<td>220</td>
</tr>
<tr>
<td>78.1</td>
<td>DESIGNATED POSITIONS</td>
<td>220</td>
</tr>
<tr>
<td>78.2</td>
<td>JOB SECURITY</td>
<td>221</td>
</tr>
<tr>
<td>78.3</td>
<td>TRAINING</td>
<td>221</td>
</tr>
<tr>
<td>78.4</td>
<td>POSTING AND SELECTION</td>
<td>221</td>
</tr>
<tr>
<td>78.5</td>
<td>SURPLUS STAFF</td>
<td>221</td>
</tr>
<tr>
<td>78.6</td>
<td>ALLOWANCE</td>
<td>222</td>
</tr>
<tr>
<td>79</td>
<td>ARTICLE 79 HAS BEEN DELETED</td>
<td>222</td>
</tr>
<tr>
<td>80</td>
<td><strong>SPECIAL CLOTHING</strong></td>
<td>222</td>
</tr>
<tr>
<td>81</td>
<td>PAYMENT FOR USE OF PERSONAL VEHICLE</td>
<td>223</td>
</tr>
<tr>
<td>82</td>
<td><strong>BUSH FIRE FIGHTING AND VOLUNTEER FIRE BRIGADES</strong></td>
<td>223</td>
</tr>
<tr>
<td>83</td>
<td>RETIREMENT BONUS</td>
<td>224</td>
</tr>
<tr>
<td>84</td>
<td><strong>EXTREME WINTER WEATHER CONDITIONS</strong></td>
<td>224</td>
</tr>
<tr>
<td>84.1</td>
<td>MAKE UP TIME</td>
<td>224</td>
</tr>
<tr>
<td>84.2</td>
<td>CLOSURE</td>
<td>225</td>
</tr>
<tr>
<td>84.3</td>
<td>STRANDED EMPLOYEES</td>
<td>225</td>
</tr>
<tr>
<td>85</td>
<td>EXTRAMURAL TRAINING</td>
<td>225</td>
</tr>
<tr>
<td>86</td>
<td>MEAL EXPENSES</td>
<td>226</td>
</tr>
<tr>
<td></td>
<td><strong>PART XIV - ADMINISTRATION</strong></td>
<td></td>
</tr>
<tr>
<td>87</td>
<td>REPRESENTATION ON OPG COMMITTEES</td>
<td>227</td>
</tr>
</tbody>
</table>
#166 RE: COAL PLANT CLOSURE ................................................................. 295
#171 RE: DENTAL CODES ................................................................. 299
#174 RE: BAND N ................................................................................ 301
#175 RE: PURCHASED SERVICES AGREEMENT (PSA) NUCLEAR
   (INCLUDING NUCLEAR WASTE AND NUCLEAR REGULATORY
   AFFAIRS) ......................................................................................... 315
#176 RE: ESA HOURS OF WORK PERMIT ........................................... 318
#177 RE: TREATMENT OF SCHEDULE 04 MANAGEMENT AND PROFESSIONAL
   TRAINEES ..................................................................................... 319
#178 RE: NUCLEAR RESPONSE FORCE - FLM ................................... 322
#179 RE: EXPEDITING SOCIETY/OPG JURISDICTIONAL ARBITRATIONS .. 324
#181 RE: PND LOCAL AGREEMENT FOR #1 SHIFT COVERAGE BY
   SOCIETY-REPRESENTED EMPLOYEES ASSIGNED TO DAYS .......... 326
#182 RE: COMPENSATION & WORKING CONDITIONS - 12-HOUR SHIFT
   SCHEDULE ...................................................................................... 333
#183 RE: SOCIETY REPRESENTED EMPLOYEES IN IMS - PERIODIC
   ASSIGNMENT TO SHIFT WORK (FINAL) .......................................... 338
#184 RE: SOCIETY REPRESENTATION OF AUTHORIZED NUCLEAR
   OPERATORS IN ROTATIONS ............................................................. 341
#185 RE: PURCHASED SERVICES AGREEMENT (PSA) NUCLEAR
   (INCLUDING NUCLEAR WASTE AND NUCLEAR REGULATORY
   AFFAIRS) ......................................................................................... 343
   RE: REDUCTION OF NUCLEAR PSA ENVELOPE AS A RESULT OF
   ESTABLISHMENT OF NUCLEAR WASTE MANAGEMENT
   ORGANIZATION (NWMO) ................................................................. 343
#187 RE: IM&CS TERMINATION OF SERVICES WITH BRUCE POWER .. 344
#188 RE: ARTICLE 67 PURCHASED SERVICES AGREEMENT ............... 348
#189 RE: ESA AVERAGING HOURS OF WORK APPROVAL ................... 353
#191 RE: REORGANIZATION OF ONTARIO POWER GENERATION
   ADOPTION OF CENTRE LED ORGANIZATIONAL DESIGN ............... 354
PART I - PREAMBLE

1 Society and Corporate Interests

The object of this Agreement is to promote harmonious relations between Ontario Power Generation Inc. (OPG) and employees consistent with the preamble of the Ontario Labour Relations Act and the Canada Labour Code and in recognition of the need for the successful accomplishment of the public purposes for which OPG has been established.

The objective of the parties is to facilitate the peaceful adjustment of salaries and benefits, working conditions, issues of fair treatment, all disputes and grievances, and to prevent inefficiencies and avoidable expenses and to reduce unnecessary delays.

OPG's mission is to contribute to the enhancement of the quality of life of the people of Ontario by serving their energy needs. The Society's mission is to strive to ensure the best rewards, career opportunities and working conditions for its members. The Society recognizes a responsibility for providing an essential service to the people of Ontario and in working towards the continued viability and continuity of OPG. Both parties recognize the fundamental importance of service to OPG customers.

The parties recognize that situations may arise where their missions, objectives, or actions come into conflict. These conflicts may impact on the bargaining unit and particularly on supervisory employees represented by The Society. The parties agree that supervisors will be able to participate fully as members and perform supervisory responsibilities without fear of reprisal or recrimination by either party.

1.1 Principles

OPG and The Society agree to make their best efforts to adhere to the principle statements found in the Articles of the Collective Agreement in a balanced way, recognizing that some principles may compete with others. With the exception of the Principles of Agreement found in the Tripartite Agreement on Health and Safety Committees in Article 89, the parties agree that these principle statements are not subject to the grievance/arbitration procedure on their own standing.

1.2 The following principles were developed by the Joint Society Management Committee (JSMC) to guide its conduct in negotiations and in its ongoing relationship. OPG is encouraged to use these principles at the local level.

1.2.1 Issues and interpretations will be dealt with in an open way with the earliest possible involvement of each party.

1.2.2 Each party will deal with the other in such a way that it effectively demonstrates respect for each individual's contribution and point-of-view.
1.2.3 Bilateral meetings will be conducted on the premise that such meetings are a "safe zone", with no rank within the room, and in an atmosphere where everyone is free to participate and no one dominates.

1.2.4 Common goals/needs will be identified, and both parties will work together to achieve them.

1.2.5 The primary focus of the parties will be the customer (Customer means OPG's customers, together with Society members. Customer focus also includes being sensitive to the environment - economic, political, environmental, and social).

1.2.6 Processes will be designed with the involvement of the people who have the knowledge of the problem or issue. The processes will encourage the resolution of the problem/issue at the level closest to the source.

1.2.7 An honest attempt will be made to resolve all problems/issues internally.

1.2.8 By virtue of adherence to the above principles, the JSMC will endeavour to act as an example to the whole organization to show how using those principles, can create a harmonious relationship, while at the same time making the customer the primary focus.

1.3 Partnership Principles

OPG and The Society are committed to a union-management partnership to mutually explore, discuss, and implement new ways to improve business operations, customer satisfaction, the way we work, and quality of work life.

PART II - RECOGNITION

2 Recognition Clause

2.1 Provincial Jurisdiction

Ontario Power Generation Inc. (OPG) recognizes The Society as the exclusive bargaining agent for a bargaining unit comprised of:

All employees employed in Ontario Power Generation, including Ontario Power Generation Inc. - Nuclear, hereinafter known as OPGI, in the Province of Ontario employed as supervisors, professional engineers, engineers-in-training, scientists, and professional, administrative and associated employees, save and except for persons who perform managerial functions as distinct from supervisory functions; persons employed in a confidential capacity with respect to labour relations; and persons in bargaining units for which any trade union held bargaining rights as of November 13, 1991.

2.2 Federal Jurisdiction

The Society was certified in May 1995 under the Canada Labour Code for a bargaining unit comprised of the following:

All employees Ontario Power Generation employed by Ontario Power Generation Inc - Nuclear in the Province of Ontario employed as supervisors, professional engineers, engineers-in-training, scientists, and professional, administrative and associated employees, save and except for persons who perform managerial functions as distinct from supervisory functions; persons employed in a confidential capacity with respect to labour relations; and persons in bargaining units for which any trade union held bargaining rights as of November 13, 1991.

On April 1, 1998, jurisdiction for labour relations for the above-noted federal bargaining unit was delegated to the Province of Ontario.

2.3 Clarity Notes

2.3.1.1 For the purposes of clarity, the bargaining units set out above include:

a) all regular, probationary, graduate students, reduced-hours and temporary employees whose functions are included in the classifications paid from Salary Schedules 01, 02, 03, 04, 05, 08, 09, 10, 11, 12, 13, and 15.

b) employees in OPGI whose full-time duties are security staff work performing the same security work as Security Staff who
were formerly OSS staff paid from schedules 05 and 15 and who are paid from Salary Schedule 01, 03, 09 or 11 (Security Staff).

2.3.1.2 Exclude:

   a) those persons who perform managerial functions as distinct from supervisory functions. An employee is performing managerial functions if:

   i) he/she performs managerial functions such as hiring, promotion, performance increase, discharge, etc., over other employees in the bargaining unit; and

   he/she is required to spend the majority of his/her time performing managerial duties; and

   he/she supervises at least seven (7) employees (directly and indirectly) on a regular and continuous basis; or

   ii) he/she supervises persons who are excluded from the Society’s bargaining unit by reason of performing managerial functions or being employed in a confidential capacity with respect to labour relations.

2.3.1.3 For greater certainty, it is understood that Article 2.1 incorporates the agreement of the parties to combine what had been two (2) separate Collective Agreements into one (1) Agreement. Prior to the execution of this Agreement, there had been separate Agreements covering OPGI’s nuclear and non-nuclear facilities. With the execution of this Agreement, it is agreed that there is now one (1) Agreement covering all such facilities.

2.3.2 Definitions

   a) “Supervisors” means employees who primarily perform supervisory functions, including the requirement to make recommendations regarding any staff or personnel matter. These staff or personnel matters include, but are not limited to, such areas as selection, promotion, appraisal, discipline, transfer, staffing needs, work methods, changes in terms and conditions of employment, grievances, or the interpretation and administration of the applicable Collective Agreement. “Supervisors” includes employees in other employee classifications who perform supervisory functions.

   b) “Professional engineer” means either: a) an employee who is a member of the engineering profession entitled to practice in Ontario and employed in a professional capacity; or b) an
employee with equivalent credentials who is in a position that
requires engineering expertise and specialized knowledge.
This definition includes all employee categories included
under the heading of “Professional Engineer” listed in
Attachment A to Appendix I “Utilization and Advancement of
Professional Engineers and Scientists” in this Agreement.
“Professional engineers” includes employees who satisfy
these criteria and who are required to perform supervisory
functions.

c) “Engineers-in-training” means an employee who has completed
a course of specialized instruction in engineering sciences and
graduated from a university or similar institution, who has not
satisfied all the requirements for practicing as a professional
ingineer and who is on a structured training program to
partially satisfy these requirements.

d) “Scientists” means employees who are university graduates in
the Natural Sciences, the Applied Sciences, Mathematics or
Computer Sciences, who are not classified as professional
engineers, and who are engaged in the application of this
specialized knowledge in the course of their employment. This
definition includes all incumbents in positions identified under
the heading of “Scientists” listed in Attachment A to Appendix I
titled “Utilization and Advancement of Professional
Engineers and Scientists” in this Agreement. “Scientists”
includes employees who satisfy these criteria and who are
required to perform supervisory functions.

e) “Professional employee” means an employee who:

i) in the course of his/her employment is engaged in the
application of specialized knowledge ordinarily acquired
by a course of instruction and study resulting in
graduation from a university or similar institution; and

ii) is eligible to be a member of a professional organization
that is authorized by statute to establish the qualifications
for membership in the organization; or

iii) performs the functions, but lacks the qualifications of a
professional employee.

“Professional employees” include employees who satisfy
these criteria and who are required to perform supervisory functions.

f) “Administrative employee” means an employee who normally
supervises persons engaged in office administration,
construction, security or maintenance work who are represented by another trade union. This definition includes employees who share a community of interest with “supervisors”.

g) “Associated employees” means employees in positions which normally require a university degree or equivalent education or experience. This definition encompasses employees who share a community of interest with “professional engineers”, “scientists” or “professionals” and includes, but is not limited to, Nurses and System Control Operators. “Associated employees” includes employees who satisfy these criteria and who are required to perform supervisory functions.

2.4 Supervisory Employees - Code of Ethics

OPG agrees to include supervisory employees in the bargaining unit on the condition that the parties recognize that supervisory employees will continue to exercise key functions in the control and operation of OPG. As members of OPG managerial staff, supervisors use judgment to express and make operative the decisions of Management. They are responsible for fostering a healthy work environment. The parties recognize the responsibility of supervisors to discharge their supervisory duties in good faith. The Society and OPG will identify, minimize and/or avoid the conflicts/perceived conflicts of interest that may arise concerning the relationship between supervisors, The Society and OPG.

It is recognized that supervisory employees may be disciplined for failure to act in good faith as a representative of Management and fulfilling their responsibilities including abuse of supervisory position and breach of trust.

2.5 Conflict of Interest - Security Staff

The Society recognizes that the inclusion of security staff in this Collective Agreement may create the possibility of a conflict of interest between the responsibilities to their duties and their membership in The Society. The Society will not impede security staff from performing any of their job duties.

These provisions are intended to permit security staff to perform their duties unfettered and to preserve the confidentiality of their work. Security staff are sometimes required to take action with respect to other employees. It is the intent of these provisions that security staff will fulfill their duties irrespective of whether the other employees involved are or are not represented by The Society. OPG agrees that all security staff represented by The Society will have normal access to Society representation.

The Society agrees not to pursue any internal disciplinary actions against security staff for performing their duties.
Any conflict of interest involving security staff will be subject to an expeditious internal confidential review/resolution process. If the internal resolution process is not capable of resolving the conflict of interest, then an expeditious external process will be activated.

The Society Board of Directors clearly recognizes the unique position of security staff regarding their relationship with other Society represented employees and will strive to ensure that any conflict of interest which may arise is handled sensitively and expeditiously.

2.6 **Exclusions Process**

OPG and The Society agree to the following process for the purpose of excluding new and changed positions from The Society's jurisdiction.

1. The following new or changed job documents or their electronic equivalents in Scenarios A to D will be sent to The Society for their review:

<table>
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<tr>
<th>Scenario</th>
<th>New Jobs</th>
<th>Revised Jobs</th>
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   | A        | Documents will be sent to The Society after finalization. | i) If job leaves Society jurisdiction, documents will be sent to The Society before finalization.  
          |          | ii) If Society jurisdiction does not change, documents will be sent to The Society after finalization. |
   | B        | Documents for new “Society Equivalent” MG (formerly MF) jobs will be sent to The Society before finalization. | If jurisdiction changes to Society bargaining unit, documents will be sent to The Society after finalization. |
   | C        | Documents for new first-level ESR jobs will be sent to The Society before finalization. | If jurisdiction changes to Society bargaining unit, documents will be sent to The Society after finalization. |
   | D        |          |              |
   | E        |          |              |
Documents for the following new jobs not established as PWU jobs in the past will be sent to The Society before finalization:

i) supervisory jobs, and

ii) non-supervisory jobs which report to a Society-represented position and are paid at the final step rate at or above MP2 Step 9.

If jurisdiction changes to Society bargaining unit, documents will be sent to The Society after finalization.

2. If there is disagreement concerning jurisdiction of a position, The Society will notify Labour Relations, OPG Human Resources within 10 working days of having received the document. The two parties will use the 10 working days to attempt to resolve the dispute.

3. If the two parties are not able to resolve the dispute, Management reserves the right to implement the position with the jurisdiction as proposed. At the same time, The Society has the right to file a grievance over the jurisdiction of the position.

4. Management will notify The Society office of any jurisdictional grievance filed by another trade union against a Society-represented position and will advise The Society of any change in status (e.g., referred to next step, resolved, withdrawn).

5. Attachment 1 is the exclusion form which will be used in accordance with this process. The Society’s agreement to exclude any position under this process is without prejudice to its position in any proceedings and will not limit The Society’s right to challenge the exclusion at a later point in time.
ATTACHMENT 1 - Request for Society Exclusion

Note: Before an occupation code can be issued, completion of the shaded areas by Line Management and/or Human Resources is mandatory.

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<tr>
<th>Date</th>
<th>Job Title</th>
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This is a: □ new document

code: □ revised and previously excluded document - existing occupation

code: □ revised and previously included document - existing occupation

Managerial Exclusion □ Confidential Exclusion

Within Another Trade Union □ Greater than 335 points

SOCIETY UNIT DIRECTOR

□ Agreed □ Disagreed

If disagreed, why?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
Society Unit Director (signature)
__________________________________________________________________________
Date: _________________________

SOCIETY STAFF OFFICER

□ Agreed □ Disagreed

If disagreed, why?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
Society Staff Officer (signature)
__________________________________________________________________________
Date: _________________________

(The Society’s agreement to exclude any position from its jurisdiction is without prejudice to challenge this exclusion at a later point.)

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<thead>
<tr>
<th>Line Management (signature)</th>
<th>Human Resources Department (signature)</th>
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Date: _________________________

Note: See Article 2 of The Society-OPG Collective Agreement for the complete Recognition Clause and Appendix VIII & IX. For clarification or information regarding exclusion, please contact your Human Resources Officer or Labour Relations - Corporate HR or The Society Office or a Society Unit Director.
2.7 Successor Rights

2.7.1 OPG agrees that it will not directly or indirectly request the government to exempt the Company or The Society from the successor rights provisions of the applicable labour relations legislation.

2.7.2 The successor rights provisions of the applicable labour relations statute shall be incorporated by reference into this Collective Agreement. No board of arbitration established pursuant to the grievance and arbitration provisions of this contract has jurisdiction to make any decision within the jurisdiction of the Labour Relations Board and nothing herein is intended to affect the jurisdiction of the Labour Board to resolve disputes related to the application of the provisions of the statute. For purposes of s.48 of the Ontario Labour Relations Act and s. 57 of the Canada Labour Code, the Ontario Labour Relations Board or the Canada Labour Relations Board shall be deemed to be a Board of Arbitration for the resolution of disputes related to the interpretation, application, administration or alleged violation of this provision of the Collective Agreement. The remedial powers of the Labour Board shall be as set out in the relevant statutory provisions governing successor rights.

3 Employee Classifications

3.1 Probationary Employees

A probationary employee is an employee, who is hired on a trial basis with the prospect of being reclassified as a regular employee, if the employee's performance satisfactorily meets the job requirements. The probation period is normally a minimum of three months and a maximum of six (6) months. After six (6) months, the employee will either be made regular, transferred to another probationary position or terminated unless there is an expectation that a longer probationary period will result in improvement in a specific area which has been identified to the employee (e.g. completion of a training course or a specific work assignment, interrupted probationary period as a result of parental leave, etc.) The employee's benefits and working conditions are the same as regular employees with exceptions identified in the provisions where different treatment has been agreed to.

3.2 Regular Employees

A regular employee is an employee who has either served the required probationary term or has previously been employed in one of the other categories and has satisfactorily met the job requirements. The employee occupies a position that is considered part of the ongoing organization of OPG.
3.2.1 Reduced Hours of Work Regular Employees

A reduced hours of work regular employee is an employee who has regular status but works less than the base hours for a full-time position. The employee's benefits and working conditions are pro-rated and based on the entitlements of the regular employees. The pro-rating is described in Article 71 (Reduced Hours of Work).

3.3 Temporary Employees

3.3.1 A temporary employee is an employee who is hired for short-term work assignment which is not ongoing (i.e. normally 12 months or less and not extending beyond 24 months). The employee's benefits and working conditions are as per Article 34 (Temporary Employees).

3.3.2 Reduced Hours of Work Temporary Employees

A reduced hours of work temporary employee is an employee who has temporary status but works less than the base hours for a full-time position. The employee's benefits and working conditions are pro-rated as per Article 34 (Temporary Employees).

3.3.3 Student Employees

A student employee is an employee who is hired for short-term work which is not ongoing. He/she is normally in the process of completing his/her post-graduate studies and is expected to return to his/her studies after an agreed employment period. The employee's benefits and working conditions are as per Article 34 (Temporary Employees).

4 Service Credit Definitions

Service credits shall be based on all previous full-time (regular, temporary and casual) service and part-time/reduced hours (regular and temporary) unless otherwise specified. (See Article 9.3 Transition Provisions of the 2006-2010 Collective Agreement).

4.1 Established Commencement Date (ECD)

The "ECD" represents the latest date of hire, subject to authorized adjustments for previous service as detailed below.
a) Regular

The ECD for regular employees is calculated by giving service credits for:

- probationary employment;
- 100% of employment service in an acquired Company;
- previous regular and temporary (full-time and reduced hours employment), if there has been no break in service exceeding twelve (12) months;
- previous casual construction employment if there was no break in employment exceeding three (3) months (or 12 months for casual construction employees on the Pension and Insurance Plan).

(The ECD has an impact on sick leave and severance pay.)

b) Temporary

The ECD for temporary employees is calculated by giving service credits for:

- previous temporary employment, if there has been no break in service exceeding 3 months and employee has less than 12 months service;
- previous temporary employment, if there has been no break in service exceeding 12 months and employee has greater than 12 months service.

(The ECD has an impact on statutory holidays and floating holidays.)

4.2 Vacation Credit Date (VCD)

The VCD represents all service regardless of breaks. While a regular employee, service credits shall be based on the current ECD and adjusted for all previous periods of OPG employment. All employees who currently work reduced hours or have done so in the past, will have such service calculated as if were full-time.

(VCD is used to determine vacation bonus.)
4.3 External Experience Value (EEV)

The EEV represents a vacation credit quantity expressed in number of years, months and days for external work experience granted to qualifying regular employees (Section 38.7). The EEV and VCD determine total years credit for vacation entitlement (days) and the length of service based search notice period (Section 64.21 - Search Notice Period).

EEV is only applicable to the initial hire with either Ontario Hydro or Ontario Power Generation and does not apply to any rehire, save and except those employees that have been forced to another employer through a “Change of Employer” under Part C of Article 64, formerly Article 102, on or after January 1, 2005 and have been rehired after 3 years.

4.4 Service Recognition Date (SRD)

The SRD for regular employees represents all service while an OPG employee on payroll regardless of breaks in employment. Service credits shall be based on the last hire date and adjusted for all previous periods of OPG employment. All employees who currently work reduced hours or have done so in the past, will have such service calculated as if it were full-time (it should never be pro-rated).

Authorized Adjustments:

a) Personal Leaves of Absence

SRD includes the time an employee is on "leave", if the employee is on a:

- personal leave of absence with pay; or
- personal leave of absence without pay which is less than 15 working days; or
- personal leave of absence without pay which is more than 15 working days and which was started on or after April 15, 1993 -- only that portion which was taken during the period from April 15, 1993 to August 31, 1997.
- prepaid leave of absence, under the enhanced leaves of absence policy dated April 16, 1993, greater than eight (8) weeks.

b) Pregnancy/Parental Leaves

SRD includes the time an employee is on a pregnancy/parental leave (previously referred to as normal or extended maternity/adoption leave).
c) **Job Sharing**

SRD is calculated as if the employee is working full-time hours.

d) **Work Sharing**

SRD is calculated as if the employee is working full-time hours.

(SRD has an impact on recognition of employee service at years 25 and 40, Quarter Century Club Membership and seniority (Article 64).)

4.5 **“Eligibility Service” or “Continuous Employment” for Pension Purposes**

Generally, it is the number of years (including a portion of a year) a pension plan member has been continuously employed in which there has been no break in employment exceeding 12 months. It includes previous OPG pensionable service which has been reinstated; external service which has been transferred into the pension plan under a reciprocal pension transfer agreement; and periods of pregnancy/parental leave. It may include certain types of non-regular service purchased under special provisions. It generally excludes leaves of absence without pay except where the employee elects to pay the pension contribution. The exceptions are detailed in the pension rules.

Eligibility Service (ES) is used as an eligibility criteria for early retirement and the associated early retirement discounts; and in conjunction with Membership Service (i.e., the service subsequent to the date actually joining/started contributing to the Plan) and Age, to determine death and termination benefit entitlements.

5 **Temporary Assignments**

There may be instances when employees are temporarily removed from their normal duties to perform work outside of The Society's bargaining unit. Likewise, employees from outside of the bargaining unit may be assigned temporarily to work within The Society's bargaining unit.

In such instances, the parties agree that:

5.1 **Employees Temporarily Excluded from Society Jurisdiction**

5.1.1 The Society shall be given prior notice of any temporary assignment exceeding three months' duration that OPG considers outside the bargaining unit, along with a rationale for the proposed exclusion.
5.1.2 The Society shall continue to represent employees who have been temporarily removed from their regular positions to perform work outside the bargaining unit for the first three months of the temporary assignment. Dues shall be deducted and remitted to The Society for the entire period of the temporary assignment of a Society member while performing work outside the bargaining unit.

5.1.3 Except where otherwise specified in this Agreement, Society-represented employees who are temporarily assigned to positions outside the bargaining unit shall have access to all benefits, plans or entitlements under Part IX (Health Benefits), Part X (Pension and Insurance), Part XI (Relocation Assistance), and Articles 64 (Employment Continuity), and 65 (Vacancies) of the Collective Agreement for the full duration of the assignment.

5.2 Employees Temporarily Included in Society Jurisdiction

5.2.1 OPG personnel from outside The Society’s bargaining unit who are temporarily assigned work within Society jurisdiction shall be represented by The Society for that portion of the assignment extending beyond three months, and dues shall be deducted for the period beyond three months.

5.2.2 During the period of Society representation, temporarily included employees shall be subject to the provisions of the Collective Agreement, but the following shall not apply:

- Article 20 (Performance Appraisals and Reduced Pay Standing Complaints), 21 (Performance Appraisal Feedback and Advanced Warning of Reduced Pay Standing) excluding 21.4, 32 (Re-earnable Incentive Plan), 33 (Progression-In-Place Plans)
- Part VIII (Absence from Work)
- Part IX (Health Benefits)
- Part X (Pension and Insurance)
- Part XI (Relocation Assistance), except for Article 55 (Compensation when Assigned to Temporary Work Headquarters)
- Article 63 (Compensation for Authorization as a Nuclear Shift Supervisor)
- Part XIII (Working Conditions)
- Other provisions or Agreements to the extent they concern the above

5.3 Grievance

The Society’s Complaint and Grievance/Arbitration procedure shall apply to any dispute relating to an applicable provision of The Society’s Collective Agreement, including any dispute as to whether the Collective Agreement is
applicable in the circumstances. The employee and/or the employee’s bargaining agent retain any rights in respect of terms and conditions of employment to which The Society’s Collective Agreement does not apply.

6 Employees on Temporary Out-of-Province Assignment

6.1 Terms and Conditions of Employment During Assignment

When a Society-represented employee accepts a temporary assignment outside Ontario, the employee:

a. retains his/her status as an employee of OPG;

b. continues to accrue service credit for all purposes under Article 4, Service Credit Definitions, of the Collective Agreement;

c. is required to pay Society dues during the term of any assignment.

6.1.2 The employee remains represented by The Society until he/she begins this assignment. When an employee accepts a personal services contract, that contract together with this Article shall constitute the employee’s complete terms and conditions of employment for the full term of the assignment. OPG will advise The Society after a personal services contract with a Society-represented employee is signed.

6.1.3 OPG will indemnify, or cause to be indemnified, each employee who, in the course of work on temporary out-of-province assignment, becomes subject to a claim made against him/her or to a threat of discipline from an association with statutory power to apply professional standards. OPG’s “Employee Indemnification Policy” (08-03-01) will apply unless indemnification provisions specific to a given contract or project are identified in the personal services contract.

6.2 Filling the Pre-Assignment Position

Before the employee commits to the assignment, Management will determine whether it intends to fill the position on a temporary or regular basis and discuss the decision and rationale with the employee. OPG will inform the employee of any intent to change this plan while the employee is on an out-of-province assignment.
6.3 Redeployment Upon Completion of Assignment

6.3.1 The line manager in the employee’s pre-assignment Business Unit shall provide or shall identify appropriate personnel to provide the returning employee with employment-related information and assistance and to carry out the provisions of this Subsection upon completion of the assignment and return to Ontario.

6.3.2 When the employee’s pre-assignment position with OPG continues to exist and has not been filled or has been filled temporarily, the employee shall return to that position.

6.3.3 When the employee’s pre-assignment position with OPG no longer exists or has been filled regularly, and the employee is not surplus by operation of Article 64, the employee shall be placed in an OPG vacancy for which he/she is qualified, in the following order:

   a) a lateral vacancy within the employee’s pre-assignment Business Unit at the pre-assignment location;

   b) within the pre-assignment Business Unit, a choice of a lateral vacancy at a new location, or a vacancy within two salary grades lower at the pre-assignment location;

   c) within the pre-assignment Business Unit, a vacancy within two salary grades lower, in a new location;

   d) redeployment in accordance with Article 64.

6.3.4 Placements under Subsection 6.3.3 (a), (b) or (c) above are exceptions to OPGI posting requirements, consistent with Subsection 65.6.1 (b).

6.3.5 When there is a reasonable expectation that an employee will be placed in a different position upon return from a temporary out-of-province assignment, OPG will identify and notify the employee of potential placements. An employee who is not placed within 30 days of completion of the assignment and return to Ontario shall have the right to be redeployed in accordance with Article 64.

6.4 Employment Continuity During Temporary Out-of-Province Assignment

6.4.1 Employees on temporary out-of-province assignments will be neither advantaged nor disadvantaged with respect to rights under Employment Continuity upon return from the assignment. When an employee’s pre-assignment position has been included in a Unit of Application for redeployment under Article 64, the employee will be redeployed in accordance with Article 64.
The Joint Redeployment Planning Team (JRPT) will consider issues such as:

- the number of employees within the unit of application who are on temporary out-of-province assignments;
- the duration of the assignments;
- the seniority of the affected employees;
- the qualifications of the affected employees;
- the ability to factor the employee into the ongoing joint planning efforts (i.e., will the employee be returning during or shortly after the joint planning process);
- the ability to fill positions in the new organization on a temporary assignment basis in order to accommodate a returning employee;
- the need to fill positions in the new organization on a continuing basis;
- the need to keep employees apprised of developments within their unit of application that may impact on their job status during the assignment.

6.4.2 If an employee is declared surplus while he/she is on temporary out-of-province assignment, the employee will be notified and all surplus entitlements will be deferred until the employee completes the assignment and returns to Ontario.

6.4.3 An employee on temporary out-of-province assignment who is subject to redeployment under Article 64 in his/her absence and the JRPT determines:

a) the employee would have been matched to a position by virtue of seniority and qualifications and is, therefore, deemed not surplus; and

b) the employee will not be matched in the redeployment; then the employee will be entitled to treatment under Section 6.3 above.
This article has been deleted.
PART III - VOLUNTARY RECOGNITION AGREEMENT

8 VRA Amendments

A Voluntary Recognition Agreement (VRA) between Ontario Hydro and The Society came into effect on January 14, 1992. A complete text of the VRA between Ontario Hydro and The Society is found in Appendix IX. The VRA, as amended in this Article, is applicable to OPG. The VRA shall remain in effect thereafter except for Sections 4.0 and 5.0 of the VRA (outlined in Articles 14 and 15 of this Agreement) which may be terminated by written notice by either party not less than twelve months prior to the expiry of the Collective Agreement in operation on January 1, 2016 or any subsequent Collective Agreement. In the event that The Society provides notice of termination of Sections 4.0 and 5.0 of the VRA, OPG may require that the supervisors defined in Section 8.1 form a separate bargaining unit for which The Society shall be recognized as the bargaining agent and for which there shall be a separate Collective Agreement. In addition, The Society shall continue to be recognized as the bargaining agent for non-supervisory staff defined in the VRA. Disputes on the identification of supervisors shall be submitted to a mutually acceptable arbitrator for settlement. If the parties fail to agree to appoint an arbitrator, either party may refer the matter to the Minister of Labour (provincial or federal) or the Chief Justice of the Ontario Court of Justice who shall appoint a single arbitrator. The arbitrator will have the power accorded arbitrators under the Ontario Labour Relations Act and the Canada Labour Code. If OPG provides notice of termination of Sections 4.0 and 5.0 of the VRA, it shall continue to recognize The Society as representing all employees in one bargaining unit as per the VRA and ensuing Collective Agreements.

In the event that either party desires to amend the VRA on or after January 1, 2016, it must notify the other party in writing not less than twelve months prior to the expiry of the Collective Agreement in effect on January 1, 2016 or thereafter twelve months prior to the expiration of any subsequent Collective Agreement. In such circumstances the parties will have the right, if either party so chooses, to appoint a mutually agreeable mediator for the purpose of reaching a settlement of the issues and where there is mutual agreement the mediator shall arbitrate outstanding matters in dispute.

Notwithstanding the above, the parties may mutually agree to amend the VRA at any time.

8.1 Supervisory Employees

For the purposes of this Article, the parties agree that Supervisory positions are those that are not excluded under Article 2.0 above and that satisfy the following criteria:

a) Employees on Salary Schedule 01, 03, 09 or 11 who under Plan A “Nature of Supervision” have either Degree 3 (or higher) or its equivalent;
b) Employees on Schedules 02, 03, 09, 05, 08, 10, 11, 12, 13, 15 on condition they normally supervise other employees.
PART IV - COLLECTIVE AGREEMENT TERM - NO STRIKE/NO LOCKOUT

9 Collective Agreement Term - No Strike/No Lockout

9.1 This Collective Agreement shall remain in effect from January 1, 2013 to December 31, 2015 inclusive and, thereafter, shall be renewed automatically from year to year, subject to Section 4.0 of the Voluntary Recognition Agreement (VRA) as amended in the Collective Agreement, unless either Party notifies the other in writing not less than 90 days prior to the expiration of the Collective Agreement that it desires to amend the Collective Agreement. As long as Sections 4.0 as amended and 5.0 of the VRA remain in effect, where notice to amend the Collective Agreement is given, the provisions of this Collective Agreement shall continue in force until a new Collective Agreement is signed.

9.2 No Strike/No Lockout

The Society, employees within the scope of the bargaining unit, and OPG are pledged to the effective and efficient operation of OPG and they pledge themselves, individually and collectively, to refrain from taking part in strikes, lockouts or sympathy strikes and other interference with work or production as long as the terms and conditions in Section 4.0 of the VRA continue.

Nothing in this Collective Agreement is intended to interfere with the exercise of lawful economic sanctions under the Ontario Labour Relations Act and the Canada Labour Code by any member of the bargaining unit or bargaining units as the case may be or by The Society itself should either party to the Agreement elect to terminate Sections 4.0 and 5.0 of the Voluntary Recognition Agreement.
PART V - UNION SECURITY

10 Society Membership and Dues Deduction

10.1 Membership in The Society

The Society agrees to permit members to withdraw from membership in The Society.

10.2 Dues Deduction (Rand Formula)

Society dues, as prescribed by The Society Constitution, or an equivalent amount, shall be deducted monthly (or more frequently if agreed) by OPG by compulsory payroll deductions from all Society-represented employees and shall be forwarded to The Society on their behalf with a list of appropriate employee information.

The Society confirms it will respect the applicable provisions of the Ontario Labour Relations Act (RSO 1990) and the Canada Labour Code with respect to bona fide religious convictions or beliefs.

10.3 Bargaining Unit Information

Management agrees to provide The Society with the following, on a regular basis:

a) A copy of the appointment letter, for employees selected to Society represented vacancies, will be copied to the appropriate Unit Director, within a reasonable period of time
b) Detailed records of dues deducted
c) Detailed information on the membership, including:
   - Occupation Code, Job Title, Salary Schedule, Salary Grade, Organization (e.g. Business Unit/Division/Department), Mailing Location, Phone Number
d) Upon written request provide to a Unit Director applicant information to specified Society represented vacancies.

11 Principles Regarding Involvement With Respect to Successor Rights

Consistent with the parties’ commitment to deal with issues in an open and co-operative manner with the earliest possible involvement of each party, the parties have developed the following principles and intent:

a) Prior to the finalization of negotiations that could lead to the sale of all or part of the business, privatization of all or part of a Business Unit, the creation of joint ventures or partnerships or other enterprises which could adversely impact on The Society’s bargaining rights or the contractual rights
of its members, The Society will be consulted to the extent that circumstances reasonably permit. The Society agrees that confidentiality will be maintained.

b) The parties agree to attempt to minimize the negative impacts on OPG employees in these circumstances. Where it is in the mutual interests of the parties, they will make their best efforts to identify and investigate new opportunities to spin-off parts of OPG.

c) OPG agrees to apprise any external third party involved in negotiations that OPG has employees represented by The Society and OPG will undertake to provide The Society with an opportunity to present its interests to the third party.
PART VI - DISPUTE RESOLUTION PROCESSES

12 No Discrimination

12.1 Human Rights

Every employee has a right to be free of harassment and discrimination in the workplace on the basis of prohibited grounds, as outlined in the OPG Human Rights Policy. An employee who has a harassment or discrimination complaint on the basis of these grounds will have access to OPG Human Rights and Complaints resolution process.

Any Society-represented employee involved in OPG Human Rights and Complaints process may consult with and be accompanied by a Society representative if he/she chooses to do so. No record of a complaint will be maintained in an employee's personnel file, except in the case of individuals who have received disciplinary action. Any person against whom a formal complaint is filed must be given particulars of the complaint.

As long as an employee has an active complaint of discrimination or harassment on the basis of prohibited grounds, either under OPG’s Human Rights and Complaints process or with the Human Rights Commission, The Society will not make such a complaint or OPG process the subject of a grievance on the employee’s behalf.

12.2 Union Activity

OPG shall not discriminate against an employee on the basis of membership or activity in The Society. An employee who has a complaint of such discrimination shall have the right to seek redress under the Grievance and Arbitration Procedure.

13 Employee Indemnification

13.1 OPG will provide assistance and financial indemnification to an employee who, as a consequence of performing the normal duties of his/her job for OPG, is made, or threatened to be made, a party to a civil action or a criminal proceeding (other than for offenses under the Criminal Code of Canada) or quasi-criminal proceeding, or other administrative proceeding (such as formal complaint filed with the Human Rights Commission), or is subject to a threat of discipline or actual discipline from an association that is empowered by statute to regulate professional standards.

Notwithstanding the above paragraph, OPG will not provide financial indemnification to an employee considered by OPG to have acted with dishonesty, bad faith, or with intentional or reckless disregard for the best interests of OPG.
An employee who is subject to prosecution under criminal law (Criminal Code of Canada) as a consequence of performing the normal duties of his/her job and found to be not guilty, or against whom charges have been dropped, may receive financial indemnification. More details are found in the OPG policy.

14 Voluntary Recognition Agreement Disputes

14.1 Enforcement

The primary method of enforcement of the Voluntary Recognition Agreement shall be pursuant to the grievance and arbitration provision in this Collective Agreement. However, should the Collective Agreement not be in operation or applicable to the dispute, either party shall have the right to refer to final and binding arbitration any differences between the parties arising from the interpretation, application, administration or alleged violation of the Voluntary Recognition Agreement, including any question as to whether a matter is arbitrable.

Subject to the conditions of this Agreement, if a mediator or arbitrator is not appointed within 30 days of a matter being referred to mediation and/or arbitration, either The Society or OPG shall have the right to refer the matter to the Minister of Labour (provincial or federal) or the Chief Justice of the Ontario Court of Justice and the Minister or Chief Justice shall appoint a mediator and/or arbitrator. The arbitrator will have the power accorded under the Ontario Labour Relations Act and the Canada Labour Code.

14.2 Selection of Mediators and Arbitrators

Mediators and arbitrators shall be selected from the list of mutually acceptable persons which include those set out below and the costs of using them will be shared equally by OPG and The Society.

List of Mediators and Arbitrators (incomplete)

The parties submit the following individuals to be used as mediators/arbitrators if mutually agreed to:

Kevin Burkett  
Pamela Picher  
Michel Picher  
Robert Howe  
Professor Ken Swan  
George Adams  
Jane Devlin
15 **Collective Agreement Negotiation Disputes**

Future contract negotiations disputes shall be resolved by binding arbitration.

The dispute resolution process shall be mediation-arbitration using the same individual as both the mediator and arbitrator. The negotiating process is set out in full in Appendix VII.

The mediator-arbitrator shall consider the following issues as relevant to the determination of the award on monetary issues:

a) a balanced assessment of internal relativities, general economic conditions, external relativities;

b) OPG’s need to retain, motivate and recruit qualified staff;

c) the cost of changes and their impact on total compensation;

d) the financial soundness of OPG and its ability to pay.

A mediator-arbitrator shall have the power to settle or decide such matters as are referred to mediation-arbitration in any way he/she deems fair and reasonable based on the evidence presented by representatives of OPG or The Society in light of the criteria in items (a) to (d) and his/her decision shall be final and binding.

16 **Complaint and Grievance/Arbitration Procedure**

16.1 **Preamble and Principles of Operation**

The following dispute resolution procedure consists of three steps: a complaint process (Step 1), a Joint Grievance Resolution Committee (JGRC) (Step 2) and an expedited or regular arbitration (Step 3A or 3B). These processes will be used by the Parties in order to resolve complaints and grievances submitted by Society-represented staff, The Society, or OPG unless the parties have expressly agreed elsewhere in this Agreement on alternate dispute resolution processes to limit the scope of the grievance/arbitration procedure.

Early discussions and resolutions at the lowest level possible are encouraged because this leads to addressing issues before a grievance is lodged, and are key to maintaining a positive working relationship.

The Parties recognize the need to share information and openly discuss options for resolution at all levels of the complaint and grievance process. This is to ensure a common understanding of all the facts and will enhance the chance of a mutually acceptable resolution. It is understood that proposals for settlement discussed during Steps 1 and 2, or during attempts...
at mediated resolutions, will not prejudice either party at the arbitration stage.

This process should have the flexibility to respond to the advantages gained through a problem-solving approach to dispute resolution.

This process is designed to be simple, efficient, and understandable for all parties involved.

16.2 Definitions

a) Employee Complaint

An employee complaint is a claim of unfair treatment that an employee has requested The Society to present on the employee’s behalf. An employee complaint, which does not meet the criteria of an employee grievance, shall not be subject for the grievance/arbitration procedure.

b) Employee Grievance

An employee grievance is defined as any dispute between OPG and The Society arising from the application, administration, interpretation or alleged violation of the Collective Agreement, or unreasonable exercise of Management discretion in the administration and application of the Collective Agreement. An employee grievance shall be filed at Step 2, normally following consideration of an employee complaint at Step 1.

c) Group Grievance

A Group grievance is defined as any dispute between OPG and The Society arising from the application, administration or alleged violation of the Collective Agreement, or unreasonable exercise of Management discretion in the administration and application of the Collective Agreement relating to the same dispute by more than one employee. A Group grievance shall be filed at Step 2. Grouped complaints will normally be considered at the Complaint Step if the employees report to a single supervisor.

d) Policy Grievance

A Policy grievance is defined as any dispute between OPG and The Society arising from matters of application, administration, interpretation, or alleged violation of the Collective Agreement. A policy grievance shall be filed at Step 2, and must be filed within 60 days after the circumstances giving rise to the grievance have come or ought to have reasonably come to the attention of The Society.
42

e) Management Grievance

OPG may present to the Joint Society-Management Committee any complaint with respect to the conduct of The Society. If such a complaint is not resolved, it may be treated as a grievance and referred to arbitration under the provisions of this Article.

16.3 Scope Notes

Job evaluation complaints shall be processed in accordance with this Article.

Disputes concerning Article 90 “Authority to Stop Work” relating to the Occupational Health and Safety Act or Part II of the Canada Labour Code will normally be referred to the Ministry of Labour consistent with Article 91 “Health and Safety Disputes”.

The scope of the Complaint and Grievance/Arbitration process includes policies listed in Article 97 “Status of Certain Policies and Procedures”.

The grievance/arbitration procedure may be used to challenge any unreasonable, arbitrary or bad faith action taken by OPG which results in the exclusion of any employee or position from the bargaining unit. The Parties will attempt to resolve disputes expeditiously. The Society may initiate an unresolved dispute as a Policy Grievance.

16.4 Timeliness

The grievance procedure shall proceed without unnecessary delay. It is recognized that in some cases strictly enforced time limitations may interfere with a mutually acceptable process of fact finding or problem resolution. However, either Party may invoke a time limitation upon five (5) days’ written notice to the other Party. Except by mutual agreement, time limits for initiating a complaint/grievance, however, must be adhered to.

16.5 Step 1: Employee Complaint

a) A Society Unit Director or Delegate must file an employee’s complaint with the complainant's supervisor within 30 working days of the date the employee should reasonably have been aware of the action or decision-giving rise to the complaint. The Society Office will provide a form outlining the grievor’s complaint, proposed resolution and identifying the employee’s Society representative. Management’s representative will be identified by the local Human Resources Office.

b) Employee complaints must normally be raised with the employee’s supervisor and/or Society Delegate and every effort should be
made to resolve it informally. OPG will provide independent facilitation where the Parties agree that this is a reasonable approach to resolving the complaint.

c) Where mutually agreeable, The Society may initiate an employee grievance arising from disciplinary suspension or discharge directly at Step 2. Benefits grievances shall be initiated at Step 2.

d) Local management and The Society representative will meet to attempt resolution within ten (10) working days of the date that the complaint is filed. Where mutually agreeable, the employee may attend the Step 1 meeting. Any resolution at Step 1 will be without prejudice and will not constitute a precedent in any other matter between the Parties except by written agreement.

16.6 Step 2: Meetings of the Joint Grievance Resolution Committee

a) The Society may file an employee grievance at Step 2, within ten (10) working days of the Step 1 meeting. A Policy grievance shall be initiated at Step 2. A grievance must be filed by letter from a Vice-President of The Society, or designate, to a management designate. This letter will outline the grievance and proposed resolution. Management will keep The Society apprised at all times as to the management designates for the purposes of receiving Step 2 letters.

b) Prior to 2nd Step the Parties will use their best efforts to identify the issue(s), the basis of the grievance and areas of agreement and disagreement. One week before each Step 2 meeting, the parties will exchange briefs outlining the issues, providing the facts and information relevant to the grievance, and containing proposals for settlement of the grievances scheduled for the meeting.

c) The parties will form a standing Joint Grievance Resolution Committee that will meet on a pre-booked, bi-monthly basis. Each party will appoint two standing members to this Committee. These appointees must be representatives with decision-making authority.

d) A Step 2 grievance may be resolved by written agreement of the JGRC. Such resolution shall be final and binding on the Parties. The JGRC may, on consensus, refer a grievance back to local parties for resolution with additional guidance and/or information. Nevertheless, if resolution is not achieved before the date of the next Step 3A meeting, the grievance will be automatically referred to arbitration.
16.7 **Step 3 - Grievance Mediation and/or Arbitration**

a) Where resolution is not achieved at Step 2, the Society may refer a grievance to Step 3A (expedited arbitration) or Step 3B (regular arbitration) within 30 working days. Grievances not referred within the time limits above shall be considered to be withdrawn.

b) Grievances will advance to expedited mediation/arbitration (Step 3A) unless based on:
- Termination or Discipline
- Harassment or discrimination
- Policy Grievances

Grievances excluded per the above will proceed to regular Arbitration unless both parties agree that the expedited process is appropriate.

c) In all cases a single Mediator and/or Arbitrator will be used. The parties will agree, on an annual basis, to arbitrators for both the expedited (Step 3A) and regular (Step 3B) arbitration procedures, and may on joint agreement engage other arbitrators on a case by case basis. A back up arbitrator will be agreed on for the Step 3A process.

d) The parties will agree on a special arbitrator to hear all grievances related to benefits.

e) Dates will be arranged as follows:
- expedited mediation/arbitration will be scheduled, in advance, bi-monthly
- regular arbitration hearings will be scheduled, in advance, tri-monthly

f) For expedited Arbitration, the parties will exchange briefs one week prior to the Hearing, with a copy to the Arbitrator, outlining their respective positions and proposed resolution. Normally no witnesses will be called unless the Arbitrator so directs. The parties may submit a joint statement of facts. The arbitrator’s award shall be delivered within 10 working days following the hearing. Each Party shall assume its own costs of the arbitration proceedings and shall share equally the cost of the arbitrator.

g) If either party requests an arbitrated outcome at Step 3A, this will be the joint direction to the mediator/arbitrator. Failure to achieve a mediated settlement will not be a consideration in any way at the subsequent arbitration.

h) An arbitrator shall consider any difference which arises between the parties relating to the interpretation, application or
administration of this Agreement, including any question as to whether a matter is arbitrable, or where an allegation is made that this Agreement has been violated. An arbitrator shall also consider any matter of interpretation, application, and administration of policy and practice as may be referred to him/her by employee grievance. An arbitrator shall consider only such evidence as is presented to him/her by representatives of OPG or The Society.

i) The arbitrator shall have the power to settle or decide such matters as are referred to him/her in a fair and equitable manner, and the arbitrator’s decision shall be final and binding. An arbitrator shall not have the power to amend or terminate this Agreement, policies, or procedures save only any policies and procedures which may conflict with the terms of this Agreement.

16.8 Employment File

a) Documents communicating discipline and discharge will be maintained in the employee’s official employment file (normally 901 file).

b) Unless otherwise agreed to, after documents communicating discipline have been on an employee’s file for a maximum of two years, and there have been no further disciplinary occurrences, then the documents communicating discipline will be removed.

16.9 Society Representatives

A Society representative will be granted reasonable time off from normal duties and have normal base earnings maintained while acting as a Society representative in any of the steps of the grievance procedure or when required by Management to be a participant in arbitration proceedings under Articles 16 “Complaint/Grievance Arbitration Procedure”, 19 “Job Challenges”, 20 “Performance Appraisals and reduced Pay Standing Complaints”, and 64 “Employment Continuity”. Requests for time off will be made to the employee’s supervisor.

16.10 Mediators/Arbitrators

The following are agreed to arbitrators under Article 16. With mutual agreement the parties may use other arbitrators who are not found on these lists:

<table>
<thead>
<tr>
<th>Expedited Arbitration</th>
<th>Regular Arbitration</th>
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16.11 Expediting Redeployment Grievances and Arbitrations

16.11.1 Complaint and Grievance Procedure

a) This Article, Expediting Redeployment Grievances and Arbitration, applies to grievances arising from the administration of Employment Continuity provisions of the Collective Agreement (Article 64.3), including the redeployment process in each Unit of Application, non-selection to positions in the mix and match and non-selection of employees entitled to priority placement in the search/notice period, and to decisions of JROTs.

b) Except as specified in this Article 16.11 Expediting Redeployment Grievances and Arbitration, all provisions and practices established in relation to the Complaint and Grievance/Arbitration Procedure apply to these grievances.

c) An employee’s complaint must be submitted no later than 20 working days after completion of the Mix and Match, e.g. final approval of the JRPT Second Report or equivalent, the JROT decision, or the selection process that includes the decision he/she feels is unfair.

d) At Step 1 of the grievance procedure, The Society will submit complaints within the scope of Article 16.11 Expediting Redeployment Grievances and Arbitrations to the relevant JRPT, JROT, and/or line management through Labour Relations. Management and The Society will be given 10 working days to attempt to resolve the grievance. The Society’s position on the grievance is not prejudiced by that of Society members of JRPTs or JROTs.

e) Failing resolution at Step 1, The Society may advance the grievance to Step 2 of the grievance procedure within a further 10 working days.

f) The Parties will appoint regular and backup members to at least one Standing Redeployment Grievance Team, which will act as a Second Step Grievance Committee according to the terms of the Collective Agreement. The Committee will meet within ten days of a grievance being filed to attempt to resolve the grievance.

g) Failing resolution at Step 2, The Society may refer the grievance to arbitration within 20 working days. The Parties will designate and retain one arbitrator for grievances under Article 16.11 Expediting Redeployment Grievances and Arbitrations.
16.11.2 Arbitration

a) The parties will review case by case the appropriateness of the following expedited arbitration process for grievances arising from the Expedited Redeployment Grievance process.

b) An arbitrator acceptable to the parties, will be retained as arbitrator for Employment Continuity grievances and he will be asked to deal with agreed-upon cases according to the terms (c) below. The arbitrator shall control the proceedings and retain jurisdiction to require further submissions of fact or argument as he deems necessary to determine the matter.

c) The expedited arbitration process will require the following:

i. each grievance can be heard on one day, more than one grievance may be scheduled per day subject to the arbitrator's direction.

ii. the parties will prepare and sign a Joint Statement of the facts giving rise to the dispute, the facts in dispute (to the extent practicable), and any agreement as to the issues to be decided by the arbitrator. The Joint Statement must be developed prior to scheduling the hearing date.

iii. each party will present three copies of a Case Statement at the outset of the hearing. The Case Statement will state the issues to be determined, the facts on which the party relies, and a summary of the position of the party, supported by documentary exhibits and references to the Collective Agreement, jurisprudence or other authorities.

iv. witnesses may be called where the arbitrator rules that there is a material factual dispute and determines which parts of the evidence sought to be called appear relevant and material to the determination of the grievance. Witnesses will be under oath and subject to examination and cross-examination.

v. oral argument will be limited to the position of the party set out in the Case Statement and the rebuttal of the other party's argument.

vi. the arbitrator will determine the matter as soon as possible, with a written decision issued to the parties within ten working days of the hearing date. Failure to meet a time limitation under this process will be deemed a technicality that does not invalidate the proceedings or the award.
d) Where the parties do not agree that a case is appropriate for this procedure, it will be dealt with by the same arbitrator as a conventional referral to arbitration.

17 Discipline and Discharge

17.1 No employee, except as noted below, shall be disciplined or discharged without just cause.

When disciplining or discharging probationary employees for just cause, it is recognized that the probationary period is an extension of the selection process and that these employees have short service. Therefore, the threshold for discipline and discharge may be less than that of a regular employee in similar circumstances.

17.2

17.2.1 Prior to the imposition of any disciplinary penalty, the employer shall conduct a disciplinary interview.

17.2.2 Where an employee is required to participate in an interview in circumstances where discipline is likely to follow for such employee, the employee shall be advised of his/her right to have a Society representative present, and to have such a representative present during the interview if he/she chooses.

17.3 The employer shall provide the Society Unit Director and the employee with an email or written notice two (2) business days in advance of any interview where discipline is likely to follow for such employee. Such notice shall indicate:

a) his/her right to be accompanied by a Society representative;
b) the purpose of the meeting including a general outline of the issues;

An email notice will be sent to the Society Office. This shall be considered a confirmation of receipt of the notice above.

17.4 Disciplinary penalties resulting in a suspension without pay will not be imposed until a final decision (agreement between the Society and Management, or an arbitrator’s decision) has been reached.

The above is contingent upon the following:

a) The case is heard at the next JGRC, respecting timelines for brief exchange
b) If unresolved, heard at the next available arbitration date
18 Principle and Process of Prior Involvement in Jurisdictional Issues/Disputes

18.1 OPG should advise The Society and provide an opportunity for its involvement at the appropriate organizational level (e.g., OPG, Business Unit, Division, Station) prior to making any final decision which could adversely affect The Society’s jurisdiction.

The Society’s jurisdiction may be adversely impacted by an organizational or operational changes, including technological changes, workload changes, and business process re-engineering. The Society’s jurisdiction is adversely impacted by any assignment of functions customarily done by Society-represented employees to persons or employees outside of its bargaining unit and/or reduces the proportion of work customarily performed by Society-represented employees relative to that done by persons or employees outside of its jurisdiction.

18.2 Prior to making a final decision that could adversely impact The Society’s jurisdiction, at the request of either party, OPG will establish a joint team with The Society which will review relevant facts and issues. In the event that the jurisdiction of another union is affected by this decision, The Society and OPG will strive to include a representative of this union in the review team. The criteria considered by the joint or tripartite review team will include the following:

- representational rights
- skill and training
- safety
- economy and efficiency
- past practice

18.3 The parties agree to make their best efforts to reach consensus on issues affecting The Society’s jurisdiction which will form the basis of recommendations to Senior Management.

18.4 In the event that consensus is not reached on issues affecting The Society’s jurisdiction or Senior Management rejects the joint/tripartite team’s recommendation(s), OPG will make the final decision and will provide written rationale for the decision to The Society.

18.5 The principle and process set out in 18.1 to 18.4 are not grievable with the exception of OPG final decision. The recommendations of joint tripartite teams are without prejudice and cannot be relied upon at grievance/arbitration or before any labour relations board.
19 Job Challenges

Job Challenge disputes not resolved through the normal process or through the process outlined below will be subject to the Arbitration provisions (Step 3) of Article 16 of the Collective Agreement, for final and binding resolution.

19.1 Employee Initiated Job Reviews

a) An employee or group of employees may request a job review through The Society, indicating a desired rating for the position(s) in question along with a justification for the new rating.

b) Management has 30 days from the date of the request to decide whether to perform a job review. If management agrees to perform a job review then it must complete the job review within 60 days of the date of agreement.

c) If management decides not to perform the job review, or the job review results in a classification unsatisfactory to the employees involved, the Society may file a grievance within 10 working days of the communication of the decision. All such grievances will be filed at Step 2 of the Society/OPG grievance procedure contained in Complaint and Grievance/Arbitration Procedure in Article 16 of the Collective Agreement.

d) In the case where a grievance is filed, the parties commit to have a fact-finding pre-meeting to share information and discuss possible resolutions. The parties, with the aid of job evaluation experts, will exchange information on out-standing job challenges.

e) If there is no resolution of the grievance, a Step 2 meeting will be held on the next regularly scheduled standing Step 2 meeting (as specified in the Complaint and Grievance/Arbitration Procedure in Article 16 of the Collective Agreement.)

f) Any unresolved issues will proceed through the grievance/arbitration process in the Complaint and Grievance/Arbitration Procedure in Article 16 of the Collective Agreement at Step 3.

20 Performance Appraisals and Pay Standing Complaints

20.1 Complaints concerning the interpretation or application of Article 21 ("Performance Appraisal Feedback and Advanced Warning of Reduced Pay Standing") and any warning of reduced pay standing may be processed through the grievance/arbitration procedure in accordance with Article 16.
20.2 Complaints concerning any disagreement of the assessment in an employee’s performance appraisal will be heard through an internal resolution process. This process consists of the following three consecutive steps:

Step 1: After a 24 to 48 hour buffer period of receiving the assessment, an employee who disagrees with the assessment should meet with his/her supervisor to attempt to resolve the disagreement.

Step 2: Failing resolution at Step 1, the employee should meet with his/her supervisor, the second-level supervisor and the Human Resources Officer. The Society Delegate (or his/her alternate) may attend this meeting if the employee wishes.

Step 3: Failing resolution at Step 2, if the employee wishes to continue the process, he/she and his/her direct supervisor will make a presentation to the Line Director and The Society Unit Director (or his/her alternate). The Line Director and The Society Unit Director will make every effort to resolve the problem within five (5) working days of the presentation. If a joint resolution cannot be reached, the performance assessment, which includes the employee's comments, will stand as a record of that year's appraisal.

The parties shall endeavor to resolve issues at the lowest possible level.

21 Performance Appraisal Feedback and Advanced Warning of Reduced Pay Standing

21.1 Principles

21.1.1 Supervisors are expected to ensure all employees understand what is expected of them, encourage ambitious goal setting, stress accountability for results, and tolerate honest mistakes but not poor performance.

21.1.2 The Performance Appraisal process will be conducted in an atmosphere of mutual respect and empathy to encourage a positive two-way communication session. The employee should be given adequate notice and time to prepare.

21.1.3 The supervisor will endeavour to provide recognition to employees commensurate with contribution and performance. Performance expectations should be guided by the job document, work program of the unit and the employee's length of service in the job.

21.1.4 The supervisor should communicate on an ongoing basis and counsel the employee toward improved performance. Also, opportunities for improvement, training, performance counseling, assistance and sufficient opportunity and time to raise
performance to the level required, should be part of the building blocks for the future.

21.1.5 The employee is responsible for recognizing that a problem exists and making a joint commitment to improve performance, or to jointly look at other alternatives, such as job skill match, etc.

21.2 Every employee has the right to an annual assessment with written feedback of his/her work over the preceding twelve (12) months.

21.3 Employees must be provided with a written record of the performance appraisal. Employees should receive written confirmation that the performance appraisal has taken place.

21.4 If an employee's performance may result in a reduction in step on the band, the employee will be given written notice at least six (6) months in advance of any contemplated action, setting out as precisely as possible:

a) the unsatisfactory performance;
b) what is required to rectify the unsatisfactory performance;
c) the actions that may be taken if improvement does not occur.

22 Role of Supervisors

22.1 As members of OPG managerial staff, supervisory employees have a role to play in the resolution of disputes in their work units before they reach the grievance/arbitration procedure. In the event that a dispute reaches the grievance/arbitration procedure, The Society agrees not to discriminate against supervisors who represent Management in Society grievances.

22.2 The Society will exclude supervisors directly involved in a particular grievance from the decisions on the referral of the grievance through the grievance/arbitration procedure. Supervisors will not act on behalf of The Society in matters associated with a particular grievance where the grievance has been lodged by another member(s) who reports to the particular supervisor.
PART VII - SALARY

23 Salary Schedules and Progression

23.1 Salary rates shall be in accordance with Salary Schedules 01, 02, 03, 04, 05, 08, 09, 11 and 12 that are part of this Agreement.

The top of the band for Salary Schedules 03 and 09 is the cap for all employees except for grandfathered employees. Similarly, no employee shall be placed below the initial step of the bands.

23.2 Employees hired on or after January 1, 2006 will be placed directly on the applicable Salary Schedule (03 or 09) and annual progressions shall be in accordance with Article 23.7 and 23.9. For greater clarity, all employees who are either hired into or enter a Progression-In-Place Plan position on or after January 1, 2006 will be placed on the MP-4 band. Employees who were on LTD prior to January 4, 2007 and were not placed on a step on a new Salary Schedule, will be placed on the applicable Salary Schedule upon their return to work at the step that is the closest to but not lower than their last pay grade.

23.3 Those employees at or above 103% at the time of placement on the bands, in 2007, will be green circled. Employees who were on LTD as of January 1, 2006 and who were at or above 103% when they went on LTD will be green circled. For greater clarity these employees will be entitled to all negotiated economic increases.

23.4 The Salary Schedules shall be increased effective January 1, 2013 by 0.75%.

23.5 The Salary Schedules shall be increased effective January 1, 2014 by 1.75%.

23.6 The Salary Schedules shall be increased effective January 1, 2015 by 1.75%.

23.7 Employees on Schedules 03 and 09 will normally progress from step to step on an annual basis on the date they were placed on the Band/Step unless otherwise specified in this Article.

The annual progression dates for employees are set as follows:

a) Employees who were transitioned to Salary Schedules 03 and 09 in January 2007 as set out in Article 23.4 in the 2006-2010 Collective Agreement will have their progression date set to the date of transition.
b) Employees placed on the bands in 2006 per LOU #177 (Treatment of Schedule 04 Management and Professional Trainees) will have their progression date set per LOU #177.

c) Hire dates will be used for employees hired on or after January 1, 2006.

d) Notwithstanding Article 23.7 a), b) and c) above, job changes resulting in a change of step and/or band will reset the annual progression date to the effective date in the position.

e) Annual progressions do not apply to employees while on LTD. This provision does not apply to those employees referenced in Letter of Understanding #91 “Rehabilitation and Reemployment” Item #2.

f) The annual progression date for employees who commenced LTD prior to January 4, 2007 will be the date of return to full-time hours or reduced hours as a permanent medical restriction.

g) The new annual progression date for employees who commenced LTD after January 4, 2007 shall be the date of their return to full-time hours or reduced hours as a permanent medical restriction, adjusted for any time worked subsequent to the Employee’s previous annual progression date during the year in which the Employee went on LTD.

23.8 Movement through the band can be restricted where:

a) the employer demonstrates a performance problem. For clarity progression restrictions are grievable;

b) for employees who are in a Progression-In-Place they will not be able to progress beyond the Qualifying Accomplishment Step unless they have met the Qualifying Accomplishments;

23.9 Movement through the band can be accelerated where management deems it appropriate.

23.10 Band N (Nuclear Operations) Payroll are excluded from the above noted provisions save and except for applying the indicated base salary increase on the same dates as identified in 23.4, 23.5 and 23.6.

24 Escalator Clause

24.1 In the event that Ontario Power Generation and the Society negotiate a Collective Agreement for a term of more than one year, a Cost of Living Adjustment (COLA) escalator clause shall become part of such an
Agreement and shall be applicable to all employees covered by that Agreement.

24.2 During the term of the Agreement, (January 1, 2013 to December 31, 2015), apply the following formula:

24.2.1 This escalator clause may generate a maximum of one wage increase on January 1, 2015 and none thereafter.

24.2.2 In the third year of the Collective Agreement, namely January 1, 2015 to December 31, 2015, the following formula shall apply;

a) An increase of more than 2.75% in the Ontario All Items index (2002 = 100) published by Statistics Canada in November, 2014 (published in December, 2014) over the index for November 2013 (published in December 2013) will activate the escalator clause.

b) On January 1, 2015, base rates and band rates will be increased by an amount equivalent to the amount by which the increase in the Index exceeds 2.75% in the 12 month period specified in (a) above but in no case shall the amount of such increase exceed 2.75%.

c) This wage increase would be implemented effective January 1, 2015 at the same time as the negotiated 1.75% wage increase. There will be no compounding of these wage increases.

24.3 In the calculation of fractions, the simple 5/4 method of rounding will be used. That is, .00001 to .00499 rounds down and .00500 to .00999 rounds up. This rounding methodology is to be used in the calculation of wage rates.

24.4 The availability of the escalator shall depend upon the continued availability of the Index calculated on its present base and in its present form. If the Index is not available, the parties will meet and agree on an appropriate alternative conversion of the Index.
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Note: This schedule is applicable to positions established as having a 35-hour basic workweek. Effective: January 1, 2013.
# Ontario Power Generation Inc.

## Salary Schedule 09

### Standard 40 Hours Per Week Schedule

### Dollars Per Week

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### Note:
This schedule is applicable to positions established as having a 40-hour basic workweek.

### Effective:
January 1, 2013
# ONTARIO POWER GENERATION INC.
## SALARY SCHEDULE 03
### STANDARD 35 HOURS PER WEEK SCHEDULE
#### DOLLARS PER WEEK

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Note: This schedule is applicable to positions established as having a 35-hour basic workweek.

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Note: This schedule is applicable to positions established as having a 40-hour basic workweek. Effective: January 1, 2014
## Salary Schedule 03

### Standard 35 Hours Per Week Schedule

**Dollars Per Week**

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**Note:** This schedule is applicable to positions established as having a 35-hour basic workweek.

**Effective:** January 1, 2015
### Salary Schedule 09

**Standard 40 Hours Per Week Schedule**

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**Note:** This schedule is applicable to positions established as having a 40-hour basic workweek.

**Effective:** January 1, 2015
25.1 Individuals with advanced degrees or some applicable experience may be given an appropriate time credit when they are placed on either step 1 or 2 of the MP 2, MP 3 or MP 4 bands.

25.2 Management may appoint individuals to a regular position upon successful completion of Step 2. Such individuals will be given a letter (copy to the Society) six (6) months prior to the completion of the training program indicating the location of their final appointment.

25.3 Employees who have reached Step 3 and have not yet been appointed to an M&P or FM&P job will be treated as special cases to be dealt with on an individual basis by line management.

25.4 Progression from step 1 to step 3 of MP2, MP3 or MP4 will be dependent upon satisfactory performance. A progression step may be withheld where OPG can demonstrate unsatisfactory performance. In such cases the employee's performance will be reviewed in six months and, if performance has been satisfactory, the employee will progress to the next step. If progression must be withheld due to unsatisfactory performance for a twelve month period, there may be cause for termination. If the employee's performance is satisfactory for one year following the withholding of a progression step the employee will be awarded any withheld step increase, thus restoring his/her original progression pattern.

25.5 An absence greater than one month due to illness, pregnancy, parental leave, etc., may result in an extension of a step in the progression process. The original progression dates may be reinstated if satisfactory progress can be shown to have been made during an extension period.

25.6 Vacation provisions that apply to M & P staff will also apply to employees on steps 1 or 2 of either the MP 2, MP 3 or MP 4 Bands.

25.7 Articles contained in Part XI (Relocation Assistance) will apply to employees paid from Steps one or two when they are appointed to an M&P or FM&P job or are progressed to Step 3 on either the MP 2, MP 3, or MP 4 bands.
25.8 Eligibility for other benefits and allowances which apply to regular staff will be granted to employees on steps one or two when they are granted regular employee status.

25.9 Shift compensation rates for developmental staff are as follows:

For work on Saturdays and Sundays:
- In 2013: $21.55/hour worked
- January 1, 2014: $21.93
- January 1, 2015: $22.31

For work on statutory holidays:
- In 2013: $43.09/hour worked
- January 1, 2014: $43.84
- January 1, 2015: $44.61

Beyond December 31, 2015 the shift premiums are subject to the same general base wage increases that are applied to wage schedules.

25.10 Student employees will be paid at either Step 1 or 2 of the MP 2 Band.

26 FM&P Salary Schedule 02

This Article has been deleted.

27 Office Supervisory and Services (OSS) Salary Schedule 05

This Article has been deleted.

28 Trades Management Supervisors/Trades Supervisors (TMS/TS) Salary Schedule 08

This Article has been deleted.

29 Short-Term Absences

Payment for short-term absences (e.g., vacation, sick leave) will be based on the normal rate paid for scheduled job hours, except as stated elsewhere in this Agreement.

30 Article 30 has been deleted
31 Job Evaluation Plans

Job evaluation plans which are used to rate Society-represented jobs form part of this Collective Agreement. These plans are:

31.1 Plan A (revised January, 1988), used to classify all M&P jobs;
  - Plan A Job Evaluation Manual - delete the phrase “Once exclusion from CUPE Local 1000 has been confirmed” on page 3.

31.2 Field Management and Professional Job Evaluation Plan (revised July, 1988), used to classify all FM&P jobs;

31.3 Trades Management Supervisors Job Evaluation Manual (April, 1986), used to classify all TMS jobs;
  - TMS Job Evaluation Manual - delete criteria “(a) qualify for exclusion from union jurisdiction” on page 2.
  - The parties agree that the Trades Management Supervisors Job Evaluation Plan will be deleted effective January 4, 2007.
  - The parties recognize that Trades Management Supervisor (TMS) positions that were moved to Schedule 09 on January 4, 2007 are struck rates and neither party will seek to re-evaluate these positions under the current Plan A and further that these positions cannot be used as benchmarks for M&P jobs.

32 Re-earnable Incentive Plan

This Article has been deleted.

33 Progression-In-Place Plans

33.1 Definition

A “progression-in-place plan” (PIP) means a developmental plan involving a hierarchy of related jobs, in which employees who meet defined criteria will be progressed without advertising, and where it is the normal expectation that employees will reach the end position.

33.2 Principles

33.2.1 The Society should be involved in the development and periodic review of PIPs.
33.2.2 Either The Society or Management may initiate discussions on PIP proposals.

33.3 Conditions

33.3.1 All new and revised PIPs must have the joint agreement of the JSMC. During the term of the Collective Agreement, a catalogue of existing PIPs will be developed and the JSMC will determine the schedule for their review upon request by either party.

33.3.2 Salary treatment upon progression for employees who are in PIPs and are on Salary Schedule 03 or 09, will be as per Article 23, Salary Schedules, with the exception of progressions from steps 9 to 10 and 11 to 12 which are subject to meeting defined criteria as per 33.4 f).

33.3.3 Employment continuity treatment of employees with respect to PIPs will be in accordance with Article 64.11, Employment Continuity.

33.3.4 Vacancies for PIP jobs will be advertised in accordance with Article 65.6.1 (e).

33.3.5 All jobs in a PIP must be evaluated under the applicable job evaluation plan.

33.4 Standard Features

All PIPs must have the following features:

a) based on a developmental plan to an end position;

b) based on the expectation that normally employees in PIP jobs will reach the end position;

c) a sunset clause;

d) joint Society-Management Agreement on progression criteria consistent with the PIP;

e) For employees on annual step based progression: progression from steps 9 to 10 and 11 to 12 within PIP is based upon the employee meeting defined criteria (e.g., performance measures, experience, breadth of assignments). For employees who meet the defined criteria for progression to step 10 or 12 prior to reaching the indicated step, that employee will not be required to re-qualify upon reaching said step;
f) targeted to have sufficient staff in the higher level positions for unit viability;

g) specification of the normal expected time period an employee should take to progress through the various stages of the PIP;

h) provision for employees to have a reasonable opportunity to fulfill requirements to qualify for progression within the normal expected time frame.

33.5 There will be separate MP-2, MP-3 and MP-4 designation/Job Documents for all purposes under the Collective Agreement, but employees in a PIP position will be placed on the MP-4 band.

33.6 There will be no promotional increase when an employee is progressed-in-place. Annual progressions are not accelerated nor steps skipped when an employees achieves the Qualifying Accomplishments for transition to the next level of the PIP.

33.7 Employees may be either promoted or hired into a PIP at any step.
34 Temporary Employees

Intent: Temporary employees are employees hired for short-term work assignments which are not ongoing and/or where there are no available qualified regular employees to perform the work. Such work assignments are not expected to go beyond 12 months, but may be extended up to a maximum period of 24 months with The Society’s Agreement. The impact on employment continuity should be an important consideration in the decision to hire temporary employees.

34.1 Society Notification

OPG will discuss the circumstances with the local Society representative prior to hiring a temporary employee. The Society will be informed of the job skill needs, the salary classification for the position, the expected job duties, and the duration of the assignment.

Assignment extension beyond 12 months requires the agreement of The Society. At 24 months, OPG will either terminate the employee, advertise the position if there is an ongoing staff requirement, or obtain the agreement of The Society for a further extension. If the position is advertised, and the temporary employee is not selected for the vacancy, the employee will be terminated.

Temporary employees will have their applications for vacancies considered in accordance with Article 65.6.3.

Notwithstanding the above, OPG may utilize a temporary employee for up to 36 months with the approval of the appropriate Society Unit Director.

34.2 Temporary Employees with Less than 12 Months’ Service

34.2.1 Compensation and Benefits Treatment

i) Vacations: payment of the prorated amount of 15 days adjusted earnings or 4%, whichever is greater.

ii) Statutory Holidays:
   a) Provincially regulated employees: pay for statutory holidays provided the employee has more than three months’ accumulated service.
   b) Federally regulated employees: pay for statutory holidays provided the employee has more than 30 calendar days’ service.

iii) Floating Holidays: three floating holidays after 20 weeks’ continuous service.

iv) Sick Leave: credits for one-half day at 100% pay for each month of accumulated service.

v) Semi-Private and EHB Plan: optional at employee’s cost.
68

vi) Remembrance Day; Personal Time Off; Parental Leave (excluding the SUB Plan); Jury Duty; Special Time Off at Christmas: same as regular employees.

vii) Kilometre Rates: same as regular employees.

viii) Personal Travel and Accident Benefits: same as regular employees.

ix) Temporary employees are entitled to annual progressions.

34.2.2 Termination

When a temporary employee with less than 12 months' service is terminated for other than cause, he/she will receive at least two weeks' notice in writing.

34.3 Temporary Employees with More than 12 Months' Service

Temporary employees with more than 12 months' service are entitled to sick leave credits equal to eight days at 100% and 15 days at 75% per annum, performance appraisals, Incremental Pay Step, and severance pay equal to two weeks' base salary per continuous year of service. All items in Section 34.2 above, except for 34.2.1 (iv), will also apply to these employees.

Temporary Employees having 20 weeks of continuous service in their second 12 month period of service shall be entitled to three floating holidays. Temporary Employees having 20 weeks of continuous service in their third 12 month period of service shall be entitled to three floating holidays.

Service shall be counted from the employees' most recent date of hire.

Any break in service, other than a short administrative break (e.g. a break over the Christmas period) will break the continuity required for establishing entitlement. In the event an employee goes from one assignment to the next without a break in service, the continuity required for establishing the entitlement will not be broken.¹

34.4 Temporary Employees Working Reduced Hours

Temporary employees who work reduced hours will have the items listed in Sections 34.2.1 and 34.2.2 pro-rated in accordance with the provisions outlined in Article 71 (Reduced Hours of Work).

¹ Note: As per grievance settlement re: OPG 1667/OPGI-2011-2733 signed January 30, 2012.
PART VIII - ABSENCE FROM WORK

35 Paid/Unpaid Time Off

Intent: It is recognized that from time-to-time, an employee will be faced with situations that may require him/her to be absent from his/her work. Such time will be either with or without pay, or a combination of both, and will be granted where there is an entitlement under this Agreement, a clear legal or statutory requirement, or where, in the supervisor's judgment, such time off is warranted by specific circumstances. It is further recognized that it is the employee's responsibility to balance his/her need for a leave of absence with the work requirements of his/her unit.

Where the granting of the absence is discretionary, considerations would include: factors beyond an employee's control that prevent him/her from attending work; severity or nature of circumstance; workload of the unit.

The exact amount of time off is at the discretion of Management; however, the entitlements of employees in specific circumstances include those described below.

35.1 Jury Duty/Required Attendance at Court

For the duration of the Jury Duty, or required attendance at an Inquest or court (subpoenaed witness), the employee's normal base earnings and benefits will be maintained. The employee is responsible for informing his/her supervisor as to the probable duration of the jury duty.

35.2 Funeral Leave

a) Provincially Regulated Employees

In the event of the death of a family member, including parent, parent-in-law, brother, brother-in-law, sister, sister-in-law, husband, wife, son, son-in-law, daughter, daughter-in-law, grandparents, grandparents-in-law, and grandchildren, an employee may be granted leave of absence with pay. The supervisor will take into consideration the relationship of the deceased, the distance that the employee has to travel, and the need for the employee to attend to arrangements when deciding how much time is to be granted. Usually a period of up to three days is an adequate amount of time. In the event of the death of a fellow employee, time off with pay may be granted to attend the funeral.
b) Federally Regulated Employees

i) An employee will be granted leave of absence on any of his/her normal working days during the three days immediately following the death of a member of his/her “immediate” family. Base earnings will be maintained for employees who have completed at least 3 consecutive months of continuous service.

“Immediate” family shall be as defined in the Canada Labour Code: spouse, including common-law; father and mother of employee; spouse of father and mother, including common-law; children; brothers and sisters; father-in-law; mother-in-law; spouse of father-in-law and of mother-in-law, including common law and relative of employee who resides permanently in the employee’s household or with whom the employee resides.

ii) An employee may be granted leave of absence with pay of up to 3 days in the event of the death of the following family members: brother-in-law, sister-in-law, son-in-law, daughter-in-law, grandparents, grandparents-in-law, and grandchildren.

iii) In the event of the death of a fellow employee, time off with pay may be granted to attend the funeral.

35.3 Medical and Dental Appointments

An employee may attend a medical consultation, receive dental treatment or be absent because of sickness for less than one-half day without reduction of sick leave credits and/or pay.

35.4 Family Care

An employee is entitled to take time off for family care. Normally, up to five (5) days a year may be taken for this purpose. By mutual agreement with his/her supervisor, the employee may pay for this time by using his/her banked overtime, by working back the time over a reasonable period of time, or by taking the time off without pay.

36 Employees Hired as Society Staff

At the request of The Society, a leave of absence may be granted to an employee who is offered a Society staff position. During this period The Society will assume:

- Cost of salary;
• OPG’s cost of contributions to the Pension and Insurance Plan, and the LTD Plan;

• The responsibility and cost of providing Health, Dental and Sick Leave Insurance/coverage;

• The responsibility for any other employee contributions related to employee wages and benefits provided by The Society.

At the end of the leave of absence, OPG is obligated to relocate the employee within OPG at a salary classification as close as possible to the position held at the time the leave of absence was granted. An employee on leave will be neither advantaged nor disadvantaged in a surplus situation.

37 Release of Society Representatives

Note: Please also see Letter Re: Clarification of Article 37 in Appendix XIV.

37.1 Intent

OPG will grant elected Society representatives reasonable paid time off from normal duties for purposes of involvement in joint processes and business related to Society/Management relations under this Agreement.

OPG recognizes and appreciates the dual responsibility employees elected to hold Society office have to their job and to Society members. Society representatives and their supervisors (those excluded from The Society) are encouraged to pursue a mutually acceptable and cooperative approach to managing the requirement for absences as a result of this dual role. Management recognizes that the need for time off from normal duties will vary with the position that the employee holds within The Society. The higher up in The Society the more will be the demands for time off.

37.2 Specific Circumstances

37.2.1 Absence from work due to The Society representative's involvement in joint processes, tripartite processes or with respect to other business related to Society/Management relations under this Agreement, should not negatively impact on his/her performance appraisal.

37.2.2 In the expectation that the joint problem solving approach based on the JSMC principles outlined in Article 1.2 will be mutually beneficial to the relationship between OPG and The Society, Management agrees to continue its practice of maintaining base salaries for Society representatives involved in all joint processes up to but not including arbitration unless required by Management to attend.
37.2.3 Society Delegates and members of the Board of Directors will be permitted two (2) days per year at their normal base rates to attend Delegates’ Council meetings or for attending Elected Representative training. Members of the Board of Directors will be permitted up to 12 additional days per calendar year at their normal base rates, to attend Society Board meetings.

37.2.4 OPG will release elected Society representatives from their normal duties without pay for other Society business. The Society will give Management reasonable notice of such releases, and Management will normally release such representatives. From time-to-time there may be unexpected events that prevent such a release, but such situations will be the exception.

37.2.5 When employees are released from their regular positions under this Article, these employees will retain the position they had subject to applicable provisions of the Collective Agreement. In addition, such employees are entitled to such reasonable training or reskilling to return to normal duties as is feasible. In the event a Society representative is declared surplus, Society responsibilities will be factored in for the purposes of clause 64.21.2 (Interruption of Search/Notice Period).

38 Vacations

38.1 Vacation Entitlement

The combination of Vacation Commencement (VCD) plus External Experience Value (EEV) determines service for vacation entitlement for the purpose of this Article.

38.2 Less Than One Year of Service by June 30

One and one-half (1-1/2) days vacation for each full month of service completed between June 30 of the previous year and July 1 of the current year to a maximum of three (3) weeks (15 working days).

38.3 One to Seven Years of Service

Fifteen (15) working days (three weeks) annually when an employee has completed from one (1) to seven (7) years of service by the end of the calendar year.
38.4 From Eight to Fifteen Years of Service

Twenty (20) working days (four weeks) annually when an employee has completed from eight (8) to fifteen (15) years of service by the end of the calendar year.

38.5 For Sixteen to Twenty-Four Years of Service

Twenty-five (25) working days (five weeks) annually when an employee has completed sixteen (16) years to twenty-four (24) years of service by the end of the calendar year.

In the year in which the employee is first eligible for 25 working days’ vacation, he/she shall be granted it in one continuous period if he/she so requests.

38.6 For Twenty-Five or More Years of Service

Thirty (30) working days (six weeks) annually in the calendar year in which an employee completes twenty-five (25) years of service and in each succeeding year.

38.7 External Experience Credit

(Applicable to 4, 5, and 6 Weeks Vacation Entitlement)

38.7.1 Appointments to Positions Paid from Salary Schedules 01, 02, 03, 08, 09, 11 and 12

Employees who were or are hired directly into, or within one year of their ECD were, or are, appointed to a Society-represented position and paid from the new Salary Schedules will receive the following vacation credits for external experience, applicable to four, five, and six weeks vacation entitlement. Credits are based upon the highest salary band attained within one year of hiring and are translated into an External Experience Value (EEV).

A Society represented temporary employee who becomes regular and has more than 12 months continuous service with no break in service since their last date of hire shall be granted an External Experience Value (EEV) credit if applicable.2

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2 As per grievance settlements re: EEV credit to temporary employees OPG 1644/OPGI-2011-2709, OPG 1437/OPGI-2010-2660, OPG 1438/OPGI-2010-2659 and OPGI-2012-2743 signed February 7, 2012.
### 38.7.2 Management and Professional Trainees

An employee hired as a Management and Professional Trainee pursuant to Article 25 will receive one year's vacation credit.

### 38.8 Vacation Credit for Prior Service

Employees will be entitled to vacation credits for all prior service, including casual employment, regardless of breaks in service. (See Section 9.3 Transition Provisions of the 2006-2010 Collective Agreement).

### 38.9 Vacation Without Pay

Up to one week off without pay may be taken by employees for vacation purposes.

### 38.10 Use of Vacation Credits of Succeeding Year at Christmas

For purposes of taking time off at Christmas (December 15 to December 31) employees will be permitted to utilize earned vacation credits for the succeeding year.

### 38.11 Banked Vacation

Upon eligibility for 25 working days (five weeks) of annual vacation, employees may defer and accumulate any vacation entitlement beyond 15 days per year. A maximum of 30 weeks' vacation may be banked. Banked vacation may be taken at a later date, subject to the supervisor's approval, or may be taken as a cash payment upon retirement.

### 38.12 Vacation Bonus

Employees shall receive one day's base pay (or adjusted earnings) for each year of service beyond twenty-five (25) years, to a maximum of ten (10) days' pay.

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3 Relevant work experience of two years or more is required to receive this credit.

4 Relevant work experience of one year or more is required to receive this credit.
38.13 **Vacation Carryover**

Employees will be allowed to carry over two (2) weeks of vacation per year with the approval of the manager. Any such request will not be unreasonably withheld.

38.14 **Vacation Entitlement on Retirement/Termination**

**Retirement**

A retiring employee may take part/all of earned vacation for the year in which he/she retires, plus authorized carryover from previous years and banked vacation, or receive cash payment in lieu, plus any vacation bonus.

38.15 **Vacation Pay on Retirement/Termination is as follows:**

a) If an employee terminates between July 1, and December 31, he/she receives the following:

i) pay for any unused vacation days earned up to June 30, and not taken during the current calendar year; plus

ii) 4% of accumulated earnings from July 1, to the date of termination, or the appropriate percentage (determined by vacation entitlement) of base earnings from July 1, to the date of termination; whichever is greater.

b) If an employee terminates between January 1, and June 30, he/she receives the following:

i) 4% accumulated earnings from July 1, to date of termination, or the appropriate percentage (determined by vacation entitlement) of base earnings from July 1, to the date of termination; whichever is greater; minus

ii) vacation taken in the current calendar year.

"Base earnings" in this Section refers to base pensionable earnings for normal scheduled hours of work.

"Accumulated earnings" in this Section refers to base earnings, plus overtime pay, shift allowances, etc.

The appropriate percentages determined by vacation entitlement are as follows:
76

- 4% of accumulated wages if entitlement is 10 working days or less annually;
- 6% of base earnings or adjusted earnings to date if entitlement is 15 working days annually;
- 8% of base earnings or adjusted earnings to date if entitlement is 20 working days annually;
- 10% of base earnings or adjusted earnings to date if entitlement is 25 working days annually plus any vacation bonus;
- 12% of base earnings or adjusted earnings to date if entitlement is 30 working days annually plus any vacation bonus.

If the reason for termination is the death of an employee, the payment will be made to the estate or beneficiary.

For calculation purposes, the termination date is the employee's last day of work. The employee is removed from payroll on this date.

In cases where the termination is due to causes other than death, the termination date must not be extended to permit use of outstanding vacation credits or lieu days which are paid for in cash on termination.

38.16 Deferment or Interruption of Vacations

38.16.1 Reimbursement will be made for out-of-pocket expenses incurred by an employee who, at the request of OPG, either defers an approved vacation or returns before the vacation has expired.

38.16.2 When an employee is called back from vacation or when an employee's vacation is cancelled at the request of OPG, the employee shall receive premium rates of pay for all normal hours worked on cancelled vacation days for which seven calendar days' notice has not been given up to a maximum of seven calendar days.

38.16.3 Deferred or interrupted vacation days will be rescheduled at a later date.
39 Statutory Holidays and Floating Holidays

For federally regulated employees, the parties agree that Article 39 meets the requirements of Part III, Division V, General Holidays of the Canada Labour Code and that the Civic Holiday is substituted for November 11 (Remembrance Day).

39.1 The following days are recognized by OPG as statutory holidays:

- New Year's Day
- Christmas Day
- Good Friday
- Boxing Day
- Victoria Day
- Labour Day
- Canada Day
- Thanksgiving Day
- Civic Holiday
- Easter Monday
- Family Day

If a statutory holiday falls on a day when an employee is off on sick leave, pay is not charged against sick leave credits for that day. A statutory holiday falling within an employee's vacation period is not counted as part of the vacation, but is taken as an extra day of holiday.

Payment for statutory holidays will be on the basis of straight time for the normal hours of work per day.

39.1.1 When Canada Day falls on a Saturday or Sunday, it shall be observed on the following Monday.

39.1.2 When Christmas falls on a Friday and Boxing Day on Saturday, a half holiday will be granted on the preceding Thursday. The days of observance will not be moved.

When Christmas falls on a Saturday and Boxing Day on a Sunday, a half holiday will be granted on the preceding Friday. Christmas will be observed on Saturday. Boxing day will be observed on Monday.

If Christmas Day falls on a Sunday, it shall be observed on Monday and Boxing Day on Tuesday.

When Christmas Day falls on a Tuesday, Boxing Day shall be observed on Monday.

When Christmas Day falls on a Wednesday and Boxing Day falls on Thursday, the Friday following Boxing Day will be granted as an additional holiday. The days of observance will not be moved.

39.1.3 When New Year's Day falls on a Saturday, an additional holiday shall be granted on either the preceding Friday, or the following Monday. The day of observance will not be moved.

When New Year's day falls on a Sunday, it shall be observed on Monday.
39.1.4 Holiday Shutdown

OPG may authorize a shutdown over the Christmas - New Year period. In order to encourage employees to voluntarily take this time off, employees will be allowed to use up earned vacation from the following calendar year in order to cover the shutdown period.

39.2 Floating Holidays

Employees who have completed 20 weeks of continuous service in any calendar year are entitled to three floating holidays. Such days will be taken on dates mutually agreeable to the employee and the supervisor. Floating holidays must be taken in the year they are earned (i.e. there is no carryover for floating holidays).

If an employee terminates after completing 20 weeks of continuous service in a calendar year, OPG will make a cash payment in lieu of any unused floating holiday credits.

If an employee terminates prior to the completion of 20 weeks of continuous service in a calendar year, entitlement is as follows:

- An employee not entitled to floating holidays in the previous calendar year is not entitled to floating holidays in the current calendar year. If an employee has been granted a floating holiday(s), OPG will recover one day's pay for each floating holiday taken.

- For an employee entitled to floating holidays in the previous calendar year, entitlement will be prorated based on the number of weeks of continuous service in the year of termination. OPG will either make a cash payment for any unused floating holiday credit or recover the value of any unearned portion taken.

39.3 Remembrance Day

39.3 Notwithstanding article 39.1, the following employees will be eligible for time off and/or payments as described in 39.3.1.

a) Those employees who are serving or have served in the Canadian Armed Forces including those who are currently active in the reserve component, or who were deployed as part of the Canadian Armed Forces.

39.3.1 Remembrance Day Payment and Time Off Provisions

If on Remembrance Day eligible employees as described in 39.3 a) are:
1. Normally scheduled to work, eligible employees shall be allowed time off with pay, at straight time for scheduled hours as far as work schedules will permit.

2. Scheduled to work and they are required to work, they shall be paid at the rate that normally applies for that day and given equivalent time off with pay, at straight time up to a maximum of normal scheduled hours, within the following six months.

3. Not normally scheduled to work and they are required to work, they shall be paid at the rate normally received for overtime work.

4. Shift workers on a seven-day coverage who are on a regular day off, shall be allowed equivalent time off with pay within the following six months.

40 Unemployment Insurance Commission Rebate

The value of any Unemployment Insurance Commission (UIC) rebate shall accrue to OPG.

41 Pregnancy/Parental Leave

The entitlements in this article are generally described in the brochure "Pregnancy and Parental Leaves – All Society Represented Performance Paid Staff" (April 1, 1999). The Brochure is under revision to reflect the provisions below.

Definitions

Pregnancy leave means a leave of absence of up to 17 weeks for a pregnant employee who has been employed by OPG for at least 13 weeks immediately preceding the expected birth date. Unless provided for in this Article, this leave is without pay.

Parental leave means a leave of absence for an employee who has been employed by OPG for at least 13 weeks and who is the parent of a child. This employee is entitled to a leave of absence following the birth of the child, or the coming of the child into the custody, care and control of the parent for the first time. Unless provided for in this Article, this leave is without pay.

For an employee who takes pregnancy leave, the leave of absence is for a period of up to 35 weeks. For an employee who does not take pregnancy leave, the leave of absence is for a period of up to 37 weeks.
In the event that the Employment Standards Act parental leave provisions are reduced below 35 weeks, OPG agrees to reinstate an extension in the same magnitude as the reduction for all categories in Article 41. The maximum reinstated extension will not exceed 4 weeks.

41.1 Pregnancy Leave

a) **Start Date:** Pregnancy leave may begin at any time during the 17 weeks immediately preceding the expected date of delivery.

b) **End Date:** Pregnancy leave normally ends 17 weeks after the pregnancy leave began.

c) **Notice:** The employee must give OPG as much notice as possible and a certificate from a legally-qualified medical practitioner stating the expected birth date. In no case, however, will the employee provide less than two weeks’ written notice of the day the leave is to begin.

d) **Reinstatement:** At the end of pregnancy leave, the employee will be eligible to return to the position the employee had prior to the leave, if it still exists, or to a comparable position, if it does not.

e) **Benefits:** OPG will continue to pay the OPG portion of the contributions for Group Dental, Extended Health Benefits, Pension Plan, Life Insurance, and any other type of benefit plan related to the employee's employment as prescribed by the Employment Standards Act for provincially regulated employees, and the Canada Labour Code for federally regulated employees, for the duration of the pregnancy leave, unless the employee gives OPG written notice that the employee does not intend to pay the employee portion of the contributions, if any.

f) **Service Credits:** Employees on pregnancy leave shall be entitled to normal accumulation of service credits for the duration of the pregnancy leave.

g) A pregnant employee may continue to work during a normal pregnancy until such time as the duties of her position cannot be reasonably performed.

h) An employee on pregnancy leave does not qualify for sick leave.

41.2 Parental Leave

a) **Start Date:** The parental leave must begin no later than 52 weeks after the day the child is born or comes into the custody, care and control of the parent for the first time for provincially or federally regulated employees.
The parental leave of an employee who takes a pregnancy leave must begin when the pregnancy leave ends unless the child has not yet come into the care and control of the parent for the first time.

b) **End Date:** Parental leave normally ends 35 weeks after the parental leave began for an employee who also took pregnancy leave or 37 weeks for an employee who did not take pregnancy leave.

c) **Notice:** The employee must give OPG as much notice as possible but in no case will there be less than two weeks’ written notice of the date the leave is to begin.

d) **Reinstatement:** At the end of parental leave, the employee will be eligible to return to the position the employee had prior to the leave, if it still exists, or to a comparable position, if it does not.

e) **Benefits:** OPG will continue to pay the employer portion of the contributions for Group Dental, Extended Health Benefits, Pension Plan, Life Insurance, and any other type of benefit plan related to the employee’s employment as prescribed by the Employment Standards Act for provincially regulated employees, and the Canada Labour Code for federally regulated employees, for the duration of the parental leave, unless the employee gives OPG written notice that the employee does not intend to pay the employee portion of the contributions, if any.

f) **Service Credits:** Employees on parental leave shall be entitled to normal accumulation of service credits for the duration of the parental leave.

g) An employee on parental leave does not qualify for sick leave.

41.3 **Benefits Under the Supplementary Unemployment Benefit (SUB) Plan**

a) In order to be paid a leave benefit in accordance with the Supplementary Unemployment Benefit Plan, the employee:

i) must provide OPG with proof that she/he has applied for, and is eligible to receive unemployment insurance benefits pursuant to the Employment Insurance Act; and,

ii) must be regular and employed by OPG for at least 13 weeks immediately preceding the date of delivery/adoption; and,

iii) must (a) be on pregnancy leave, or (b) be on parental leave.
According to the Supplementary Unemployment Benefit Plan, payments will consist of the following:

i) for the first two (2) weeks, payments equivalent to ninety-three percent (93%) of the employee's base pay (pregnancy leaves and parental leaves); and

ii) when receiving EI benefits, the employee is eligible to receive payments equivalent to the difference between the EI benefits and ninety-three percent (93%) of the employee's base pay for up to fifteen (15) weeks while on pregnancy leave and for up to five (5) weeks while on parental leave. Where the employee's base salary exceeds 1.5 times the Years Maximum Insurable Earnings, the employee will receive an additional $300 as a lump sum as full compensation if a clawback is required by Canada Customs and Revenue Agency or any other government agency.

iii) where an employee becomes eligible for an annual increment/salary schedule adjustment during the period of pregnancy/parental leave, payments under 41.3(b)(i) and 41.3(b)(ii) shall be adjusted accordingly.

c) An employee who qualifies under Section 41.3(a) shall sign an agreement with OPG providing:

i) that she/he will return to work and remain in OPG's employ for a period of six (6) months from the date of return to work;

ii) that she/he will return to work on the date of the expiry of pregnancy/parental leave, unless this date is modified with OPG's consent or unless the employee is then entitled to a leave extension provided for in this Article;

iii) that should the employee fail to return to work as per the provisions of Subsections 41.3(c)(i) and 41.3(c)(ii), the employee recognizes that she/he is indebted to OPG for the amount received under the SUB plan.

PREGNANCY/PARENTAL LEAVES - TIME LINES

*Only maximum entitlements available are shown:

Time lines show maximum lengths of leaves which may be available, providing qualifiers/conditions of specific legislation/agreements/policies are met.
EI Benefits show maximum amounts which may be available. Employees should be referred to the nearest EI Office to determine their specific entitlements.

SUB Plan Benefits show maximum amounts which may be available, providing qualifiers/conditions of specific agreements/policies are met.

**PROVINCIAL AND FEDERAL EMPLOYEES**

**Birth Mothers:**

<table>
<thead>
<tr>
<th>Pregnancy</th>
<th>2 wks</th>
<th>15 wks</th>
</tr>
</thead>
<tbody>
<tr>
<td>93%</td>
<td></td>
<td>EI+SUB=93%*</td>
</tr>
</tbody>
</table>

Plus Parental Leave as outlined below.

All parents who are entitled to Parental Leave and EI benefits in accordance with Employment Standards Act or Canada Labour Code

<table>
<thead>
<tr>
<th>Parental Leave</th>
<th>2 week waiting period (if required*)</th>
<th>5 wks</th>
<th>32 weeks maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>unpaid</td>
<td>EI*+SUB=93%</td>
<td>EI</td>
</tr>
</tbody>
</table>

Duration of Parental Leave is maximum 35 weeks if the employee has preceded their Parental Leave with Pregnancy Leave. Otherwise, the maximum is 37 weeks.

* Note: A waiting period is not always required, should parents choose to share parental benefits, the parent filing the second claim would not be required to serve a two-week waiting period. There would be one waiting period per birth or adoption.

All parents who are entitled to Parental Leave in accordance with Employment Standards Act or Canada Labour Code, but who are not eligible for EI benefits

<table>
<thead>
<tr>
<th>Parental Leave (Maximum 35 weeks)</th>
<th>Unpaid</th>
</tr>
</thead>
</table>

**42** Sick Leave Plan for employees hired prior to January 1, 2001 or covered by the transition provisions in Article 9.3 of the 2006-2010 Collective Agreement

**42.1** The Sick Leave Plan provides for maintenance of an employee's income when he/she is absent from work due to illness or non-occupational injury.

**42.2** Employees are granted 23 days of sick leave a year - eight (8) days at full pay and 15 days at three-quarter pay. These grants accumulate
continuously each year if not used, up to a maximum of 200 days at three-quarter pay and no limit to the number of days at full pay.

42.3 In the year in which an employee completes six years of service, all sick leave used in the first year of service will be restored. In the 7th year of service, all sick leave used in the 2nd year of service will be restored. This will continue until the employee has completed 15 years of service. In the 16th year of service, all sick leave used in the 11th through to the 15th years of service will be restored. In every year after 16 years of service, sick leave credits will be restored at the end of the year following the year in which they were used. There will be no payout of unused sick leave credits when an employee leaves the service of OPG.

Employees who have been approved for LTD (Article 43) shall be entitled to receive one re-accumulation prior to receiving LTD benefits. When an employee returns from any approved LTD they shall re-accumulate their sick leave in the normal fashion.

42.4 An employee will be reimbursed for any doctor's note required by OPG.

42.5 In keeping with Article 2.4, Society Supervisors will be responsible for the administration of the sick leave plan. However, the final determination with regard to discipline related to misuse of sick leave will be the responsibility of management.

42A Sick Leave Plan (For Employees Hired On Or After January 1, 2001)

42A.1 The Company's Sick Leave Plan will provide probationary and regular employees with substantial income protection regardless of their seniority. Probationary and Regular Employees will accumulate 8 sick leave credits (a credit equals 8 hours, 7.5 or 7 hours, whichever applies to the employee) per year of service at 100% of the employee's base pay.

42A.2 When employees have exhausted their sick leave credits and are on sick leave, they will be paid at 75% of their base rate for a period of up to 6 months.

42A.3 Employees who are on continuous sick leave for 6 months and who qualify will be placed on Long Term Disability (LTD).

42A.4 In the event of denial of LTD benefits, the employee will have their wages maintained at 75% of base wages until completion of an LTD appeal process.

42A.5 Employees will be required to submit all Major Medical Absence forms required by management through their personal physician. The Company will compensate the employee for the cost associated with completion of these forms up to a maximum of $20.00. It is the responsibility of the
employee to ensure that the employer receives these forms within a reasonable period of time. If there is an issue with the receipt of this form, the supervisor will contact the employee’s Society delegate and the delegate will work with the employee to provide the documentation as soon as possible. If the Major Medical Absence form is still not forthcoming, then the supervisor may discontinue the sick leave entitlement until the form is received.

Employees will be reimbursed for any additional doctor’s notes required by OPG.

42A.6 Regular part-time employees shall receive a pro-rated number of sick leave credits.

42A.7 In keeping with Article 2.4, Society Supervisors will be responsible for the administration of the sick leave plan. However, the final determination with regard to discipline related to misuse of sick leave will be the responsibility of management.

43 Long Term Disability for employees hired prior to January 1, 2001 or covered by the transition provisions in Article 9.3 of the 2006-2010 Collective Agreement

The Long Term Disability Plan provides financial security and rehabilitative employment features to regular employees during their absence from work due to extended sickness or injury. The benefits and terms and conditions of benefit entitlement of the Long Term Disability Plan are as described in: the Collective Agreement; the brochure entitled “Sick Leave and Long Term Disability Plans, updated April 10, 2000”; and sections 1 through 7 of “Exhibit A” of the Administrative Services Agreement, dated April 1, 1999 between the company and the carrier. These documents, by reference, form part of the Collective Agreement. The benefits and terms and conditions of benefit entitlement as described in the above documents can be changed by mutual consent only.

43.1 Qualifying Period

The qualifying period is defined as the period six calendar months from the starting date of the employee’s continuous absence due to disability; or a total of six months in accumulative authorized medical absences in the year prior to the date sick leave expires due to the same progressively deteriorating disability; or the expiration of sick leave whichever is longer.

43.2 Disability Period

The period in which an employee cannot continuously perform the essential duties of any position available in accordance with the priority placement criteria of the Rehabilitation and Re-employment Procedure.
43.3 Benefits

During the disability period, the plan will provide an income equal to the lesser of:

43.3.1 Sixty-five percent (65%) of base earnings at the end of the qualifying period for LTD benefits, or

43.3.2 Seventy-five percent (75%) of base earnings at the end of the qualifying period for LTD benefits less any pension entitlement and/or any supplement from the Workers’ Compensation Board (excluding the Non-Economic Loss award) and/or the Canada Pension Plan, excluding benefits for dependents.

A person who runs out of sick leave credits during the qualifying period will be granted a leave of absence without pay until such time as the LTD qualifying period elapses. The employee will continue to receive service credit during this period and have coverage maintained in, but will not be required to contribute to, the Ontario Power Generation Inc. Pension Plan, Health and Dental benefits, and the Group Life Insurance Plan.

43.4 Other Conditions

43.4.1 OPG and/or the insurance carrier reserve the right to periodically obtain necessary proof of continued disability. If at any time an individual who has been declared disabled and placed on LTD is capable of returning to any further service with OPG, OPG will request and The Society will normally grant a waiver of posting requirements except in the case of redeployment under Employment Continuity.

43.4.2 Employees who are in receipt of LTD benefits will have their LTD benefit levels adjusted by the indexation increase which is applied to the OPG Pension Plan.

43.4.3 Where a position is identified that both OPG and the employee on LTD agree he/she can become qualified for through educational retraining, OPG will pay tuition fees associated with the retraining, up to a maximum of three years.

43.4.4 Employees on LTD must apply for CPP disability benefits after an appropriate period (6 months) unless there are compelling (e.g., medical) reasons that prevent the employee from doing so.
43A Long Term Disability (For Employees Hired On Or After January 1, 2001)

The Long Term Disability (LTD) Plan provides financial security and rehabilitative employment features to regular employees during their absence from work due to extended sickness or injury. The detailed information is included in the Insurance policy and generally described in the brochure "Sick Leave and Long Term Disability Plans - Society Represented Employees - Updated April 10, 2000"

43A.1 Qualifying Period

The qualifying period is defined as the period six calendar months from the starting date of the employee's continuous absence due to disability; or a total of six months in accumulative authorized medical absences in the year prior to the date sick leave expires due to the same progressively deteriorating disability.

43A.2 Disability Period

The period in which an employee cannot continuously perform the essential duties of any position available in accordance with the priority placement criteria of the Rehabilitation and Re-employment Procedure.

43A.3 Benefits

During the disability period, the plan will provide an income equal to the lesser of:

43A.3.1 Sixty-five percent (65%) of base earnings at the end of the qualifying period for LTD benefits, or

43A.3.2 Seventy-five percent (75%) of base earnings at the end of the qualifying period for LTD benefits less any pension entitlement and/or any supplement from the Workers' Compensation Board (excluding the Non-Economic Loss award) and or the Canada Pension Plan, excluding benefits for dependents.

A person who runs out of sick leave credits during the qualifying period will be placed on 75% of their base pay until the LTD qualifying period elapses. The employee will continue to receive service credit during this period and have coverage maintained in, but will not be required to contribute to, the Ontario Power Generation Inc. Pension Plan, Health and Dental benefits, and the Group Life Insurance Plan.

43A.4 Other Conditions

43A.4.1 OPG and/or the insurance carrier reserve the right to periodically obtain necessary proof of continued disability.
If at any time an individual who has been declared disabled and placed on LTD is capable of returning to any further service with OPG, OPG will request and The Society will normally grant a waiver of posting requirements except in the case of redeployment under Employment Continuity.

43A.4.2 Employees who are in receipt of LTD benefits will have their LTD benefit levels adjusted by the indexation increase, which is applied to OPG's Pension Plan.

43A.4.3 Where a position is identified that both OPG and the employee on LTD agree he/she can become qualified for through educational retraining, OPG will pay tuition fees associated with the retraining, up to a maximum of three years.

43A.4.4 Employees on LTD must apply for CPP disability benefits after an appropriate period (6 months) unless there are compelling (e.g., medical) reasons that prevent the employee from doing so.

44 Workers' Compensation Leave

An employee awarded a Workers' Compensation grant shall be granted a compensable disability leave with compensation made up of a tax-free Workplace Safety Insurance Board award, and a taxable top-up grant for the duration of Workers' Compensation Disability benefits. The top-up grant will ensure an employee's net pay is maintained.

If the employee is awarded a Future Economic Loss (FEL) award and is unable to perform the essential duties of any available job, the leave and top-up grant will be extended for the first 24 months of the FEL award. If an employee is unable to return to work during the first two years of a FEL award, an application for LTD should be submitted. The qualifying period is waived in these cases, and LTD benefits will be payable at the expiry of the first FEL for a qualifying employee.

Pending a decision of the Workers' Compensation Board regarding the legitimacy of a claim the employee will receive sick leave. Employees who are receiving Workers' Compensation benefits for claims or injuries suffered while in the employ of an Employer other than OPG are required to notify OPG of being in receipt of those benefits in order to qualify for the top up grant. These employees will not be eligible for sick leave while receiving Workers' Compensation benefits for the top-up grant.

The top-up grant for compensable disability leave will be withheld if the employee refuses a medically suitable position that she/he is capable of performing, pursuant to the provisions of Article 45 ("Rehabilitation and Re-Employment") of the Collective Agreement. The grant may also be withheld where an employee is subject to
appropriate discipline or discharge for cause pursuant to Article 17 ("Discipline and Discharge").

Authority for withholding the supplementary grant is vested in Directors.

## 45 Rehabilitation and Re-Employment

### 45.1 Application

This Article applies to OPG employees who either have qualified for Long Term Disability (LTD) Plan benefits or have been approved for a Workers’ Compensation (WCB) award, and, regular employees who have medical disabilities that prevent them from performing the essential duties of their jobs.

### 45.2 Policy

The parties seek to ensure that timely vocational rehabilitation and placement assistance is provided to affected employees whose medical impairments prevent performance of the essential duties of their jobs. The goal is re-employment in a continuing capacity which will make maximum use of these employees’ capabilities.

Entitlements to rehabilitation and re-employment will be provided pursuant to the terms of the OPG Policy 04-03-04, "Rehabilitation and Re-employment", dated August 1991. As applied to Society-represented employees, the Policy will be subject to other provisions of this Collective Agreement and to relevant legislation, and may not be altered except by mutual agreement. The Society will be provided with notice in all circumstances in which notice is given to "the Union" under the Policy.

### 45.3 Rehabilitation

An employee who is eligible for rehabilitation and is capable of rehabilitative employment is entitled to placement in a medically suitable position.

### 45.4 Re-employment

An employee who is eligible for re-employment must be given a reasonable job offer in accordance with placement priorities under the Policy. Where more than one job is available, the employee will be offered the job nearest the salary level of the pre-disability position. The job offered should be no more than two salary levels below the pre-disability position. When an employee is placed in a lower rated position following rehabilitative employment, OPG will maintain the base salary and benefits of the pre-disability position until the employee's Incremental Pay Step in the new position exceeds that in the pre-disability position.
45.5 Termination of Employment

In the event an eligible employee refuses reasonable rehabilitative employment or a reasonable job offer for re-employment, the employee shall be terminated without entitlement to LTD benefits. Where an employee grieves termination for medical incapacity an arbitrator shall have jurisdiction to consider relevant post-termination evidence of rehabilitation.
PART IX - HEALTH BENEFITS

OPG, through its claims services provider, shall provide extended health benefits and dental coverage as outlined in the brochure entitled “Society-Represented Employees, Pensioners and Dependents – Health and Dental Benefits, Understanding Your Plan, effective January 1, 2006 and in accordance with the existing insurance carrier contract for Society-represented staff.

46  Extended Health Benefits (EHB)

46.1 Effective January 1, 2006, the following applies:

- When a married pensioner plan member dies and his or her spouse\(^5\) remarries:
  - a) The new spouse will not be entitled to Health and Dental Benefits.
  - b) Any dependent children of the surviving spouse would be entitled to Health and Dental Benefits.
  - c) These changes will not be applied retroactively.
  - d) It is recognized that an amendment to the pension plan document will be required to enact these changes.

46.2 OPG agrees to offer employees the option of using the Preferred Vision Services (PVS) Plan, subject to its availability.

46.3 OPG agrees to investigate using its purchasing power to negotiate a discounted group rate for employees who wish to purchase out of country travel insurance.

47  Dental Plan

OPG, through its claims services provider, shall provide extended health benefits and dental coverage as outlined in the brochure entitled “Society-Represented Employees, Pensioners and Dependents – Health and Dental Benefits, Understanding Your Plan, effective January 1, 2006 and in accordance with the existing insurance carrier contract for Society-represented staff.

Effective January 1\(^{st}\) of each year of the Collective Agreement, the dentist fees will be paid up to the amounts shown in the current Ontario Dental Association (ODA) Fee Guide.

- The parties agree to conduct a Dental Code Review

Effective January 1, 2012:

\(^5\) Spouse at the moment of death
Amend dental coverage to provide for coverage for dental implants where dental implants are recommended by the treating dentist as the most effective treatment choice.

| Semi-Private Hospital Accommodation Plan |

Coverage under the Semi-Private Hospital Accommodation Plan is unchanged.
49.1 The benefits and terms and conditions of benefit entitlement for group life, living benefit and spousal life insurance for employees are as described in: the Collective Agreement; the brochure entitled “Group Life Insurance, Living Benefit and Spousal Life Insurance, updated April 10, 2000” and, group policies on group life insurance and living benefit and spousal life insurance dated April 1, 1999 between the company and the carrier. These documents, by reference, form part of the Collective Agreement. The benefits and terms and conditions of benefit entitlement as described in the above documents can be changed by mutual consent only.

49.1.1 The cost of basic term insurance for employees will be paid by OPG.

49.1.2 The cost of additional term insurance for employees will be paid by the employees.

49.1.3 Upon retirement, term insurance equal to 50% of final base annual earnings will be provided, reducing to 25% ten years after retirement.

49.1.4 An employee will become eligible for membership in the plan upon being assigned regular status.

49.1.5 In the event that an employee does not make an election, Option I (see 49.2 below) will automatically be designated.

49.1.6 After the initial election period, a re-election of option will be permitted only once a year during the month of December.

49.1.7 The employee will be required to submit evidence of insurability if a re-election results in total increased insurance coverage.

49.1.8 Any re-election shall become effective on the January 1st following the year in which the re-election is made or on the date of approval by the insurer of any required evidence of insurability, whichever is later.
49.2 Life Insurance Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Basic Term Insurance</th>
<th>Additional Term Insurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Two Times Base Salary</td>
<td>Nil</td>
</tr>
<tr>
<td>II</td>
<td>Two Times Base Salary</td>
<td>One Times Base Salary</td>
</tr>
</tbody>
</table>

49.3 The maximum additional term insurance that may be purchased by an employee shall be referred to a tripartite (Society, Management and PWU) forum for further consideration.

49.4 An employee who meets the following criteria shall be eligible to cash out 50% of his/her total claim value to a maximum of $50,000.

Criteria:
- the illness must be terminal with death likely to occur within 24 months;
- OPG’s consent is required;
- the consent of the employee and his/her beneficiary is required;
- the beneficiary must have reached the age of majority; and
- the employee must be competent and able to understand a transaction of this nature.

Payments must be processed as a loan and interest charged to avoid making the payment a taxable benefit to the employee.

When death occurs, the advance payment plus accrued interest is deducted from the claim value.

49.5 Spousal Insurance

49.5.1 Only spouses of active employees are eligible.

49.5.2 Insurance is available in units of $10,000 to a maximum of $150,000 (15 units).

49.5.3 The entire cost, including administration costs, will be paid by the employee. The employee will arrange payment with the insurer and payment will be the direct responsibility of the employee.

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6 Basic Term Insurance is composed of term insurance equal to base annual earnings raised to the next $500.00 and multiplied by 2.

7 Additional Term Insurance is the optional term insurance which an employee may elect in addition to the basic insurance coverage. It is equal to base annual earnings raised up to the next $1,000.00.
49.5.4 The participation rate will have to be 20-30% otherwise proof of insurability will be required.

49.5.5 The premium rate will be different from the rate for employees, and will be experience rated. The premiums would then vary from year to year based on the experience of the previous year.

50 Pension Plan

The Ontario Power Generation Inc. Pension Plan (Registration #1059120) forms part of this Collective Agreement. The provisions of the Pension Plan are generally described in the brochure Ontario Power Generation Inc. Pension Plan – Effective January, 2000. Changes to the Pension Plan affecting Society-represented members of the plan, other than legislative changes, shall be made only upon mutual consent.

It is agreed that normal administrative matters such as changing financial advisors are not considered by the Parties to be changes to the Pension Plan within the meaning of Article 50, subject to any understanding, agreement, or decision to the contrary with the PWU.

50.1 All the changes to the Pension Plan heretofore agreed to between The Society and OPG have been incorporated into the Pension Rules/text.

50.2 The employer shall not request legislation, regulations, or Order-in-Council approval or make rules which would change pension benefits, unless upon mutual consent. Moreover, the employer will not unilaterally seek legislation to change access to surplus unless upon mutual consent.

50.3 Probationary Employees

Probationary employees who have attained three months’ service shall be eligible to become members of the Pension Plan. A new employee who completes his/her probationary period after January 1, 1999 and who is a contributor to the Plan may irrevocably elect and pay the required contribution within three months immediately following completion of the probationary period, to buy credited service for his/her probationary period, failing which there shall be no subsequent right to elect.

Effective January 5, 2006, probationary employees shall commence Pension Plan membership on their first day of work.

50.4 Spousal Benefit

Effective July 1, 2000 the survivor benefit maximum shall be increased from 64% to 66 2/3rds. This improvement will apply to members whose pensions commence on or after July 1, 2000 and also to pensioners and surviving spouses in receipt of pensions.
50.5 Bridging Benefit

1. This benefit is payable to eligible employees who retire after January 1, 1997 and this benefit replaces the existing bridge benefit.

This amendment does not change the amount of pension payable after age 65. The purpose of the amendment is to pay the bridge benefit now payable to members who retire before age 65 with 35 years of credited service to a member retiring after January 1, 1997 before age 65 with 30 years of credited service. For members who retire before age 65 with less than 30 years of credited service, the bridge benefit will be prorated in proportion to credited service.

The bridge benefit will be reduced by the same percentages as is applied to the lifetime pension if a member retires prior to qualifying for an unreduced pension.

2. For people retiring on or after January 1, 1997 the bridge benefit payable when a member eligible for an unreduced pension retires will be increased from:

\[ A \times B \times C \]

where:

A equals 0.625%
B equals post 1965 credited services to a maximum of 35 years
C equals the lesser of the member's average earnings in the 60 consecutive months when the earnings were the highest and the average of the YMPE's during the 60 consecutive months when the earnings were the highest.

to:

\[ A \times D \times C \]

where A and C are as above and
D equals 35 times the lesser of 1 and the member's years of credited service divided by 30.
50.6 Rule of 82
Employees may retire without discount when their age and years of continuous service equals 82 or more.

50.7 Continued Contribution
Contributions are now allowed beyond 35 years.

50.8 Employee Contribution Holiday
At any time during the period that this Collective Agreement is in effect and that either OPG or the PWU members stop their contributions to the pension plan, the Society will be given the opportunity to stop contributions by Society represented pension plan members for an equivalent period.

50.9 Plan Formula
Effective January 1, 2006 the employee’s contributions will be increased to 7% below and above the YMPE.

50.10 Supplementary Plan
The following language will be included in the supplementary plan:

“Society members of the OPG Pension Plan, whose pension income as a pensioner will exceed the limits prescribed by the Income Tax Act (ITA) for pension paid from a registered pension plan, are eligible for the Supplementary Payment Schedule (SPS). The SPS tops up the amount one receives from the OPG registered pension plan to the amount one would receive if there were no ITA limits.”

50.11 Reciprocal Transfer Agreements
OPG will seriously consider reciprocal transfer agreements with respect to any Change of Employer situations, where the new employer is not a competitor of OPG, and where the new employer agrees to a reciprocal transfer agreement.

50.12 Fund Transfer
The Society shall continue to have access to reasonable pension plan and pension fund information, which shall include reasonable information related to the allocation and transfer of pension funds to a successor pension plan. The Society will have the opportunity for input prior to the filing of any transfer report or new plan text with FSCO. In the event that pensioners or deferred pensioners are to be transferred, the Society will also have access to and input on, such situations.
PART XI - RELOCATION ASSISTANCE

The following provisions apply to regular employees and are outlined in the brochure entitled "Relocation Assistance Benefits for Performance Paid Staff" (1995). Employees who are Management and Professional Trainees pursuant to Article 25 will receive the treatment contained herein when appointed to regular positions, and required to relocate as a result of OPG business.

51 Housing Assistance Plan

51.1 Intent

51.1.1 OPG’s purchase of an employee's principal place of residence is designed to ensure that an employee who moves will not be forced to endure unreasonable periods of family separation or inconvenience due to inability to sell the employee's home at a fair market price.

51.1.2 It will be the prerogative of OPG to reject an employee's application for Housing Assistance if in Management's opinion the property is not an acceptable risk.

51.1.3 The employee must abide by all of the requirements of the Housing Assistance Plan. Failure to do so will result in the employee becoming ineligible for housing assistance from OPG.

51.2 Purchase Guarantee

51.2.1 OPG will provide a purchase guarantee based on an appraisal of the property's current worth by a group of up to three appraisers, to be selected by the Real Estate Division in conjunction with the employee.

51.2.2 OPG will not request appraisals until the employee is ready to list his/her house in the marketplace providing this is within one year of the employee's transfer to the new work location and the employee is prepared to abide by Subsection 51.2.4 and Subsection 51.3.1.

51.2.3 The employee must acknowledge acceptance or rejection of OPG's Purchase Guarantee within five days of its receipt. If the employee rejects the Purchase Guarantee, OPG has no further responsibility with regard to Housing Assistance or the Purchase Guarantee.

51.2.4 If the employee wishes to participate in the Housing Assistance Plan, the employee must not list the property for sale until the Purchase Guarantee has been accepted.
51.2.5 Home Appraisal Documentation

OPG will provide The Society with an initial six month report of home appraisal documentation prior to January 1, 1995. Representatives from OPG and The Society will meet to discuss the particular form and content of subsequent reports. Upon agreement on the form and content a Letter of Understanding will be developed which will require the report to be given to The Society on a semi-annual basis for the term of this Collective Agreement. Any anomalies in the report may be discussed by The Society and the OPG confidentially with full disclosure of information (including appraisals).

51.3 Listing of Property

51.3.1 If an employee chooses to participate in the Housing Assistance Plan, by accepting the Purchase Guarantee, the employee will immediately list the property for 90 days on MLS (where such service is available) at a price not exceeding 107% of the guaranteed price.

51.3.2 The employee will retain the right to sell to a third party until such time as the property is turned over to OPG for resale.

51.3.3 In order to assist the employee to dispose of the property expeditiously and at a fair market value, the employee should notify the Employee Relocation Administrator of all offers to purchase during the listing period. OPG may ask the employee to accept an offer which is lower than the Purchase Guarantee, whereupon the employee will be compensated for the difference between OPG’s Purchase Guarantee and the amount of the offer. The employee’s acceptance of any offer less than OPG’s Purchase Guarantee is not mandatory and the employee will retain control of the sale of the residence throughout the listing period. All offers to purchase will be held in confidence by the Employee Relocation Administrator.

51.4 Sale of Property by OPG

51.4.1 The employee must be prepared to sign power of attorney authorizing OPG to sell property on the employee’s behalf on the first day following the 90 day listing period. If the employee will be unable to vacate the premises at that time, the Employee Relocation Administrator must be notified.

51.4.2 OPG will pay to the employee the difference between the value of the property to OPG (Purchase Guarantee) and all existing encumbrances, including the advance of equity.
51.4.3 When an employee applies for assistance under this procedure, he/she must declare under oath, if required by OPG, all encumbrances of any nature or kind whatsoever, including executions, chattel mortgages, and notices of conditional sales contracts which the employee is obliged to pay.

51.4.4 In consideration of the payment to the employee of the amount established in Subsection 51.4.2, the employee will complete a deed of sale of the property, conveying the same by good and marketable title, but subject to all existing encumbrances, to OPG or its nominee.

51.5 **Advance of Equity**

In order to provide the employee with funds for a deposit or down payment on a residence at the new location, an advance of up to 100% of the employee's equity (Purchase Guarantee minus encumbrances) in the residence at the former location may be loaned to the employee by OPG. Advance of equity is interest free for employees who avail themselves of the Purchase Guarantee for 90 days for until the house is turned over to OPG or until the closing date of the sale of the house to a third party, whichever comes first. For employees who reject the Purchase Guarantee, the advance of equity is interest free for 90 days. Repayment is as set out in the Relocation Assistance Benefits brochure.

51.6 **House Evaluation and Guarantee – Atikokan Thermal Generating Station (TGS)**

51.6.1 Employees at Atikokan TGS who are declared surplus and terminated may avail themselves of the Housing Evaluation Guarantee provisions outlined in Article 54.

52 **Moving Expenses**

52.1 **Intent**

52.1.1 Since OPG has province-wide operations, employees may be required to move about the Province as part of their jobs.

52.1.2 OPG recognizes that there may be a number of relatively costly expenditures associated with moving and will endeavour to ensure that such expenses will be adequately covered.

52.1.3 OPG will not assume responsibility to compensate for any upgrading in an employee's standard of living which may take place as a result of moving.
52.1.4 The Housing Assistance Plan will apply to the employee’s principal place of residence and will not cover summer cottages, commercial real estate holdings or other secondary properties.

52.2 Minimum Moving Distance

52.2.1 Normally, an employee must move a minimum of 40 road kilometers closer to the new work location to qualify for relocation assistance. Distances on which calculations will be made are land distances by the most direct route. However, where an employee believes that this requirement creates a hardship, a joint Society-Management review at the Divisional or Business Unit level of the receiving unit shall consider the individual situation. This review shall consider the following criteria:

- increase in commuting time;
- increase in commuting cost;
- access to public transit;
- personal family considerations;
- recognition that OPG is not responsible for upgrading the individual's standard of living;
- permanence of move to the new work location;
- comparability of eligibility in comparison to treatment of Society-represented employees in similar circumstances.

The review team will balance the results of this review with the business requirements of the unit and may decide to waive or amend the minimum distance rule. The decision of the review team is final and binding. If the review team is unable to reach consensus, the matter will be referred to the JSMC which will have the authority to make a decision or to have the issue resolved as they see fit without prejudice.

52.3 Expenses for Reimbursement

52.3.1 Household Effects

OPG will arrange for and shall pay the cost of packing, moving by freight or truck and insurance charges on household effects.

52.3.2 Home Buying and Legal Fees

Employees shall be reimbursed for legal disbursements and real estate brokerage fees associated with the purchase and/or sale of property valued up to five times the employee's annual base salary in the new location at the time of job transfer as follows:
Legal Fees

- The employee will advise OPG of his/her preferred lawyer. OPG will request the lawyer for an estimate on what the fees will be to complete the sale and/or purchase transaction. If OPG finds the solicitor’s estimate to be unreasonable, OPG will ask the employee to recommend another solicitor to close the transaction.

- Legal fees and disbursements actually incurred in selling an old and buying a new residence will be paid by OPG.

- Legal fees shall be defined to include fees for arranging or discharging a first mortgage when required and will include land transfer tax.

- Disbursements shall be defined herein as those items paid by a lawyer on behalf of the employee for services in connection with the purchase or sale of the employee’s residence including land transfer tax and land surveys when required, Ontario New Home Warranty Program if required for a new house, GST, and penalty costs to a maximum of three months’ interest payments involved in discharging a first mortgage on the residence in the former location when required.

52.3.3 Transfer Expenses

A transferred employee is expected to make arrangements to move expeditiously but this should not exceed a period of one year from date of transfer, except where there is a specific agreement between the employee and local management for an extension. The employee must provide in writing his/her intention to move to the supervisor, prior to receiving payment for any applicable living expenses. Reimbursement for actual costs incurred in the move will be allowed as follows:

- All employees who are eligible for moving expenses shall be afforded 12 weeks from the date the employee reports to work in the new location (i.e., date of transfer) to decide whether or not they wish to move. Payment of the following expenses is predicated on the employee maintaining his/her previous principal residence:
  
a) During this 12 week period, the employee shall have the option of either commuting to and from his/her new work location and receiving incremental travel expenses (i.e., additional travel costs beyond the employee’s normal travel costs to the old work location) or being paid living
expenses in the new location. If the employee chooses to receive travel expenses the employee must travel farther than their previous commute and will receive the mileage to the new work location minus the mileage to the old work location, the total cost of which not to exceed living expense equivalent. If the employee expressly indicates that he/she does not intend to relocate his/her residence, all expenses will cease at that time.

b) All expenses will stop at the end of the 12 week decision period unless the employee has provided in writing his/her intention to move within one year of date of transfer. Providing that the employee demonstrates to Management’s satisfaction that arrangements to move with employee's family to the new location are being made as quickly as possible, the employee’s living expenses in the new location or incremental travel expenses will be paid until such time as the employee moves or for a period not to exceed a further nine months. The time limits mentioned above may be extended by a specific mutual agreement between the employee and line management for a total period not to exceed two years from the date of transfer.

c) If an employee, after providing written notification of his/her intention to move fails to do so, all expenses paid on his/her behalf or travel expenses paid to him/her for any period beyond the initial 12 weeks from the date of transfer or the date of his/her written intent to move, whichever comes first, shall be repayable to OPG. Repayment shall be made within one month of a written communication stating his/her intention not to move or within one year of date of transfer whichever comes first.

d) Exceptions to the repayment requirement should the employee fail to move may be made by reasonable exercise of the Business Leader's discretion (e.g., for reasons of significant unforeseen life hardships, OPG transfers, OPG international assignments, etc.).

e) Employees shall be entitled to only one move per household per redeployment or transfer.

- Transportation to the new location and living expenses while in transit to the new location will be paid for the employee and family (spouse and dependent children) and any other dependents of the employee's household. A reasonable number of visits by the employee and family, to the new
location to assist in the selection of a new principal residence will be paid at the discretion of local Management.

- Living expenses of the employee and family during the period while household effects are in transit will be paid.
- Reasonable upkeep costs including mortgage interest on the old residence will be paid for a period of up to three months after the employee has moved to the new residence but still retains title to the old residence due to an inability to sell. If closure of the sale is imminent, the period may be extended by up to six weeks.
- Time off with pay to a maximum of one day’s base earnings if the day of the move falls on a normally scheduled working day.
- Employees may elect, subject to the negotiations of their availability, through a LOU to receive lump sum payments in lieu of the following:
  - temporary living expenses;
  - reimbursement for costs associated with return to residence headquarters;
  - benefits and expenses associated with house hunting trips;
  - temporary storage, etc.

52.3.4 Spousal Assistance

An employee will be reimbursed for his/her spouse’s job search expenses, supported by receipts, up to a maximum of $750.

52.3.5 Rental Assistance

An employee who transfers to a higher cost rental area and who rents comparable rental accommodation will be provided with rental assistance by OPG as follows. The extent of this assistance will be the lesser of:

a) the monthly rent in the old location multiplied by OPG rental differential;

or

b) the amount of the monthly increase in rent.
An employee who rents in the former location and purchases in the new location will be eligible for the equivalent of rental assistance as will the employee who conversely owns a home in the former location and rents in the new location.

Rental assistance will be provided for a five year period, based on 100% assistance in the first year and decreasing by 10% annually over the next four years.

This assistance will cease if the employee transfers to a new work location, terminates his/her employment with OPG, ceases to rent, retires or dies.

52.3.6 Rental Management Program

Upon request, OPG will arrange for a rental management firm to rent an employee's house when he/she is expected to return within five years and will pay the costs associated with this arrangement if it is in OPG's financial interests to do so.

52.3.7 Miscellaneous Expenses

Employees will be reimbursed for miscellaneous expenses associated with the move up to the limit of one month's salary based on normal scheduled hours of work. These expenditures are intended to cover items such as:

- cost of rental search assistance;
- costs incurred as a result of the move such as, cleaning, painting and decorating costs; adaptation, removal, installation or replacement of house furnishings and appliances;
- costs for connecting water, natural gas, and electricity to a new house if charged to the employee as purchaser.

Employees will not be reimbursed for capital expenditures which tend to increase the market value of a house, major house repairs or renovations.

52.4 Second Related Move

If a suitable residence is not available at time of transfer, an employee may rent temporary premises for up to one year. Under these circumstances, OPG will reimburse the employee for costs incurred in accordance with all Sections of this Agreement for either one of the two moves. For the other move, only costs of transportation, moving household effects, and legal fees incurred will be paid.
52.5 On Retirement

52.5.1 If OPG requires an employee who occupies a house or trailer on OPG property or a site under OPG control to move on retirement, the employee will be reimbursed as outlined in Section 52.3 for the cost of a move to any location in Ontario in which he/she desires to settle.

52.5.2 If an employee is requested to undertake a change in work headquarters involving a change in principal residence, and is age 55 or older on the date of transfer, consideration shall be given to the reimbursement of some or all of the moving expenses of that individual upon eventual retirement from OPG. The extent and terms of the assistance to be provided upon retirement will be determined at the time of transfer.

52.5.3 Only moving expenses within the Province of Ontario or to the nearest exit point from the Province will be eligible for consideration.

53 Financial Assistance Plan

OPG shall contribute towards the interest costs on the increase in capital expenditure for an employee who is transferred to a higher cost housing area. Eligibility for this assistance will be determined by using either:

a) the current Ontario Residential Locality Differential Chart (see attached chart for provisions in effect as of January 2013; OR

b) if either the employee's former location or his/her new location is not on this chart, a house-for-house comparison conducted by OPG.

The amount of assistance will depend upon the:

- sale price of the residence in the former location;
- relative value of comparable housing in the new location;
- actual increase in housing costs (purchase price less sale price);
- current interest costs.
107

Filed: 2016-10-26
EB-2016-0152
Exhibit L
Tab 6.6
Schedule 1 Staff-144
Attachment 2
Page 109 of 371


The locality differential will be based on the differential in effect as of the date of closing of the purchase of the residence in the new location. The interest rate used to calculate the level of assistance will be based on OPG's employee housing loan rate for a five year term as published by the Treasury Division (or the actual mortgage rate, whichever is less) as of the date of closing of the purchase of the residence in the new location.

The financial assistance will decrease annually in twenty (20) percent increments over a five year period.

An employee receiving financial assistance must advise OPG if he/she sells or rents his/her house in the new location within five years of purchase. Assistance provided to the employee will be reviewed and revised accordingly.

Financial Assistance ceases upon termination or retirement. However, should an employee die while receiving financial assistance associated with relocation, such assistance may continue as per the original entitlement based on a case-by-case review by the Business Unit providing the following condition is met:

- the designated beneficiary provides affidavits on an annual basis that the principal residence for which the assistance is paid continues to be his/her principal residence and that no new revenues for renting any portion of the residence are being received.

### 54 House Evaluation and Guarantee Plan

Upon subsequent transfer within OPG, an employee will be guaranteed his/her purchase price up to a maximum of four times his/her base salary at the time of the initial transfer (plus $1,500 for capital improvements on new homes, $15,000 for resale homes or minus $3,000 for damages to the property). This guarantee will be for a period of ten years from the date of purchase. Improvements must be verified by receipts and do not include normal painting, decorating and maintenance costs. An employee may not sell his/her house for less than the guaranteed amount without the consent of OPG.

### 55 Compensation When Assigned to Temporary Work Headquarters

#### 55.1 Intent

a) When there is an assignment to a Temporary Work Headquarters, the employee and his/her supervisor must have a mutual understanding of the terms of the assignment prior to its commencement using the following provisions.

b) Employees assigned to a Temporary Work Headquarters should not be separated from their families for exceptionally long periods of time due
to work requirements and should be compensated for all reasonable out-of-pocket expenses and travel costs.

c) When an employee is assigned to a Temporary Work Headquarters, the employee will normally remain at the Temporary Work Headquarters. If there is mutual agreement between the supervisor and employee to commute daily, then the employee may do so.

d) Employees will be reimbursed for all reasonable out-of-pocket expenses associated with being assigned to the Temporary Work Headquarters.

e) Employees will be reimbursed for any additional travel costs beyond their normal travel costs to their Regular Work Headquarters.

f) Travel time on the first trip to, and on the last trip from, the Temporary Work Headquarters shall be either during normal scheduled hours or compensated in accordance with Article 58 (Travel Time) if outside normal scheduled hours.

g) Selections for Temporary Work Headquarters assignments should not be made on the basis of travel cost considerations.

55.2 Definitions

"Regular Work Headquarters": The location to which the employee normally reports in order to receive work assignments or to perform regular duties.

"Temporary Work Headquarters": The location to which an employee is directed in order to carry out assigned duties away from Regular Work Headquarters.

"Periodic Return": The return to the employee's principal residence once every two weeks.

55.3 Compensation When Remaining at Temporary Work Headquarters (TWHQ)

a) When the employee resides at the TWHQ and does not commute, the employee shall be reimbursed for all reasonable out-of-pocket expenses incurred while at the TWHQ.

b) An employee who resides at the TWHQ will be allowed a periodic return once every two weeks.

The employee shall be reimbursed for travel costs associated with the periodic return for the distance between his/her principal residence and his/her TWHQ, less normal travelling costs. Travel time associated
with periodic return, outside normal scheduled hours and in excess of one hour each way, shall also be compensated. Compensation will be either in equivalent time off, or in pay, at straight time rates. Time spent in obtaining a meal will not be compensated.

c) On intermediate weekends, if the cost of remaining at the TWHQ would be less than the cost of a return trip, the employee may claim actual travel costs up to the cost of remaining at the TWHQ. If the cost of remaining at the TWHQ is greater than the cost of a return trip, the employee may be reimbursed for all travel costs incurred for a return trip on that weekend.

d) For employees who reside in rental or leased accommodation at the TWHQ, cost of travel on intermediate weekends will be based on the lesser of a per diem rate based on the daily costs of normally used local hotel/motel accommodation (meals included) or actual travel costs (less normal travelling costs).

e) Travel time will not be paid for return trips to home on intermediate weekends.

55.4 If the temporary assignment appears to cause the employee to reside separately from his/her family for a long duration, and for long distances, i.e., more than 100 kilometers, the supervisor may permit the employee to rent accommodation for his/her family near the TWHQ. In this situation, the employee will be reimbursed for all reasonable out-of-pocket costs, including the difference in rent paid out in the temporary location and any rent received from the principal residence.

55.5 Compensation for Daily Commuting To, and From, Temporary Work Headquarters

a) When an employee and supervisor have mutually agreed that the employee may commute to the TWHQ on a daily basis, the employee shall be compensated for his/her travel time in accordance with the provisions of Article 58 ("Travel Time").

   The use of an OPG vehicle will be one of the commuting options considered.

   If an OPG vehicle is not used, the employee shall be compensated for his/her travel costs (i.e., public transportation costs or cents per kilometer, whichever, in the Supervisor's opinion, is the most reasonable considering the travel time and transportation expenses involved) in addition to his/her travel time.

   The total amount of reimbursement for the employee's travel time and travel costs will be up to a maximum of the expenses that would have been incurred if the employee were to remain at the Temporary Work
Headquarters (lodging and meals). In determining this maximum, consideration will also be given to the expenses that would have been incurred if the employee had used an OPG vehicle.

b) When an employee commutes daily, he/she is required to be at the Temporary Work Headquarters at normal starting time and remain until normal quitting time.

Note: Where the planned duration of the assignment at a Temporary Work Headquarters is greater than one year, the employee will be eligible for full relocation assistance.

55.6 Exception

This Article does not apply to employees who on a daily or short-term basis may be required to work at a number of different work headquarters. In these cases, local management will determine the appropriate compensation treatment, but such compensation will not be less than that applicable to other employees under this Article.
PART XII - TIME WORKED OUTSIDE NORMAL HOURS

56 On-Call Service

The following on-call service provisions shall apply.

56.1 Definition

On-call service is the requirement to be available outside normal work hours to meet unusual conditions, satisfy needs for assistance or direction, and return to work within a reasonable time, as specified by the supervisor. During the period of assignment, the employee must be capable of responding. Normally, employees are not expected to be on call for a continuous, long-term period. Wherever possible volunteers will be solicited for on-call assignments.

Normally, an employee will not be expected to be on-call for more than 18 weeks in a calendar year. In the event that the employee is required to be on-call for more than 18 weeks, agreement of The Society and the employee is required.

56.2 Payment

56.2.1 Compensation for on-call service is applicable in the following cases:

a) There is a regular need for it (e.g. weekly, monthly, annually) and;

b) The supervisor formally notifies the employee of the on-call assignment in writing (email, memo, etc.).

If the employee is not notified of the assignment in writing, the employee will not be considered to be on-call.

56.2.2 The on-call service payment for any 16-hour period outside normal work hours twenty one dollars and fifty six cents ($21.56).

56.2.3 The on-call service payment for any 24-hour period outside normal work hours (i.e., Saturday, Sundays, Statutory Holidays and granted days) thirty seven dollars and thirty eight cents ($37.38).

56.2.4 The maximum on-call service payment for a normal work week is one hundred and eighty two dollars and fifty cents ($182.50).

56.2.5 The on-call service payments specified above will apply only to the time periods as specified.
56.2.6 Where an employee (whether on-call or not) received an approved call while not at work the employee shall be paid at the appropriate overtime rate for all work performed prior to his or her next scheduled shift, save and except where the total of all work performed in such period is one-half hour or less, the employee shall receive a fixed amount of $35.00 for such work.

57 Overtime

The following provisions shall apply to employees when assigned to work overtime.

57.1 The method of compensation, for authorized overtime, may be money or time off at the appropriate premium rate. If the employee elects for time off, the time for such time off will be subject to their supervisor’s approval, which will be granted unless OPG’s operational needs are such as to make the time off unreasonably difficult. If approval is not granted, the method of compensation will be money.

57.2 Day Workers

<table>
<thead>
<tr>
<th>Overtime Worked</th>
<th>Overtime Hours</th>
<th>Rate of Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday to Friday</td>
<td>Authorized overtime beyond normal scheduled hours worked in the day</td>
<td>Time and one half (T-1/2)</td>
</tr>
<tr>
<td>Saturday</td>
<td>Authorized overtime</td>
<td>Time and one-half (T-1/2)</td>
</tr>
<tr>
<td>Sunday</td>
<td>Authorized overtime</td>
<td>Two times (2T)</td>
</tr>
<tr>
<td>Granted Days</td>
<td>Authorized overtime</td>
<td>Time and one-half (T-1/2)</td>
</tr>
<tr>
<td>Statutory Holiday</td>
<td>Authorized overtime</td>
<td>Monday to Friday: Two times (2T) for all unscheduled hours plus a Statutory Holiday credit. Saturday: Two times (2T) for all unscheduled hours worked.</td>
</tr>
</tbody>
</table>
### 57.3 Shift Workers

<table>
<thead>
<tr>
<th>Overtime Worked</th>
<th>Overtime Hours</th>
<th>Rate of Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scheduled Work Days</strong></td>
<td>Authorized overtime beyond normal scheduled hours worked in the day.</td>
<td>Monday to Saturday: Time and one half (T-1/2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sundays and Statutory Holidays: Two times (2T)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Granted Days: Time and one half (T-1/2).</td>
</tr>
<tr>
<td><strong>Scheduled Days Off</strong></td>
<td>Authorized overtime on a normally scheduled day off.</td>
<td>Monday to Saturday: Time and one-half (T-1/2).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sunday: Two times (2T).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Statutory Holidays (Monday to Friday): Two times (2T) plus a Statutory Holiday credit for hours worked up to normal hours for the day.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Statutory Holiday (Saturday): Two times (2T).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Granted Days: Time and one-half (T-1/2)</td>
</tr>
</tbody>
</table>

- **57.4** For OSS and TMS/TS staff required to work overtime and supervise staff receiving a higher overtime rate than that paid under Sections 57.2 and 57.3 above, the treatment shall be as follows: OSS and TMS/TS staff receive two times their base hourly rate for all work, as described above, performed outside the first four clock hours after normal quitting time, Monday to Friday, and for all such work performed on Saturday.

- **57.5 a)** In addition to employees covered under Subsection 57.4, employees who are directly involved in the operation, maintenance or construction of production, transmission or distribution facilities (exclusive of head office staff) and who directly supervise or work beside PWU employees will be compensated with the equivalent to PWU overtime premiums for all overtime worked, including the minimum payments received by PWU staff for both emergency and scheduled overtime. Employees work beside PWU employees if, as a regular part of their job, they are required to work with PWU staff on essentially the same job, under the same general conditions, and their presence at site for the overtime in question is necessary for task progress.
Employees may be designated as eligible under the above on an ongoing basis or on an assignment by assignment basis at the discretion of OPG.

57.6 Recording Overtime

Management shall record assigned and paid overtime and will report the same to The Society every 6 months.

57.7 Where management directs an employee to attend a training course, he/she will receive overtime payment for all hours spent in training beyond his/her standard hours of work. Management agreement to an employee request for training does not constitute a management direction to attend.

58 Travel Time

The following provisions shall apply to employees who are required to travel on business for OPG.

58.1 General

Some travelling time outside of normal hours of work to and from work locations, other than the regular work headquarters, is an inherent part of many jobs, for which no additional compensation is normally made.

58.2 Excessive Travel

a) Travel Time in excess of one hour at the beginning and one hour at the end of the normally scheduled day will be compensated at straight time.

b) When an assignment requires departure from the employee’s home the night before, or on a regular day off, time spent in travel will be compensated at straight time.

58.3 Emergency Overtime Work

Non-Pretaarranged Overtime Work: Travel time will be paid at the appropriate overtime rates for any work outside and in addition to normally scheduled hours for which there has been no pre-arrangement and an extra trip is required. Notification for prearranged overtime must be given at least 24 hours in advance of the start of such work.

58.4 Attendance at Seminars, Conventions, Etc.

a) When an employee attends a convention, seminar, training course, or similar function and does not arrive at the destination or depart from it until after normal work hours, no additional time allowance will be paid,
i.e., this travel time will be considered as part of the employee's contribution to attendance at a mutually benefiting function of this nature.

b) Where OPG directs an employee to take a training course, travel time will be compensated in accordance with Article 58.2.

58.5 Flexibility

Variations to the provisions of this Article made by agreement between the supervisor and the employee are permitted, subject to Director approval.

59 Shift Work (M&P, TMS/TS)

59.1 Definitions

*Shift:* All scheduled hours of a shift are considered to occur in the calendar day that the shift ends.

*Scheduled Work:* The hours of work assigned as per the shift schedule. Scheduled work cannot include overtime.

Regular Shift Schedule: A 12 month time balanced rotating shift schedule that covers the fiscal year ending on the last day of the fiscal month of December and posted as part of the station’s Master shift schedule 30 days prior to commencement.

*Positive/Negative Time Balances:* Total hours accumulated in a time bank less the product of the normal scheduled hours of work for the position times the number of weeks since the time bank was previously balanced to zero. The result may be positive or negative.

Periodic Shifts – are shifts for non-shift workers who are assigned to shift for a limited amount of time. The shift schedule can be either a time balanced or non-time balanced shift schedule.

59.2 Shift Workers

Meaningful consultation with the Society will occur prior to the implementation of any new shift schedule.

An employee’s base hours of Work will not be changed as a result of this Article.

Some jobs are shift work jobs e.g. Shift Operating Supervisors. Management reserves the right to put incumbents in these jobs on shift.
The job evaluation plan used to evaluate M&P jobs will be used as the vehicle to determine the relative worth of M&P shift positions within the shift family of jobs, and to establish appropriate relativity between positions in this family and other non-shift M&P positions.

The requirement to obtain and maintain a license(s) to hold a shift position shall be identified in the job document (description and specification).

The number of personnel provided per shift position shall be such that no regularly scheduled overtime will be required. Due to the nature of OPG's operations, it may be necessary for employees on shift to work some overtime.

Management shall retain the right to place employees in shift positions for training and development purposes provided that the implications of possible classification changes on completion of the shift development phase are fully identified to the incumbent before the shift position is accepted.

Management shall provide an opportunity for input from employees prior to establishing shift schedules.

Management will provide a minimum of seven (7) days' notice for shift workers and non-shift workers working on shift, when their hours of work, as shown on their shift schedule, are to be changed. Failure to provide appropriate notice will require payment at the appropriate overtime rate for all hours worked during the notice period.

In the case of a forced unit outage or for reasons of equipment failure or safety, employees can be shift changed effective immediately and overtime rates apply for all hours worked during the first three (3) days.

Where a PWU represented employee working on shift receives "Penalty" payment for insufficient notice of a shift change, their direct shift supervisor will be entitled to the equivalent "Penalty" treatment. For clarity, where both the Society represented shift supervisor and the PWU represented crew member(s) have received insufficient notice of the shift change, the Society represented shift supervisor shall receive the equivalent premium rates as the PWU represented employee for work performed on shift until the notice has expired.

Written notification, such as email, shall be provided. In situations where the employee is absent from their regular work location, verbal notice shall be given and will be followed by written notice.

Management will use reasonable efforts in revising the regular schedule so as to provide the following minimum hours off between shifts:
a) Shift change notices between 12-hour shifts will provide at least 12 hours off.

b) Shift change notices from a 12 hour shift to an eight hour shift will provide at least 12 hours off.

c) Shift change notices from an eight hour shift to a 12 hour shift will provide at least 15 hours off.

d) Shift change notices between eight hour shifts will provide at least 15 hours off.

59.3 Shift Allowances (M&P, TMS/TS)

When employees work overtime on Saturdays, Sundays or Statutory holidays, they shall not be entitled to receive shift premiums (as found in Article 59.3 (a), 59.5 (c), 60.4, 61.3 and any other applicable sections). For clarity, this clause is only applicable to shift premiums.

a) Shift Premiums

- Shift work on Saturdays and Sundays shall be as follows per hour worked:
  - In 2013: $29.09
  - January 1, 2014: $29.60
  - January 1, 2015: $30.12

- Shift work on statutory holidays shall be as follows per hour worked:
  - In 2013: $58.15
  - January 1, 2014: $59.17
  - January 1, 2015: $60.21

The statutory holiday shift premium shall be paid on an actual hourly-as-worked basis.

Beyond December 31, 2015 the Shift Premium Rates above are subject to change based on the same general base wage increases that are applied to the wage schedules.

b) Shift Differentials

- For work on an 8-hour afternoon shift (16:00 – 24:00 hours) - 80¢ per hour worked

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For work on an 8-hour night shift (00:00 – 08:00 hours) - $1.10 per hour worked

For work on a 12-hour night shift only $1.25 per hour worked.

For work on a 10 hour night shift only - 80¢ per hour worked

Twelve (12) hour shift workers will receive shift differential payments when working overtime hours between the hours of 18:00 and 06:00 as per the following:

- The 8-hour afternoon shift differential will be paid for overtime hours worked during the hours 18:00-24:00; or
- The 8-hour night shift differential will be paid for overtime hours worked during the hours of 00:00-06:00; or
- The 12-hour shift differential will be paid for any overtime shift (this does not include extension overtime) that runs greater than 10 hours and spans over midnight

All other shift and non-shift workers will receive shift differential payments when working overtime hours between the hours of 16:00 and 08:00 as per the following:

- The 8-hour afternoon shift differential will be paid for overtime hours worked during the hours 18:00-24:00; or
- The 8-hour night shift differential will be paid for overtime hours worked during the hours of 00:00-08:00; or
- The 12-hour shift differential will be paid for any overtime shift (this does not include extension overtime) that runs greater than 10 hours and spans over midnight

59.4 Information Management Systems Division (M&P)

In the Information Management Systems Division (IMSD) where the shift allowance payable to an M&P Shift Supervisor does not amount to at least 112% of the shift-related payments received by the PWU-represented staff working the same shifts, an annual adjustment will be made to the shift allowance for the M&P Shift Supervisor.

Until OPG is able to solve the relativity problem in IMSD, M&P shift supervisors shall receive an annual adjustment which would result in a 12% differential between their shift allowance and the shift-related payments received by the PWU-represented staff working the same shifts. Where a 12% differential exists, no annual adjustment will be made.

Employees in IMSD who either start or leave an M&P shift position during the year will receive a monthly pro-rated allowance. One-half month's tenure is necessary for receipt of the allowance for that month.
Ten Hour Shifts

OPG may assign employees covered by this Article to 10 hour shifts, without a vote, with the exception of employees subject to the Letter of Understanding (LOU#14) re “Hours of Work for Field Management and Professional (FM&P) Staff” dated July 2, 1996.

The following conditions shall apply:

a) Notice

Management will use reasonable efforts in revising the regular schedule so as to provide the following minimum hours off between shifts:

i) Shift change notices between 10 hour shifts will provide at least 12 hours off.

ii) Shift change notices between a 10 hour shift to a 12 hour shift or vice versa, will provide at least 12 hours off.

iii) Shift changes notices from a 10 hour shift to an 8 hour shift or vice versa will provide at least 15 hours off.

b) Shift Differential

- First shift – 06:00 – 18:00 hours - no shift differential
- Second shift – 14:00 – 02:00 hours - $0.80 differential per hour worked

c) Shift Premium

- Shift work on Saturdays and Sundays shall be as follows per hour worked:
  - In 2013: $29.09
  - January 1, 2014: $29.60
  - January 1, 2015: $30.12

- Shift work on statutory holidays shall be as follows per hour worked:
  - In 2013: $58.15
  - January 1, 2014: $59.17
  - January 1, 2015: $60.12

The statutory holiday shift premium shall be paid on an actual hourly-as-worked basis.
Beyond December 31, 2015, the Shift Premium Rates above are subject to change based on the same general base wage increases that are applied to the wage schedules.

d) Special Circumstances

Collective Agreement provisions for time off shall apply except as modified for the following Special Circumstances:

On 10 hour day/shifts the following items will be credited for pay purposes on an hour-for-hour basis:

i) Vacation
ii) Floating Holidays
iii) Sick Leave
iv) Leave of Absence/Unpaid Time Off
v) Travel Time
vi) Medical and Dental Consultation - Periods of less than four hours shall not be deducted from sick leave credits.

a) In the application of the above-noted items (i) (ii) and (iii), a "days" entitlement will mean eight hours, i.e. a 10-hour day/shift will constitute one day and two hours deducted from credits.

b) When an employee is scheduled to work a 10-hour day/shift and one of the under-noted conditions occurs, a "day" will be considered to be 10 hours.

i) Jury duty and attendance at court
ii) Funerals
iii) Moving Day
iv) Time Charges for Attendance at Delegates’ Council and meetings of The Society’s Board of Directors.

59.6 Periodic Shifts for Non-Shift Workers

a) Periodic shifts for non-shift employees shall be allowed to mirror shifts created under PWU "periodic shift" agreements in force January 01, 2005, when The Society employee(s) provides direct supervision or technical support (including inspection/testing) alongside such PWU-represented employees for:

i) field settings
ii) laboratory settings.

b) In the circumstances described in paragraph 1, above, an employee shall be assigned to periodic shifts for a maximum of 13 weeks for
each calendar year under applicable shift provisions of the Collective Agreement including normal shift differentials and premiums.

The exception to the above is the I&M Technician Supervisors who may be required to work on shift for up to 8 months of the year.

c) Shift assignment shall be in accordance with Article 59.7.

d) This Article does not alter existing local Agreements in force at the time of settlement, including Agreements reached pursuant to Article 72, and modifications of the provisions of paragraphs a) and b) are negotiable as Letters of Understanding.

e) The JSMC may review the application and operation of this Article prior to the end of the Collective Agreement.

59.7 Assignment to Shift – Non-Shift Workers

OPG may assign non-shift workers to shift, for station support and special projects, on the following basis:

a) Qualified volunteers will be sought, if insufficient volunteers are available, qualified employees will be assigned. Non time balanced shift schedules shall be staffed by volunteers only.

b) Seven days notice, prior to the commencement of shift will be provided – failure to provide notice requires the payment of overtime premiums for all work outside of the normally scheduled hours, until such time as the notice period has elapsed.

c) Shift work not to exceed 13 weeks for each calendar year. Any shift work beyond the periods indicated above is voluntary.

d) Employees will be paid per the appropriate shift provisions in this article.

e) Any concerns that arise from the transition and adjustment to shift work will be discussed by management and The Society.

59.8 Time Balancing

Save and except for employees covered by LOU #183, a time bank will be established for each employee to record the total number of scheduled hours worked plus scheduled hours paid for vacation, sick leave, time off in lieu or other approved paid time off. Where there is a positive time balance at the end of a periodic shift schedule for an employee, on an M & P pay schedule, management will endeavour to time balance within sixty (60) days.
If at the end of the 60 day period, mentioned above, a positive time balance remains it shall be reduced to zero as follows:

The employee may elect:

i) payment at time and a half for 50% of the hours and double-time for the remainder;

or

ii) time off at straight time.

Negative time balances existing at the end of the shift schedule, or caused by interruption or cancellation, will be written off.

Overtime hours are not counted in the time bank.

60 Shift Work (FM&P)

60.1 Intent

- Assignment of FM&P staff to shift will normally be on a voluntary basis. However, in the absence of any qualified volunteers, OPG reserves the right to appoint specific individuals to perform the work.

- An employee who has volunteered may opt out of a shift arrangement by giving one month's written notice, subject to the above.

- Except in an emergency situation, at least seven days' notice will be given with respect to shift change notices.

- OPG will propose shift arrangements and seek The Society's input on proposed shift arrangements.

- A minimum period for a shift is four days.

- OPG reserves the right to terminate specific shift arrangements by giving one month's written notice.

60.2 Definitions (See Article 59)
60.3 Shift Differentials

Scheduled hours worked in shifts commencing during the following hours shall have the following shift differential apply:

a) two- or three-shift coverage of eight hours or less:

<table>
<thead>
<tr>
<th>Time</th>
<th>Differential</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>07:00 - 10:00</td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>18:00 - 07:00</td>
<td></td>
<td>$10.78/Hr</td>
<td>$10.97/Hr</td>
<td>$11.16/Hr</td>
</tr>
</tbody>
</table>

b) two-shift coverage of greater than eight hours:

<table>
<thead>
<tr>
<th>Time</th>
<th>Differential</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
</tr>
<tr>
<td>10:00 - 06:00</td>
<td></td>
<td>$10.78/Hr</td>
<td>$10.97/Hr</td>
<td>$11.16/Hr</td>
</tr>
</tbody>
</table>

Beyond December 31, 2015 the Shift Differential Rates above are subject to change based on the same general base wage increases that are applied to the wage schedules.

60.4 Shift Premiums

Scheduled hours worked on Saturday and Sunday will be paid at an amount equal to the employee's base rate plus the following rate per hour worked:

- In 2013: $26.14
- January 1, 2014: $26.60
- January 1, 2015: $27.07

For scheduled work performed on a statutory holiday, the amount paid equals the employee's base rate plus the following rate per hour worked. An additional day off will be scheduled in lieu of the statutory holiday.

- In 2013: $53.87
- January 1, 2014: $54.81
- January 1, 2015: $55.77
Beyond December 31, 2015 the Shift Premium Rates above are subject to change based on the same general base wage increases that are applied to the wage schedules.

60.5 Overtime

Authorized overtime beyond the normal scheduled shift hours shall be compensated in accordance with the overtime provisions of this Agreement.

60.6 Time Balancing

A time bank will be established for each employee to record the total number of scheduled hours worked plus scheduled hours paid for vacation, sick leave, time off in lieu or other approved paid time off. The time bank will be reduced to zero after the duration of the shift schedule.

For positive time balances the employee may elect:

i) payment at time and a half for 50% of the hours and double-time for the remainder;

or

ii) time off at straight time.

Negative time balances existing at the end of the shift schedule, or caused by interruption or cancellation, will be written off.

Overtime hours are not counted in the time bank.

60.7 Special Circumstances

In the application of the under-noted items a reference under the appropriate provision to "days" entitlement will mean eight hours. For example, a 12-hour shift will constitute one and one-half days deducted from credits. Items (e) and (f) will be credited, for pay purposes, on an hour-for-hour basis.

a) Vacation

b) Floating Holidays

c) Sick Leave

d) Leave of Absence

e) Travelling Time Outside Normal Working Hours

f) Payment for Relief Work
When an employee is scheduled to work shift and one of the following items applies, a "day" will be considered to be one scheduled shift.

a) Legal Hearings
b) Funerals
b) Moving Day

### 61 Compensation and Working Conditions - 12-Hour Shift Schedule

The following provisions apply to employees in any Business Unit who work a 12-hour shift schedule.

#### 61.1 General Provisions

61.1.1 The 12-hour shift schedule will average the regular scheduled hours per week for employees and will indicate the days and hours of work (shift) for each employee. Payment will be determined in accordance with this Article and as outlined elsewhere in Article 59 ("Shift Work (M&P, TMS/TS)").

61.1.2 The implementation of 12-hour shift work will be on the understanding that its application will not result in any appreciable increase in cost to OPG.

61.1.3 OPG or The Society Local Vice-President shall have the right to terminate 12-hour shift work. Written notice must be provided by the Department Manager to The Society Local Vice-President or vice versa.

a) If the notice is two months prior to the end of the current schedule, 12-hour shift work will terminate at the end of the current schedule. Reason(s) for termination will be provided by the respective party.

b) The 12-hour shift schedule may be cancelled immediately by OPG should any of the following be adversely affected: safe operation of plant; health of shift workers; public safety.

Appendix I to this Article provides further information about the 12-hour shift monitoring criteria for OPG.

c) When employees at any Department have exercised the right to opt out of time-balanced 12-hour shift work, no new 12-hour shift work may be introduced for those employees without the mutual agreement of local management and the local Society Unit Director.
61.1.4 All policies and agreements which normally apply to employees will continue to apply unless specifically stated otherwise in this Article.

61.2 Shift Differential

A shift differential of $1.25 per hour worked will be paid to 12-hour shift employees for each night shift hour worked, in accordance with Article 59.3 ("Shift Work (M&P, TMS/TS)").

61.3 Shift Premium

Hourly shift allowances shall be paid to M&P and TMS/TS shift workers, for hours worked as follows:

- Shift work on Saturdays and Sundays shall be as follows per hour worked:
  - In 2013: $29.09
  - January 1, 2014: $29.60
  - January 1, 2015: $30.12

- Shift work on statutory holidays shall be as follows per hour worked:
  - In 2013: $58.15
  - January 1, 2014: $59.17
  - January 1, 2015: $60.12

The statutory holiday shift premium shall be paid on an actual hourly-as-worked basis.

Beyond December 31, 2015 the Shift Premium Rates above are subject to change based on the same general base wage increases that are applied to the wage schedules.

61.4 Overtime

61.4.1 Authorized overtime beyond 12 hours of work on scheduled workdays Monday to Saturday inclusive and all hours worked on scheduled days off Monday to Saturday inclusive shall be compensated in accordance with the overtime provisions of this Agreement.

61.4.2 Authorized overtime beyond 12 hours of work on scheduled workdays which are Sundays or statutory holidays and all hours worked on scheduled days off which are Sundays or statutory holidays shall be compensated in accordance with the overtime provisions of this Agreement.
61.5 On-Call

On-call service payments will not be applied to those employees on the Minimum Availability Requirement (MAR) list (see Section 61.8).

61.6 Special Conditions

61.6.1 The following items will be credited for pay purposes on an hour-for-hour basis:

a) Vacation

b) Floating Holidays

c) Sick Leave

d) Time Off Without Pay

e) Travel Time

f) Medical and Dental Consultations - Periods of less than four hours shall not be deducted from sick leave credits.

61.6.2 In the application of the above-noted items (a), (b) and (c), a reference under the current provisions of this Article to a "day's" entitlement will mean eight hours. Therefore a 12-hour shift will constitute one and one-half days deducted from credits.

61.6.3 When an employee is scheduled to work a 12-hour shift and one of the under-noted conditions occurs, a "day" will be considered to be 12 hours.

a) Jury duty and attendance at court.

b) Funerals.

c) Moving Day.

d) Time Charges for Attendance at Delegates' Council and meetings of The Society's Board of Directors.

61.7 The basic statutory holiday and special time off provisions remain unchanged in that time off and pay entitlements will continue to be calculated on an eight-hour basis.
61.8  Minimum Availability Requirement (MAR) List

61.8.1  In order that a sufficient number of shift employees are on duty to maintain and ensure a continuous operation at any Department utilizing 12-hour shifts, a MAR List will be prepared.

61.8.2  A sufficient number of employees, by job classification and qualifications, will be determined by OPG. Employees will volunteer their willingness to be called in to work in this situation, by placing their name on the MAR List under the day(s) they wish to be called. If there are no volunteers, OPG reserves the right to assign employees to the MAR List. Employees will not be placed on the MAR List who are scheduled to work on an adjoining shift.

61.8.3  An employee on the MAR List agrees to be available during the Required Availability Period (RAP), to report to work to cover short-term absence. The RAP is the period of time commencing two hours prior to each shift change and ending one hour after each shift change.

61.8.4  If an employee whose name is on the MAR List cannot be available for the specified day(s), the employee must arrange for a substitute acceptable to OPG, whose name then would be added to the MAR List.

61.8.5  Volunteering or being assigned to the MAR List for RAP periods does not entitle the person to any compensation, i.e., on-call pay, etc., nor does it guarantee that overtime will result.

61.8.6  In the event that an employee is called to work from the MAR List, he/she will be entitled to overtime premium rates (outlined in Section 61.4) for all hours worked.

61.9  Time-balanced 12-hour shift work will be introduced in an OPG Department when the following conditions are met:

61.9.1  More than fifty percent (50%) of employees who vote in that Department must vote in favour of 12-hour shift work.

61.9.2  More than fifty percent (50%) of all eligible shift workers who vote in that Department must vote in favour of the 12-hour shift work.

61.9.3  The vote will be determined by a secret ballot scrutinized jointly by appointees of OPG and the Local Vice-President of The Society.

61.9.4  Employees eligible to vote are those employees normally assigned to shift and may include Shift Supervisors, Shift Supervisors in Training, Shift Operating Supervisors, Control Room Shift Supervisors, Control Room Shift Operating Supervisors,
61.9.5 Although the content, preparation, costing and administration of shift schedules is the sole responsibility of OPG, the preference of the majority of shift workers in a station/department/plant for a particular basic type of schedule will be considered. Such preferences must be made known to OPG four months in advance of the starting date of the new schedule. Master Schedule Guidelines are attached as Appendix II.

61.9.6 Supernumerary Shifts while working on the 12-hour shift schedule will be 0800 - 1600.

61.9.7 Three supernumeraries can be exchanged for working two 12-hour regular days off. Supernumeraries can be shift changed to shift crews on a 3:2 supers to shift crew basis.

61.9.8 When a regular shift commences before midnight and continues after midnight, all hours during the continuous shift shall, for pay and time balance purposes, be recorded and treated as if they occurred during the calendar day in which the shift ends.

Exception: The statutory holiday shift premium shall be paid on an actual hourly-as-worked basis.

61.9.9 Shift workers with a plus or minus four hours time balance assigned to day work or shift for an indeterminate period of time may be required to take off or work a four-hour period respectively, but no payments, premium or otherwise, will apply to such time worked as an extension of a normal eight-hour day to resolve a minus time balance.

61.9.10 For the day on which an election occurs and up to three days before and after, all employees on a 12-hour schedule will be changed to an eight-hour schedule unless joint agreement is reached to do otherwise.

61.10 Twelve-hour shift work may be introduced in other locations when the following conditions are met:

61.10.1 If local management determines that a 12-hour shift work arrangement is appropriate, a vote will be held in the affected work unit(s).

61.10.2 More than 50% of those eligible to vote in the work unit(s) must vote in favour of 12-hour shift work.
61.10.3 The vote will be determined by a secret ballot scrutinized by the appointees of OPG and The Society.

APPENDIX I

12-Hour Shift Monitoring Criteria

<table>
<thead>
<tr>
<th>Non-Public Safety</th>
<th>OPGI Public Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee Health</td>
<td>Reliable Process Systems</td>
</tr>
<tr>
<td>Employee Safety</td>
<td>Reliable Safety Systems</td>
</tr>
<tr>
<td>Employee Attitude</td>
<td>Multiple Barriers</td>
</tr>
<tr>
<td>Attrition</td>
<td>Competent Operators</td>
</tr>
<tr>
<td>Overtime Availability</td>
<td>Detect and Correct Failures</td>
</tr>
<tr>
<td>Insufficient Notice for Shift Change</td>
<td>Control Zones</td>
</tr>
<tr>
<td>Operating Error</td>
<td>External Training</td>
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<tr>
<td>Productivity</td>
<td>Emergency Plans and Procedures</td>
</tr>
<tr>
<td>Shift Turnover</td>
<td>Competent Staff</td>
</tr>
<tr>
<td>Cost</td>
<td>Detect and Correct Failures</td>
</tr>
</tbody>
</table>

APPENDIX II

Master Schedule Guidelines

1.0 All work groups must follow the same schedule.

2.0 An excessive number of 12-hour shifts cannot be worked in sequence. Three would be the maximum for nights; four would be the maximum for days.
3.0 At least 48 hours off will immediately follow each sequence of shifts. At least two regular days off will be scheduled in each week.

4.0 Time balances should cycle between +36, with an additional +4 hours as an exception.

5.0 Other specific rules in Section 61.9 of the Article should also be noted.

Note:

1. Supernumerary shifts will be worked between the hours of 08:00 and 16:00. These shifts will be spread evenly throughout the year except for July and August. Supernumerary shifts will only be scheduled in July and August if required for outage schedules.

2. For hours actually worked by an individual the following implementation rules apply:

   2.1 Maximum of 3 night shifts in a row, except for MAR list needs.

   2.2 A minimum of 48 hours off per pay period, except for MAR list needs.

62 Shift Turnover

62.1 A shift turnover allowance will be paid to employees who have been authorized to perform shift turnovers, based on the criteria in Sections 62.2 and 62.3 and in compliance with the chart below.

62.2 Only one person will be paid for each shift turnover, either the incoming or the outgoing shift, but not both.

62.3 Rights to overtime are waived in favour of the above allowance when performing normal shift turnovers. The exception to this is in cases where the turnover is 30 minutes or longer due to unusual circumstances. In such cases all time beyond normal working hours will be compensated according to the overtime provisions of this Agreement in place of the allowance.
## Payment Per Shift Turnover

<table>
<thead>
<tr>
<th>Salary Grade</th>
<th>Fossil Stations with Shift Superintendents&lt;sup&gt;9&lt;/sup&gt;</th>
<th>Fossil Stations with Production Supervisor - Shift&lt;sup&gt;10&lt;/sup&gt;</th>
<th>IMSD and Nuclear Stations</th>
</tr>
</thead>
<tbody>
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</tr>
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<td></td>
<td></td>
<td>15.55</td>
</tr>
<tr>
<td>MP2</td>
<td></td>
<td></td>
<td>14.50</td>
</tr>
</tbody>
</table>

### Compensation for Authorization as a Nuclear Shift Supervisor

**63.1** An employee who receives initial authorization to act as a Nuclear Shift Supervisor on or after January 1, 1993 will receive a bonus of $7,000.

**63.2** An employee who was previously authorized to act as a Nuclear Shift Supervisor and who has become re-authorized to act as a Nuclear Shift Supervisor at a different station after January 1, 1993 will receive a bonus of $5,000.

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<sup>9</sup> Thunder Bay, Lennox, Lakeview

<sup>10</sup> Lambton, Nanticoke
PART XIII - WORKING CONDITIONS

64 Employment Continuity

- There are three separate and distinct parts to Article 64:
  1. Part A Redeployment Surplus
  2. Part B Non-Surplus Redeployment of Society Staff
  3. Part C Decontrol/Change of Employer

- In accordance with Article 64.32 Article 64 Part B is applicable in non-surplus situations that necessitate the redeployment of Society represented employees, except as follows:
  - In the Nuclear Unit of Application, where employees who are in an over complement situation at their work headquarters and can be accommodated at another work headquarters that is under complement on the basis of same job classification (i.e. like to like) Article 105.5 will apply;
  - In the Fossil Unit of Application, where there is a “closure” of a Fossil location announced by the government LOU #166 “Coal Plant Closure” will apply.
  - For Surplus redeployment as outlined in Article 64.34 Article 64 Part A is applicable.
  - Notwithstanding the above, in the event where there is decontrol or change of employer the parties agree Article 64 Part C will apply.

Unit of Application

- Where OPG establishes organizational units which do not clearly fit the definitions contained in the unit of application default provisions under Article 64A and/or Article 64B, the matter of the appropriate unit of application will be reviewed by the JSMC. The JSMC will make a decision which ensures that employment continuity rights are fairly applied.

Unit of Application Dispute Resolution Process

- In the event of a change during the term of the Agreement, with respect to a default units of application issue under Article 64A

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11 Clarity Note: For the purposes of this Article, the term “Fossil” refers to what is now known as “Thermal”.
12 Clarity Note: The term “closure” applies to both full and partial station closures (e.g. unit closure or fuel conversion).
and/or Article 64B, that cannot be resolved by the parties, the dispute shall be resolved as follows:

- Where no decision of the JSMC is reached on a proposed change to default units of applications, within 10 working days of the JSMC’s consideration of the matter, the parties shall exchange written briefs.

- The matter will be determined prior to the mix and match by a designated, mutually agreed arbitrator within 10 working days after the briefs have been exchanged.

- The arbitrator shall hear the matter in the most expeditious manner possible, and shall only hear oral evidence where he/she determines that it cannot be determined on the basis of the written briefs and oral submissions. The arbitration decision shall be based on an updated equivalent balance of the Units of Application of this Article as of January 1, 2006.

- The arbitrator shall issue an award within 5 working days of the hearing, setting out the default unit of application.

- The arbitrator has all the powers under the applicable Labour Relations Act.

- The JRPT shall continue to function and develop other elements of its first report pending determination of the default unit of application through this process, and the outcome of this process does not preclude the JRPT from achieving consensus on a unit of application notwithstanding the arbitrator’s award.

- This process does not prejudice or waive any grievance rights under Article 64.3 but the arbitrator’s award on the default unit of application cannot be grieved.

PART A – REDEPLOYMENT SURPLUS

64.1 Scope

This Article will apply to all employees except temporary employees, and takes precedence over other provisions of this Collective Agreement with regard to vacancies and job placements unless otherwise specified. Article 34 “Temporary Employees” describes the entitlements for temporary employees. Employees on leave (e.g. LTD) or on foreign assignments will be neither advantaged nor disadvantaged upon return from the leave.
64.2 Preference for Regular Employees

When a surplus arises, surplus regular employees will be retained, and used for temporary work, in preference to temporary employees if the conditions below are satisfied:

- within the same Unit of Application;
- where the regular employees are qualified to perform the work and are able to perform the job within a reasonable period of time given the length of the assignment;
- where the work is normally performed by Society-represented employees.

64.3 Grievability/Arbitrability

Employees may use the grievance/arbitration procedure to appeal decisions of the joint teams referred to in this Article if they believe they have been treated unfairly. JRPT decisions and processes are grievable. It is expected that the parties will support their decisions and recommendations. This is not intended to prevent the parties from jointly agreeing to change their decisions and recommendations. The recommendations and decisions by other Joint Redeployment Planning Teams and other Joint Reasonable Offer Teams are without prejudice and cannot be used as precedents in grievance arbitration. Any agreements reached by the JSMC within the scope of Article 64 are neither grievable nor arbitrable.

64.4 Preamble and Principles of Operation

It is intended that the parties will make their best efforts to interpret, apply and administer the provisions of this Article to reflect a balance among the principles set out below and throughout this Article.

Employment continuity is an element in sustaining a work climate that supports a high level of employee commitment, performance and job satisfaction. The following principles reflect our underlying values and beliefs and provide the direction on which this Article is founded:

64.4.1 Career change should be expected and viewed positively.

64.4.2 Individuals are responsible for their own career decisions and should be involved in developing options affecting their careers.

64.4.3 OPG and The Society recognize the value of retaining, utilizing and enhancing the asset of employee skills and abilities.
64.4.4 Employment continuity issues will be discussed openly and employees and their representatives should be involved in these discussions as early as possible.

64.4.5 Employees will be provided with access to opportunities for learning and development and will take a proactive role in their development to prepare for the future.

64.4.6 It is in the best interests of both our customers and our employees for OPG to be a viable and healthy business entity with operations province wide.

64.4.7 Employment continuity policies must reflect a balance between the fundamental interests of OPG and its employees.

64.4.8 Employees will be treated fairly and with respect and dignity.

64.4.9 OPG and The Society recognize that there will be competing individual interests and will structure redeployment strategies which will minimize the occurrence of that competition and its negative impact.

64.4.10 A commitment to effective short and long range planning is critical to employment continuity.

64.4.11 For a JRPT to operate effectively and efficiently, it is important that it be provided with a pre-determined organizational structure and adequate/appropriate resourcing.

64.5 Definitions

64.5.1 “ADVERSE IMPACT” shall mean that due to organizational and operational changes that include technological changes, workload changes, and business process re-engineering and all other circumstances where the numbers of Society represented employees are reduced and/or positions with incumbents are either eliminated or significantly changed (e.g. a change to job duties and/or skills/qualifications and/or rate as covered in the job document).

64.5.2 “BASIC SEARCH/NOTICE PERIOD” shall mean a period of not less than 24 weeks during which a surplus employee has "priority consideration" for vacancies.

64.5.3 “BUSINESS UNIT” shall mean the organizational unit under a Vice-President or equivalent.

64.5.4 “CONSSENSUS” shall mean an agreement on a given issue that all parties to the agreement can live with and publicly support.
64.5.5 "DECLARED SURPLUS" shall mean that the employee has insufficient seniority and/or qualifications to be matched to an ongoing position that is deemed to be a reasonable offer in his/her unit of application.

64.5.6 "DIVISION" shall mean an organizational unit which reports to Vice-President.

64.5.7 "EMPLOYMENT CONTINUITY"

For employees in the Nuclear Business Organization shall mean the obligation on OPG’s part to provide opportunities and options to maintain productive and rewarding employment within the Nuclear Business Organization and in the event that such opportunity is not available, to provide fair and reasonable employment adjustment and terms and conditions for departure. It is the obligation on the part of the employee, The Society and OPG to actively participate in the redeployment process.

For employees in the Fossil, Hydroelectric and Corporate Business Organizations shall mean the obligation on OPG’s part to provide opportunities and options to maintain productive and rewarding employment within the combined Non-Nuclear Business Organizations and in the event that such opportunity is not available, to provide fair and reasonable employment adjustment and terms and conditions for departure. It is the obligation on the part of the employee, The Society and OPG to actively participate in the redeployment process.

64.5.8 "Employment Equity", for the purposes of this Article, shall mean if employment equity programs will be seriously set back through the application of this Article, the Joint Redeployment and Planning Team may by consensus agree to protect sufficient lesser service employees in order to prevent such a set back from happening. This provision is not intended to further or enhance employment equity initiatives.

64.5.9 "INCUMBENCY" is a concept that a JRPT may use as a part of its redeployment process. The JRPT may identify an employee as an incumbent only if the position meets the following criteria:

- substantially unchanged duties and responsibilities; and
- unchanged location.

13 The operational meaning as determined by the JRPT.
unchanged hours of work;
unchanged salary band.

64.5.10 "LATERAL POSITION" shall mean a job paid from:

a) the same salary schedule and is the same salary band as the employee’s current grade;

or

b) the same band on a different salary schedule;

or

c) For employees on Salary Schedules 03 or 09:

either Salary Schedule and is the same salary band as the employee’s current salary band

64.5.11 "PRIORITY CONSIDERATION" is provided to surplus employees and shall mean an obligation to select the most suitable candidate from amongst the qualified surplus applicants for advertised vacancies for whom the vacancy represents a lateral or lower-rated position. If there are no qualified surplus applicants Management is then obliged to select the most suitable candidate from amongst those surplus applicants who can become qualified in a reasonable period of time.

64.5.12 "PROMOTION" shall mean a position in which the demands and responsibilities are greater than in the employee’s current job and the position is a minimum of one salary band higher than the employee’s current job if rated on the same salary schedule or the equivalent of one salary band higher if rated on a different salary schedule.

64.5.13 "QUALIFIED" shall mean having the qualifications and experience required to perform the job within a reasonable period of time, normally not expected to exceed six months.

64.5.14 "SENIORITY" shall mean all prior service with Ontario Hydro and OPG or other eligible seniority as per the transition provisions in Section 9.3 of the 2006 – 2010 Collective Agreement regardless of breaks in employment, employee category and/or bargaining unit/representational status. Regular employees who currently work reduced hours or have done so in the past, will have such service calculated as if it were full-time. In the event that a contractor is determined to be dependent, service shall be counted from the date of a declaration of dependent contractor application to the
OLRB or the date of joint agreement between OPG and The Society regarding contractor status.

64.5.15 "SERVICE" for the purpose of calculating severance shall mean the employee's Established Commencement Date (ECD) and does not include any external experience credits. Employees who have received severance pay under this Article shall not be entitled to the service used to calculate previous severance pay in any future employment with OPG.

64.5.16 "SERVICE BASED SEARCH/NOTICE PERIOD" shall mean a search/notice period based on the surplus employee's Service Recognition Date (SRD) plus External Experience Value (EEV), during which a surplus employee has "priority consideration" for vacancies.

64.5.17 "UNIT OF APPLICATION" shall mean the organizational unit (e.g., Department, Division, Business Unit or a cross Nuclear Business Organization grouping or a cross Fossil/Hydroelectric/Corporate grouping) in which seniority and the identification of surplus staff shall be administered.

64.5.18 "VIABILITY OF THE WORK UNIT" shall mean if the ability of the organizational unit to adequately perform its functions is placed in jeopardy by the application of seniority.

64.6 Notification and Involvement of The Society

64.6.1 Principle of Prior Involvement

Prior to making final decisions on significant organizational or operational changes that have an adverse impact on the employment continuity of Society-represented employees, OPG will establish a team in a timely manner which will include representatives appointed by The Society. The team will examine how the organizational or operational change will be implemented and will strive to develop mutually acceptable recommendations in a timely manner for the appropriate level of Management based on this examination. In the event that recommendations are not developed or the recommendations are not accepted, OPG will make the final decision.

64.6.2 Notification

In the event that an OPG business decision has an adverse impact on the employment continuity of Society represented staff, The Society will be notified as soon as possible.
64.6.3 Involvement

The Society will be involved in all decisions respecting how Society represented employees are treated with respect to this Article.

There are three levels of involvement. They are as follows:

a) Joint Consultation

OPG and The Society will discuss the issue and attempt to reach a jointly acceptable course of action.

Failing an agreement, OPG will make the final decision.

b) Joint Recommendation

OPG and The Society will attempt to reach consensus on an issue which will form the basis of a recommendation to senior management.

In the event a consensus is not reached, the issue will be managed in accordance with the negotiated default contained in the relevant provisions this Article.

c) Joint Decision

OPG and The Society are obliged to reach an agreement on the issue.

64.6.4 Voluntary Surplus

In circumstances where Management is aware that job loss may occur, Management in its discretion may agree to a voluntary termination by an employee in the affected work group. In such cases, employees who terminate their employment will be entitled to their own entitlement for search notice and severance, plus an additional week of severance for each completed year of service, to a maximum additional payment of 26 weeks’ pay. The combined total of the employee severance entitlement, plus the additional week under this Article cannot exceed 78 weeks.

64.7 Set Up Joint Redeployment and Planning Team

OPG shall decide the organizational structure required to carry out approved work programs.

OPG and The Society will appoint an equal number of representatives to the Joint Redeployment and Planning Team. This team will develop a redeployment plan which minimizes to the extent possible, the effect on and
number of employees to be declared surplus, consistent with the need to carry out OPG's work and be responsible for overseeing its implementation. The team is also responsible for communications to affected staff. The Joint Redeployment and Planning Team will develop its recommendations/decisions by consensus using problem solving techniques.

Senior Management (e.g., Directors, Vice Presidents) shall meet to discuss with the Joint Redeployment and Planning Team the number and type of positions that will no longer be required.

64.8 Joint Planning - Responsibilities of the JRPT

a) The Joint Redeployment and Planning Team will review its proposed redeployment plan with the Senior Management (e.g. Directors, Vice Presidents) and Society Unit Director(s) in the work unit in at least two stages. The first report will include recommendations/decisions with respect to:

i) The Unit of Application for identification of surplus staff (refer to 64.9)

ii) Development of a process and strategies for redeploying staff within the Unit of Application (refer to 64.10).

b) The second report will include recommendations/decisions with respect to:

i) The preparation of seniority lists and identification of surplus staff (refer to 64.15).

ii) Identification of redeployment tools for the purpose of minimizing involuntary terminations (refer to 64.19).

c) Senior Management (e.g. Directors, Vice Presidents) will be required to:

i) approve each report as a package; or

ii) request the team to reconsider specific issues and to either confirm or agree to change specific recommendations.

d) Failing joint agreement on the team's proposal in full, Senior Management (e.g. Directors, Vice Presidents) will be required to reject the proposal in full and implement a plan based on the defaults in this Article. Differences related to the interpretation, application or administration of the redeployment plan may be submitted to the grievance/arbitration procedure.
e) Continuing Responsibilities of the JRPT

Respond to questions and grievances related to its process and decisions.

f) Local accountabilities for:

i) Minimizing surplus.

ii) Determining an implementation plan for JRPT redeployment recommendations. This responsibility includes identifying clear accountabilities for the use of the redeployment tools.

iii) Testing possible vacancies in the Unit of Application against the surplus employees in the Unit of Application.

iv) Testing rotations in the Unit of Application that are greater than six months against the surplus employees in the Unit of Application.

shall be clearly assigned in the JRPT’s second report.

g) The parties agree to the establishment of the Redeployment Information Service which will manage and coordinate information related to placement opportunities for surplus staff and provide support services to local Society and Management representatives.

h) With respect to the application of 64.28.2, ensure that purchased services contracts are reviewed by OPG throughout the redeployment process.

64.9 Unit of Application

64.9.1 Size of the Unit of Application

In determining the size of the unit for purposes of identifying who is surplus, the parties will be governed by the following:

- The size of the unit will be sufficiently large to provide a fair means for identifying the surplus employee(s).
- The size of the unit will be sufficiently small to minimize the disruption to both the employee and the work to be done.

A joint recommendation will be made in determining the size of the unit of application.

64.9.2 The Unit of Application for Society-represented staff in Nuclear Business Organization will be as follows:
<table>
<thead>
<tr>
<th>Division U of A Default</th>
<th>Business Unit Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pickering (including 700 University and work sites listed in Article 105.1)</td>
<td>Nuclear</td>
</tr>
<tr>
<td>Darlington (including work sites listed in Article 105.2, 105.3 and 105.4)</td>
<td>Nuclear</td>
</tr>
<tr>
<td>Nuclear Waste</td>
<td>Nuclear</td>
</tr>
<tr>
<td>IMS</td>
<td>Nuclear</td>
</tr>
</tbody>
</table>

Where fewer than 10% of Society-represented employees in an OPGI–Nuclear Division are adversely affected, then the default Unit of Application will be the Division.

64.9.3 Default Unit of Application for Fossil, Hydroelectric and Corporate Functions Business Organizations

Should the parties not agree to the size of the unit of application for the identification of surplus, then the unit size will be the Business Unit with this exception:

Where fewer than 10% of Society-represented employees in a Business Unit, and fewer than 20% of The Society-represented employees in the Division are adversely affected, then the default Unit of Application will be the Division.

64.9.4 Unit of Application Beyond the Business Unit

A JRPT may jointly recommend to a Vice-President (or equivalent) that the Unit of Application should be expanded beyond the Business Unit in a surplus situation. If the recommendation is approved, the recommendation will be jointly discussed with the Business Unit(s) into which expansion of the Unit of Application has been recommended. If no jointly agreeable solution is achieved at this stage, the recommendation may be brought by either party to the JSMC for consideration and resolution. If no jointly agreeable resolution is achieved at the JSMC, the issue may be taken by either party to the President of OPG and the President of The Society for final resolution. In appropriate circumstances (e.g., Corporate Functions, Multiple Business Unit JRPTs), matters may be directly referred to the JSMC.

64.9.5 The Unit of Application for Society-represented staff in OPG Fossil and Hydroelectric Business Organizations will be as follows:
The Unit of Application for Society-represented staff in OPG Corporate Business Organization will be as follows:

<table>
<thead>
<tr>
<th>Division U of A Default</th>
<th>Business Unit Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity Production Central Office Staff</td>
<td>Electricity Production</td>
</tr>
<tr>
<td>Fossil</td>
<td></td>
</tr>
<tr>
<td>Hydroelectric</td>
<td></td>
</tr>
</tbody>
</table>

64.9.7 Employees covered by the FM&P Letter of Understanding 14 dated July 2, 1996 will have a Unit of Application that consists of OPG.

64.9.8 All employees will normally be assigned to one and only one unit of application. Exceptions may result from the application of significant inequity rights contained in this Article.

64.10 Process for Staff Changes - Mix and Match

The Joint Redeployment and Planning Team will develop the mix and match procedures to fill positions in the new organizational structure from employees within the Unit of Application. The intent is to sort employees within the Unit of Application among the jobs in the new organization on the basis of qualifications and seniority. In the event there are no qualified employees from the Unit of Application, the positions will be advertised in accordance with Article 65.

JRPTs are expected to keep accurate records of the reasons for deeming employees not qualified. Upon request, the employee will be provided with the written reasons for being deemed not qualified.
64.11 Mix and Match Rules

1) No promotions, i.e., only laterals or demotions are permitted in a mix and match process. (Note: Exceptions are described in 64.11.10 and 64.15).

2) Applies within the affected Unit of Application.

3) The process must be open and participatory and involve individual employees in planning and an agreed-upon form of posting within the Unit of Application.

4) In the event there are more qualified candidates than positions available in the new organization, then the most senior of the qualified candidates will be selected to fill the positions.

5) Employees who accept a lower-rated position or who experience a reduction in hours of work as a direct result of Mix and Match will be entitled to the provisions of 64.25 “Compensation”.

6) Pregnancy Leave and Paid Parental Leave

   The employee should be treated as though he/she is at work.

7) Other Leaves/Absences

   • If the return date is known and it will occur during the Mix and Match (or shortly thereafter), the JRPT should normally include the employee in the Mix and Match.

   • If the employee's anticipated return date is not shortly after the conclusion of the Mix and Match, he/she would not normally be included in the Mix and Match. His/her employment continuity rights would be exercised upon his/her return.

   • Where an employee is not included in the Mix and Match, the JRPT needs to determine whether the position held by that employee prior to the start of the leave/absence will be included in the Mix and Match.

      The JRPT should consider each circumstance on a case-by-case basis, considering such things as the employee’s availability to participate.

64.11.8 Out-of-Province Assignments

   Refer to the Article 6.4 “Employment Continuity during Temporary Out-of-Province Assignments”. 
64.11.9 Temporary Assignments/Rotations

Normally, employees will exercise the redeployment rights applicable to their regular positions. Exceptions:

There will be a local joint review with respect to the duration of an assignment where it is greater than two years and is outside The Society’s jurisdiction.

At the outset of the assignment, the employee will be advised of his/her rights with respect to Employment Continuity as described below:

- For assignments of two years or less, the employee will return to The Society’s jurisdiction for redeployment.
- For any portion of an assignment beyond two years, the employee will remain in the jurisdiction of the assignment position for the purpose of exercising redeployment rights.

Employees whose regular positions are outside of The Society’s jurisdiction but who have been acting in positions within The Society’s jurisdiction for at least two years continuously and who can demonstrate a severe disadvantage by returning to their regular position will be allowed to exercise redeployment rights within The Society’s jurisdiction. These situations will be reviewed on a case-by-case basis by OPG and The Society.

64.11.10 Employees Previously Demoted via Article 64

An employee previously demoted through the application of Article 64, or its predecessors, is eligible for consideration at up to his/her previous higher level during a subsequent Mix and Match subject to the following:

- The subsequent Mix and Match (i.e., upon approval of the first report) must occur within two years of the date that the employee reported to the lower-rated position.
- Displacement of another employee at a level higher than their current level is not permitted.

64.11.11 Progression-in-Place Programs (PIP)

a) Employees in a PIP will be retained in their PIP (should it continue to exist) based on seniority, subject to item (d) below.
b) Employees in non-PIP positions or in other PIPs will be considered for PIP positions subject to the following:

i) for lateral or lower-rated levels of the PIP only;

ii) must be minimally qualified at the entry level of the PIP;

iii) able to achieve the terminal level of the PIP;

iv) placement is based on seniority.

c) Employees in a PIP position will be considered for non-PIP positions for which they are qualified, subject to the following:

i) considered for lateral or lower-rated positions;

ii) placement is based on seniority.

d) OPG may determine a minimum number of employees qualified at the terminal level of the PIP at an appropriate work unit level (e.g., Division, Department, Section).

64.11.12 Participation of Surplus Employees

Surplus employees will participate in any subsequent mix and match process in their appropriate unit of application.

Their search/notice clocks will be stopped at the time the first JRPT report is approved and restarted upon approval of the second JRPT report if the employee is still surplus. An employee will retain priority consideration for any vacancy he/she has applied for prior to stopping of his/her clock.

A surplus employee not placed through a subsequent mix and match will have his/her clock restarted at the point it was stopped.

64.11.13 Vacancy Process

In the application of a mix and match, the JRPT may consider an expedited priority selection to vacancy process at each salary grade/Band level in descending order with the expectation of making additional positions available for the process.
64.11.14 Boundary Issues

The JRPT will identify all X, Y and Z positions in accordance with LOU #5 “Society-Management Function/ESR Boundary Issues”. The JRPT will ensure that positions so identified will be treated in accordance with the procedure outlined in the LOU unless agreed to otherwise by the parties.

64.12 Available Options if Employee Refuses a Job Offer

The Joint Redeployment and Planning Team will decide during the planning process which options will be available to an employee who rejects an offer that is upheld by the Joint Reasonable Offer Team (refer to 64.23) as reasonable. The affected employee must, within 48 hours of being advised of the decision, choose between the option (or options) as made available by the Joint Redeployment and Planning Team. The options are:

a) Accept job offer; or

b) Confirm refusal and terminate with 75% of lump sum payments as per Subsection 64.27.2 (a); or

c) Confirm refusal and be declared surplus with 50% of the normal search/notice period and 50% of the normal severance entitlement.

If there is no Agreement by the Joint Redeployment and Planning Team on the options, then (a) and (b) will be available.

Note: While option (a) is always available, the JRPT may choose to provide option (a) in combination with (b) and/or (c).

Exception: Employees who have been demoted as a result of the direct application of Article 64 and who, in a subsequent mix and match, face a demotion again due to the direct application of Article 64 will be allowed to choose between accepting the demotion or being declared surplus with full entitlements. They will not be required to submit to the JROT process.

64.13 Refusal of an Incumbent Position

Where an employee has been declared to be an incumbent to a position by the JRPT, he/she will not be entitled to file a challenge with the JROT in relation to the incumbent position. If the employee does not accept a match to his/her incumbent position, he/she may be deemed by Management to have voluntarily terminated his/her employment with OPG.
64.14 Pre-Mix and Match Surplus Declarations

Intent

To provide a fair opportunity to retain employment for those employees who are at a substantial risk of being declared surplus within the Unit of Application of those JRPTs yet to conclude their mix and match.

Process

a) Employees who are a part of a Unit of Application that has not yet concluded its mix and match and who wish to apply for corporate vacancies may request that they be granted surplus status subject to the following:

b) Employees will submit their request to be accorded surplus status to their JRPT. The JRPT will only extend surplus status to those employees who are at real risk of being declared surplus or, subject to confirmation by the JROT, at real risk of not receiving a reasonable job offer. The JSMC will be advised of such employees.

c) Employees who are extended surplus status by their JRPT will be provided with a surplus letter as is described in the Employment Continuity provisions.

d) The search notice period of an employee who is extended surplus status will begin upon written receipt of his/her Declared Surplus letter.

e) This surplus status will be automatically removed when the employee is selected to or placed in an ongoing position. Surplus status will also be withdrawn at the employee’s request, if Management withdraws the vacancy notice in which the employee was seeking priority consideration. In such circumstances, the surplus status will be withdrawn from the date it was issued.

f) An employee who is provided with surplus status as described above will be entitled to the same rights as those employees who have been Declared Surplus as a result of a mix and match procedure. Such employees will also be entitled to fully participate in the mix and match process within their own Unit of Application.

g) JRPTs will have the responsibility to monitor and update a list of employees to whom they extended “at risk” surplus status.

64.15 Identification of Surplus Employees

64.15.1 The Joint Redeployment and Planning Team will compare the seniority of employees performing work which requires
substantially the same qualifications and experience. In addition the team will compare the qualifications and experience of displaced employees with the qualifications and experience required by lateral or lower rated positions in the Unit of Application and retain the most senior at that level in descending order. Through this process the Joint Redeployment and Planning Team shall decide by consensus which employees within the Unit of Application have greater seniority and shall be retained to fill the ongoing positions and which employees have least seniority and shall be declared surplus subject to 64.15.7 and 64.15.8 below.

64.15.2 Seniority rights apply to lateral and lower rated positions but are not applicable to higher rated positions. The exception to this can occur where there are essentially no lateral or demotional positions with respect to which an employee can exercise his/her Employment Continuity rights and where the JRPT believes there are reasonable opportunities for promotion. The JRPT will identify the individual employee(s) or categories of employees facing these circumstances and the positions or categories of positions that represent promotional opportunities.

64.15.3 Employees who are not supervisors shall not exercise their seniority and displace supervisory employees with respect to supervisory positions unless they have supervisory qualifications. Employees who are not First Line Managers (FLM) shall not exercise their seniority and displace FLM employees with respect to FLM positions unless they have FLM qualifications.

64.15.4 Employees who are Management and Professional Trainees will not normally have their seniority considered with employees who are not Management and Professional Trainees. The Joint Redeployment and Planning Team may decide on exceptions when employees who are Management and Professional Trainees have greater seniority than entry level employees who are not Management and Professional Trainees and who are on the same band.

For the purposes of Subsection 65.6.3 where the Joint Redeployment and Planning Team has agreed to make exceptions based on the above circumstances, such employees who are Management and Professional Trainees will have priority consideration in the same manner as other Salary Schedule 03 or surplus employees. Where the Joint Redeployment and Planning Team does not accept that the circumstances warrant exceptions, surplus employees who are Management and Professional Trainees will have priority consideration for MP2 and equivalent vacancies following consideration of the surplus regular employees from within the bargaining unit and before the applications of all other employees.
64.15.5 Employees from outside of the bargaining unit shall not displace Society-represented employees.

64.15.6 In the event that the team is unable to reach consensus on the identification of surplus employees, OPG will determine who is declared surplus in accordance with the provisions of Subsection 64.15.

64.15.7 Viability of the Work Unit

The Joint Redeployment and Planning Team may decide to protect sufficient lesser service employees to restore the viability of the organizational unit. If the team is unable to reach consensus, then Senior Management (e.g., Directors, Vice Presidents) will decide. In situations where junior staff are protected by the implementation of viability of the work unit, and where the Unit of Application is smaller than a Business Unit, greater service employees who cannot be placed as a result of such protection shall have the right to have their seniority applied across the Business Unit.

64.15.8 Employment Equity

In situations of employment equity concerns, The Joint Redeployment and Placement Team may by consensus agree to protect sufficient lesser service employees in order to prevent such a setback from happening and extend the same provisions as set out in 64.15.7 above. Where the team has not reached consensus on the need to protect lesser service employees because of employment equity concerns, then the normal rules for identifying surplus employees on the basis of seniority will apply as outlined above in Subsection 64.15.

64.16 Declared Surplus

Employees declared surplus will receive written notice at the outset of their search notice period. Surplus status can be withdrawn at any time. The written notice shall contain:

- The cause of the surplus.
- A reference to this Article.
- The expected expiration date of the search notice/period (termination date).
- The right to priority consideration for vacancies in accordance with Subsection 65.6.3.
• The total severance entitlement.
• The anticipated date the employee will vacate his/her position.
• The expectation that the employee is expected to actively pursue internal and external placement opportunities.

64.17 Declared Surplus - Significant Inequity Rights

A significant inequity requires:

1. a declared surplus employee with eight or more years’ service; and

2. an employee not in the surplus employee’s unit of application with five or more years’ lesser service performing work for which the senior employee is qualified.

A significant inequity can occur:

• within a Business Unit; or
• across Business Units; or
• when organizational units have been split.

64.17.1 Within a Business Unit

The senior employee in the Significant Inequity situation will be offered a choice of:

a) displacing the most junior employee from a position for which he/she is qualified within two salary grades below his/her position provided the most junior employee has five or more years’ lesser seniority. If such a displacement is not available, then the employee may displace the most junior employee in the next lower salary grade in descending order under the same conditions as stated above; or

b) the right to apply with first priority consideration over all other surplus employees to Society vacancies, in accordance with Article 65.6.3, on a lateral or demotion basis; or

c) voluntary termination with entitlement to the provisions in 64.28.1(a). If the employee has chosen (b) above, he/she may at any time elect (c).
64.17.2 Beyond the Business Unit

The senior employee in the Significant Inequity situation will be offered, upon self-identification to the JRPT, a choice of:

a) the right to apply with first priority consideration over all other surplus employees to Society vacancies, in accordance with Article 65.6.3, on a lateral or demotion basis; and/or

b) voluntary termination with entitlement to the provisions in 64.28.1(a). If the employee has chosen (a) above, he/she may at any time elect (b).

64.17.3 Split Organizational Units

To displace beyond the Business Unit, the following conditions must be satisfied:

a) The senior and junior employees must have been in the same organizational unit within 12 months prior to the date of self-identification to the JRPT.

b) The organizational unit must have been split.

c) The junior employee must not be part of the senior employee's current unit of application.

d) The junior employee must be in a position performing a function that was in the same organizational unit as the senior employee within 12 months of self-identification.

The senior employee will be offered, upon self-identification, the following choices:

i) displacing the most junior employee as per Section 64.17.1(a) within his/her current Business Unit;

ii) if (a) above is not available, then the same displacement rights will apply within all split portions of the original organizational unit;

iii) the right to apply with first priority consideration over all other surplus Society employees to Society vacancies, in accordance with Article 65.6.3, on a lateral or demotion basis; and/or

iv) voluntary termination with entitlement to the provisions in 64.28.1(a). If the employee has
64.17.4 Significant Inequity Bump and Vacancy Issue

a) When exercising the option to displace, and a vacancy exists within the unit affected by the significant inequity rights, normally a vacancy will be considered to be the “least senior employee” and the displacement will occur into that vacancy. The exceptions to this are:

i) Where the vacancy is lower rated than the position that the least senior employee occupies; or,

ii) Where displacement into the vacancy requires a move that would not otherwise have occurred had the least senior employee been displaced.

b) When one (or both) of the exceptions applies, the displacing employee has the option of:

i) displacing the least senior employee, if that employee is qualified to perform the duties and responsibilities of the vacant position; or

ii) displacing into the vacancy.

64.17.5 Rights of Displaced Employees

An employee who is displaced as a result of the application of this section will be entitled to all of the provisions of Article 64, including the provisions of this section.

64.17.6 Significant Inequity

Where an employee has at least 8 years’ service and is within one of the following functional groups, such an employee may displace an employee in the same functional group with at least 3 years’ less service, who is performing work for which the senior employee is qualified: Finance, Human Resources, Health and Safety, Procurement, Real Estate.

64.18 Voluntary Surplus

An employee from the affected unit of application who would not otherwise be surplus may volunteer to be declared surplus, subject to the following:
156

a) The withdrawal of surplus status will be offered in seniority order to those surplus employees who are qualified to perform the duties and responsibilities of the position of the employee who is volunteering.

b) The surplus employee will not be considered for a promotion, but may be considered for a Progression-In-Place position.

c) This must result in the withdrawal of surplus status from the surplus employee.

d) The employee who is volunteering to be surplus will assume the surplus entitlements of the surplus employee who has his/her surplus status removed. A JRPT may recommend that different entitlements be made available to employees volunteering to be surplus.

e) The exchange of employees arising out of the application of these provisions is subject to the approval of OPG. The decision to approve (or disapprove) will be on the basis of further disruption to the work of the affected work unit.

64.19 Redeployment Tools

These would include, but are not limited to, the use of rotations, bridging to retirement, early retirement, retraining, and external placement.

These tools are not contractual entitlements but rather are methods for consideration by the Joint Redeployment and Planning Team.

64.19.1 Bridge to Retirement

A declared surplus employee who is close to retirement may wish to exchange severance pay for a working bridge to retirement subject to the following conditions:

a) The surplus employee must make a decision to opt for a bridge within 4 weeks of being declared surplus.

b) The period of time that represents the bridge would commence at the end of the search notice period.

c) The time period for which the bridge exists will not exceed the equivalent weeks of severance pay.

d) At the end of the bridging period the employee will terminate employment.

e) This decision is irrevocable.
64.19.2 Bridging for Future Workload

Surplus employees may be assigned to perform work in temporary positions which bridge them to a point in time where additional ongoing work requirements exist, subject to the following conditions:

a) That access to such positions be equitable (e.g. involve some form of advertising).

b) Surplus employees shall have their surplus status and rights withdrawn when selected to bridging positions.

c) Bridging could also include work sharing and job sharing where there is Agreement with the employees involved.

64.19.3 Rotations

Rotational opportunities should be used for developmental purposes and not to replace a legitimate vacancy. The following conditions will apply when rotational opportunities are used as a redeployment tool:

a) Posting of rotational opportunities should be in accordance with Article 65 (Vacancies (Relief, Rotations and Selections)).

b) The posting should include basic information such as position name, salary level, location, a description of the duties, starting date and proposed duration of the rotation.

c) The selection process should use formal selection criteria.

d) Interviews will be the responsibility of the receiving unit.

e) Rotations will normally be from six (6) months to two (2) years.

f) Terms and working conditions while on job rotation will be in accordance with Article 65 (Vacancies (Relief, Rotations and Selections)).

g) In the event that the search/notice period continues during the rotation, the surplus employee will not be restricted from applying to vacancies or from subsequently being released in a reasonable period of time, if he/she is the successful applicant.
64.19.4 Retraining
Retraining is intended to enhance the skill and qualifications of the surplus employee thereby increasing his/her marketability. It can include formal classroom training as well as developmental assignment within or external to OPG.

64.19.5 Educational Leave
The intent is to provide the surplus employee with the opportunity to enhance his/her potential for redeployment.

Treatment will be in accordance with the OPG policies on Educational Leave (see Article 97 (Status of Certain Policies and Procedures).

64.19.6 External Placement
External placement assistance may be provided, at OPG's discretion, to a maximum value of two (2) weeks’ salary (e.g. Outplacement counseling, legal or financial counseling, external job search expenses.).

64.20 Re-assignment of Declared Surplus Employees
Surplus employees who have not been placed into a regular position will normally be reassigned to work of a different nature within the basic search/notice period. This work should complement and assist the employee's redeployment by ideally providing opportunities to develop skills.

In situations where a Plant Closure has been identified as a cause for the adverse impact, unplaced employees at the Plant identified for closure, who are declared surplus, will not be entitled to reassignment during the search/notice period. In such situations the employee will be terminated. The employee will be paid the cash equivalent of basic search/notice + 100% service based search notice + severance (as outlined in 64.27.1). Such employees will be entitled to recall per Article 64.30.

Probationary employees who are not placed within eight weeks of their declared surplus date will be terminated and will be entitled to a payment equal to the amount of time remaining in the basic search/notice period. A probationary employee will not have the time that he/she is declared surplus credited towards the attainment of regular status.
64.21 Search Notice Period

64.21.1 Procedures

All full-time and reduced-hours employees who are declared surplus will have a search/notice period calculated as follows:

- no less than a 24 week basic search/notice period;

plus
- service-based search notice period equal to the sum of:
  - two (2) weeks per year of service for the first five years of service, and
  - one (1) week per year of service for service greater than five years, and
  - employees (who are not hired as Trainees) with relevant previous experience will receive additional service-based job search credits based upon their highest salary grade within one year of hiring in accordance with the following:

<table>
<thead>
<tr>
<th>Salary Band Hired Into</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP-2</td>
<td>4 weeks</td>
</tr>
<tr>
<td>MP-3</td>
<td>6 weeks</td>
</tr>
<tr>
<td>MP-4</td>
<td>8 weeks</td>
</tr>
<tr>
<td>MP-5</td>
<td>10 weeks</td>
</tr>
<tr>
<td>MP-6</td>
<td>12 weeks</td>
</tr>
</tbody>
</table>

- For reduced hours employees, the service-based search/notice period will be calculated as if all service had been worked full-time.

The total search/notice period will not exceed 60 weeks.

64.21.2 Interruption of Search/Notice Period

Intent:

The search/notice period will normally run continuously uninterrupted, except where circumstances seriously impede the employee's ability to search for a new job or interfere with the employee's timely release to accept a new job. In those situations where the search/notice period is suspended, the right to priority consideration is also suspended, except as outlined below.
Specific Circumstances:

a) OPG Assignments Outside of Ontario

If the assignment is greater than one year, the surplus employee will be entitled to a 24-week search/notice period or the remainder of his/her search/notice period whichever is greater, upon return to OPG. If the assignment is less than one year, the search/notice period will continue unless the employee is not available to search for a new position in which case the search/notice period will be suspended. (See also Article 6 “Employees on Temporary Out-of-Province Assignments”).

b) Secondments

If the term of the secondment is defined, then the surplus employee is given the same treatment as described for out-of-province assignments. If the term of the secondment is undefined, then the employee is considered placed.

c) Pregnancy and Paid Parental Leave

- The search/notice period is suspended when the employee commences the leave. It continues when the employee returns to work.
- The rights associated with being declared surplus do not cease during the leave.

d) Other Leaves (e.g. Unpaid Parental Leave, Educational Leave etc.)

The search/notice period and any associated rights are suspended.

e) Rotations/Temporary Assignments

Normally, surplus employees are expected to continue their job search and be available for placement. However, if the nature of the rotation/temporary assignment is such that the surplus employee is precluded from reasonably participating in the job search, the search/notice period shall be suspended for the duration of the assignment. Such decisions should be made at the outset of the rotation/temporary assignment.

f) WSIB/LTD/Long Term Sick Leave
The Joint Redeployment and Planning Team will examine each case on its own merits and in the context of the intent of this Subsection.

64.21.3 Extension Beyond Search/Notice Period

Intent:

To allow surplus employees who are on rotation to extend their employment beyond the expiration of their search/notice period.

a) It is possible for employees who are on rotation to continue employment with OPG beyond the expiration of their search/notice period when the expected duration of their rotational assignment goes beyond the expiry date of their search/notice period.

b) The decision to extend employment beyond the expiry of the search/notice period and the responsibility for the employee will be assumed by the receiving unit (i.e., the unit with the rotational assignment).

c) Normally, the extension will be for the expected duration of the rotational assignment. Where the line management of the receiving unit deems it necessary, a cancellation provision (minimum of 30 calendar days) can be included as one of the terms of the rotational assignment. This cancellation provision would be identified prior to the commencement of that portion of the rotation beyond the expiry of the employee’s search/notice period.

d) For the period of employment, following the expiration of the search/notice period, employees will be considered per Article 65.6.3.1(f) and will not have priority consideration for corporate vacancies.

e) The extension of employment beyond the expiration of the search/notice period shall not be used for the calculation of any other entitlement (i.e., severance, notice of termination, lump sum payments and voluntary resignation) under Article 64.

f) With the exception of the limitations stated in sections (d) and (e) above, employees whose employment has been extended beyond the expiration of their search/notice period will be treated as regular employees and will be covered by all of the other provisions of the Collective Agreement.
64.22 Acceptance/Rejection of Job Offers

64.22.1 A surplus employee will have up to 7 calendar days to accept or refuse an offer of a position.

64.22.2 Assessment of Suitability

If there is more than one applicant for a vacancy within The Society's jurisdiction, the applicants will be considered in the priority set out in Subsection 65.6.3.

Within each category the most suitable candidate will be selected.

64.22.3 Right of Refusal - 24-Week Basic Search Period

A surplus employee may refuse any offer of employment without penalty.

64.22.4 Right of Refusal - Service-Based Search Notice Period

If the surplus employee refuses a job offer that is within 2 salary bands lower, he/she will either:

i) terminate employment with severance pay;

or

ii) challenge that the offer is not a reasonable one. If the challenge succeeds, the surplus employee will continue on the job search period. If the challenge fails, the surplus employee will accept the offer or be terminated with 50% severance pay.

64.23 Reasonable Offer Challenge Process

A Joint Reasonable Offer Team (JROT) will be established for each Unit of Application established under this Article.

This team will resolve employees' appeals arising from offers made during the mix and match process. Offers made subsequent to the final report of the JRPT process shall be subject only to the grievance/arbitration and not to the JROT process.

The team will meet and make a decision within three (3) working days of receipt of the appeal. The decision will become part of the JRPT final report recommendation.
It will take into consideration items such as job level, geographical location, responsibilities, status, health, family, legal precedents, community standards and past practices.

The team will be made up of two employees representing OPG and two employees representing The Society. The members of the team must be different than those on the Joint Redeployment and Planning Team. The team's membership composition should avoid conflict of interest.

The surplus employee is responsible for presenting his/her own case.

Members of the JROT may request assistance from either the Society or OPG.

In the event that the JROT is unable to reach a decision within the three (3) working days the appeal will be heard by a standing arbitrator within three (3) days. In the case of extenuating medical circumstances the three (3) days for the appeal may be extended to thirty (30) days to complete the entire process.

If a job offer is found to be unreasonable by the Joint Reasonable Offer Team, then the employee will be allowed to refuse it and be declared surplus with full entitlements.

### 64.24 Legal Notice of Termination of Employment

It is agreed that the basic search/notice period and the service based search/notice period are sufficient and full notice as per the requirements of the relevant legislation. This Article is the Adjustment Plan as required under the Ontario Labour Relations Act and meets the requirements of the Canada Labour Code, Part III, Division IX, Group Termination, for federally regulated employees.

### 64.25 Compensation

**Salary Maintenance**

64.25.1 The surplus employee’s base rate of pay will be maintained, including economic increases and special allowances in the case of TMS staff (refer to Appendix XVII), until placement or termination. This provision with respect to special allowances for TMS staff is not applicable in the operation of Article 64 after January 4, 2007.

64.25.2 If the surplus employee accepts a position at the same salary level, salary maintenance will continue as in Clause 64.25.1.

64.25.3 If a surplus employee accepts placement in a lower rated position his/her current base salary dollars will be frozen until the
employee’s current pay entitlement as determined from the salary band and step exceeds the frozen level. This salary treatment must be conveyed in writing when the offer is made.

**Exception:**

A surplus employee who is within three years of eligibility for an undiscounted pension will be entitled to any negotiated economic increases for the period of time prior to qualifying for the undiscounted pension. In the event that the employee does not retire upon qualifying for an undiscounted pension, his/her base salary dollars will be frozen at that time. (This would include any economic increases occurring during the period of time prior to qualifying for an undiscounted pension.) At this point, the normal salary maintenance provisions will apply.

64.25.4 Premiums will be calculated on the basis of the Incremental Pay Step assessed for the lateral or lower rated job.

### 64.26 Reduction in Hours of Work

**Principles**

- Pay should reflect hours worked.
- Pay should reflect the job performed.

64.26.1 Where employees move to positions where the normal weekly hours are less than in their former positions The Society and OPG will attempt to reach a local agreement on a transition which would allow the affected employees to work additional hours above the 35 hour base for an extended period of time with staged reductions.

64.26.2 Failing agreement in accordance with Clause 64.26.1 the following treatment will apply:

a) **Voluntariness of Application**

   Employees who wish to immediately work a 35 hour work week can do so. Their rate would be reduced immediately to the 35 hour rate upon starting the 35 hour work week position.

b) **Employees within 3 Years of Undiscounted Pension**

   On the day of reporting to the new position an employee who is within 3 years of an undiscounted pension will not have normal
hours of work reduced for 3 years or until such time as the employee is eligible for an undiscounted pension, if earlier. The employee will continue to receive economic pay adjustments. If the employee does not retire upon qualifying for an undiscounted pension, then the hours of work and base rate will be immediately reduced to the hours and rate of the position.

c) Start Date of Freeze and Reduction

All employees impacted by the freeze and reduction decision will be treated as follows:

Employees previously working 40 hours:

Employees reporting to new positions will have their pay frozen according to the current salary schedule. Their hours of work will be reduced to 39 hours the first fiscal day of the next fiscal year. In all subsequent years, hours of work will be reduced by 1 hour per week, effective the first day of the fiscal year. The employee will be unfrozen after reaching 35 hours, or when their pay equates to the Incremental Pay Step for 35 hours.

Employees previously working 37.5 hours:

Employees reporting to their new positions will have their pay frozen according to the current salary schedule. Their hours of work will be reduced to 36.5 hours on the first fiscal day of the next fiscal year and finally to 35 hours on the first fiscal day of the following year. The employee will be unfrozen after reaching 35 hours, or when their pay equates to the Incremental Pay Step for 35 hours (see paragraph e) below).

d) Promotions, Demotions, and Laterals

This article covers Promotions and Laterals only. Promoted employees will have promotional increases, if any, applied to their rate and Incremental Pay Step before it is frozen. There will be no demotions into positions that result in reduced hours of work.

e) Incremental Pay Steps

The Incremental Pay Step (IPS) will be used for employees on salary schedules 03 and 09. The IPS will be used as the salary rate on the 35 hour/week schedule. This is determined by applying the person's existing rate to the new schedule (i.e. a person at step 12 of MP-4 on a 40 hour week/schedule will be at Step 12 MP4 on the 35 hour/week schedule). The
Incremental Pay Step will be subject to annual step progressions as per the collective agreement.

f) Completion of Process

When the salary rate becomes unfrozen the person is eligible for economic and step progression increases to their actual pay rate.

Hours of work will be reduced until either the ramp period has expired or the person's Incremental Pay Step is reached. If after the ramp period has expired, the employee's Incremental Pay Step has not reached their frozen level, the frozen dollars shall be applied to the new salary schedule to determine an equivalent level which becomes the employees new unfrozen pay standing. The employee will then be eligible for future step progressions and economic increases.

g) Definition of "Day"

During the reduction of hours process employees will have daily hours of work that vary between 7 and 8 hours per day. For the purposes of vacation, sick leave, floating holidays and leave of absence/unpaid time off, a "day" will mean any work day between 7 and 8 hours in the work week.

64.27 Severance, Lump-Sum Payments and Voluntary Resignation

64.27.1 Severance

Severance pay for the purpose of this Article will be calculated, for employees with less than 20 years’ service, at a rate of 2 weeks for each year of service at the termination of employment date. Employees with a minimum of 20 years of service shall receive severance pay of 3 weeks per year of service at the termination of employment date to a maximum of 78 weeks. It will be calculated at the weekly rate for base hours of work for the full-time position (refer to Article 71.2 "Reduced Hours of Work (RHOW) Arrangements") to the nearest whole month (30 days). Credit will be given on a prorated basis for any service which exceeds a whole year to the nearest whole month (30 days).

Severance pay is paid only when employment has terminated.

Persons receiving severance pay will not be considered employees for the purpose of any benefit, service accumulation nor for any other purpose from the day of termination except for recall as per Section 64.30.
The maximum amount of severance is 78 weeks.

64.27.2 Lump Sum Payments and Voluntary Resignation

Surplus employees are entitled to voluntarily resign their employment rather than proceed with redeployment.

Surplus employees will be entitled to the residual search/notice period and severance entitlement in the form of a lump sum payment in lieu of their continued rights in accordance with the following:

a) Voluntary Termination During the Basic Search Notice Period

One hundred percent (100%) of any unused portion of their basic search notice period plus 50% of their service-based search notice period plus 100% of their severance pay entitlement.

b) Voluntary Termination During Service-Based Search Notice Period

50% of the unused portion of the service-based search notice period plus 100% of their severance pay entitlement.

Reduced hours employees will be entitled to lump sum payments which reflect pay for Normal Scheduled Reduced Hours (See Article 71.2 (“Reduced Hours of Work (RHOW) Arrangements”).

64.27.3 Previous Severance and Lump Sum Payment

Surplus employees who have received a payment under Subsection or Clause 64.22.4 “Right of Refusal - Service Based Search Notice Period”, 64.27 “Severance Lump Sum Payments and Voluntary Resignation”, Section 64.28 “Purchased Services”, or the predecessor Agreement “S3”, will have their severance calculated on the basis of continuous service since the last time severance was paid.

64.28 Purchased Services

64.28.1 Employees who are surplus as a result of purchased services will have the following additional entitlements:

a) If the surplus employee voluntarily terminates his/her employment prior to the end of the basic search/notice period, he/she will be entitled to 100% of the unused portion of the
basic search/notice plus 75% of their service based search/notice period plus 100% severance pay.

b) If the employee is placed into a lower-rated position, then he/she will be entitled to one additional economic increase at his/her former rate prior to having the rate frozen.

c) The employee may be allowed to bid on the work being considered as a purchased service subject to the following conditions:

- there be no preference for the bid;
- if the surplus employee is the successful bidder, his/her employment will automatically terminate and he/she will receive severance pay; and
- the surplus employee will be entitled to the equivalent of two weeks' salary if he/she is the successful bidder to assist in setting up his/her business.

Note: (c) will only form part of this Article if in OPG's opinion it is feasible.

d) The surplus employee will be entitled to enhanced outplacement services equivalent to one week's salary guaranteed plus two additional weeks' salary at OPG's discretion.

64.28.2 Prior to the involuntary termination of surplus employee(s) under this Article and where there are purchased services operating within the Unit of Application, OPG will review the purchased services contract with a view to determining if it would be a sound business decision to terminate the purchased services contract(s) based on consideration of such factors as the cancellation charges in the contract and the cost of the layoff.

64.29 Termination of Employment

If a surplus employee is not placed by the end of the service based search period, he/she will be terminated with a severance pay entitlement as per Subsection 64.27.1 "Severance".

Throughout of this Article, wherever surplus employees eligible to retire terminate their employment voluntarily or involuntarily, such employees will be entitled to full retirement benefits in addition to full entitlements under of this Article.
64.30 Recall Rights

Surplus employees whose employment is about to terminate because their search/notice period has expired, or who terminated from a Plant identified for closure per Article 64.20, are entitled to the following:

a) a terminating surplus employee will be eligible for either:
   - a weekly paid severance payment with entitlements to recall;
   - or
   - a lump sum severance payment with no right to recall.

b) terminated surplus employees will be eligible for recall rights for 12 months from the date of their termination.

c) former surplus employees with recall rights will be considered for vacancies in the bargaining unit as per Article 65.6.3.1(f) of the Collective Agreement, including their right to grieve non-selection (refer to Subsection 65.6.3).

d) weekly severance payments will cease in the event a terminated former surplus employee is rehired.

e) severance pay received prior to recall will be subtracted from any future severance pay entitlements under this Article.

f) persons on recall are not employees and shall not be entitled to any benefits provided to employees except recall rights as noted above.

g) notwithstanding clause (f) above, persons on recall shall be provided with coverage under the OPG Health and Dental Plan from the date the right of recall commences for a period of 6 months or until the commencement of alternative employment whichever comes first.

64.31 Relocation and Housing Assistance

64.31.1 OPG will restructure the cost of relocation so it mitigates the disincentive in the redeployment of surplus staff.

64.31.2 A surplus employee in a community where OPG’s presence influences the housing market, e.g. Atikokan, Port Elgin, etc. may avail himself/herself of the House Evaluation and Guarantee Plan in accordance with the OPG policy.
PART B NON-SURPLUS REDEPLOYMENT OF SOCIETY REPRESENTED STAFF

64.32 Conditions for Expedited Non-Surplus Redeployment

Attachment 1 shall be the process for redeployment of Society-represented employees (as per Article 3.1 and 3.2) in the Nuclear, Corporate, Fossil and Hydroelectric Units of Application. The foregoing is subject to the following:

a) Unplaced employees shall be bridged to future workload through productive or developmental work assignments in the applicable unit of application (Nuclear, Corporate, Hydroelectric or Fossil), and no employee is to be declared surplus;

b) Demoted employees shall be entitled to consideration for any position at or below their previous salary band in the next Mix and Match;

c) Priority selection status for corporately posted vacancies under Article 65.6.3 (e) shall not apply for the purposes of the process contemplated under Attachment 1.

d) Attachment 1 shall be incorporated in Part B, and further changes shall be subject to approval of the parties.

64.33 Unit of Application

a) The default Unit of Application for any redeployment under Attachment 1 shall be:

i. Nuclear for employees within the Nuclear Business Organization;

ii. Corporate for employees within the Corporate Business Organization;

iii. Hydroelectric for employees within the Hydroelectric Business Organization;

iv. Fossil for employees within the Fossil Business Organization.

b) The default Unit of Application for any redeployment under Part A of Article 64 shall be according to Article 64.9.2 for Nuclear employees, and according to Article 64.9.3, 64.9.4, 64.9.5 and 64.9.6 for Corporate, Hydroelectric and Fossil employees;

c) The Unit of Application shall not include employees who are identified as members of a different Unit of Application pursuant to provisions of the Collective Agreement in effect at the time.
64.34 Joint Redeployment and Planning Team

The parties shall form standing Joint Redeployment Planning Teams (JRPTs) in each of the Nuclear, Corporate, Hydroelectric and Fossil Business Organizations, which shall be activated from time-to-time for purposes of redeploying staff under either Attachment 1 or Article 64 on the following basis:

a) Management shall provide timely notice of a planned reduction or downgrade of positions at any location; and

i. whenever Management confirms the conditions set out in Article 64.32 will be met, the JRPT(s) shall apply the redeployment process in Attachment 1, or

ii. if any conditions of Article 64.32 are not met the JRPT(s) shall plan and implement the redeployment process under the provisions of Part A of Article 64.

b) an employee who has been matched through the operation of Attachment 1 or Part A of Article 64 and whose position is subsequently downgraded within 18 months shall be subject to redeployment at the previously matched level under either Attachment 1 or Part A of Article 64, as applicable in the circumstances;

c) the JRPT(s) shall have a continuing responsibility to review and match surplus or unplaced employees on the basis of seniority and qualifications to any lateral or lower rated Nuclear Society vacancy posting.

d) where Attachment 1 is being implemented, the JRPT(s) shall operate by consensus and provide a consensus Report including all currently planned redeployment outcomes, which shall be subject to approval of the Chief Nuclear Officer or designate, or the approval of the Senior Executive in the appropriate Business Organization or designate.

64.35 Dispute Resolution

Where the JRPT reaches impasse in implementing Attachment 1 or does not agree whether Attachment 1 applies in the circumstances, the impasse shall be resolved as follows and the JRPT shall continue with the redeployment thereafter:

(a) after giving 48 hours written notice of any issues it considers in dispute, either Party may refer these issues for final and binding resolution to the arbitrator designated under Article 16.11,
“Expediting Redeployment Grievances and Arbitrations”, who shall rule within 24 hours of hearing, with written reasons to follow;

(b) the arbitrator shall have the powers of an arbitrator under the Labour Relations Act, with jurisdiction to determine procedure and make such orders as required to resolve disputed issues consistent with this Article and the Collective Agreement;

(c) this procedure does not apply to complaints regarding qualifications or reasonable offer challenges of individual employees or positions, which if not resolved by the JRPT shall be dealt with by the grievance procedure;

(d) individual employees and The Society reserve Article 64.3 grievance rights with regard to the outcome of the process in Attachment 1, but the decision of the arbitrator under this section shall not be the subject of a grievance.

64.36 Relocation Assistance

For employees receiving living expenses, rather than commuting, during the transition period of a relocation or while on a relief or rotational assignment, OPG shall pay mileage expenses for a weekly trip home if the employee utilizes it.

64.37 Related Agreements

Except as expressly modified by this Article or Attachment 1, all provisions of the Collective Agreement shall continue to be applicable.

64.38 Operation and Future Consideration

Part B of this Article and Attachment 1 shall operate within the Nuclear, Corporate, Hydroelectric and Fossil Business Organizations or successors thereof, effective the date of the Collective Agreement.
Attachment 1

Introduction

The redeployment of employees from the old organization to the new organization requires the full cooperation of everyone involved. The JRPT has designed this process on the assumption that employees will be able to provide sufficient details on their qualifications that will allow the JRPT and ultimately Management to make objective decisions with respect to the employee’s suitability for positions.

Employees are responsible for completing the required forms and submitting forms to the JRPT.

Management will be responsible for:

- Developing job documents for the purposes of assessing qualifications;
- Assessing qualifications for given positions and determining who is qualified for a given position under consideration by the JRPT.

The Joint Redeployment Planning Team will:

- Manage the process described below;
- Ensure conformance with the process and deal with exceptional matters as they arise;
- Match the employees to available positions as set out in the below process;
- Communicate relevant information at appropriate milestones;
- Prepare a report describing the outcome of the mix and match process;
- Prepare a list of the names of all employees and their respective placements.

The JRPT will review critical positions (as described by Management) for advance posting and filling. These positions will be subject to 2.2.10.

1 Redeployment Process

1.1 Pre-Steps (steps taken prior to the Mix and Match process)

2.1.1

Ontario Power Generation Management will provide details on the new organizational structure at a detail level that will indicate the classification, location, number of positions in the new organization and priority of staffing the position. A listing of existing staff by category and location will be provided. Management will provide an up-to-date employee database for the applicable Unit of Application. Management will identify (in writing) the qualifications and selection criteria for positions without incumbents.

2.1.2
The redeployment team will consider promotions on the basis of Article 64.15.2. Groups and salary grades to be determined by the JRPT.

2.1.3

All employees will be required to submit a Fact Sheet and a list of irrevocable location and job preferences. The template will be provided by the JRPT.

2.2 Redeployment Process Steps

The Redeployment process will take the following steps:

2.2.1 Determine Incumbents/Non Incumbents/Vacancies

Management to prepare list of employees, list of positions, designate incumbents, review with Site Joint Implementation Team (JIT). The JIT’s will consist of equal numbers of Society and management representatives and shall make decisions on a consensus basis. The incumbency rules will be as follows:

Incumbency Rules

i) Salary Grade (same)
   Similar Job Duties (Majority of duties and responsibilities that you were doing in your base position).
   Hours of Work (same)
   And either Work Location Unchanged or the Work Location is moved and the employee volunteers to move with their position

i.e. **NUCLEAR**
   Bruce site
   700 University Ave
   Nuclear East Sites as defined in Article 105

**FOSSIL**
   Nanticoke
   Lambton
   Lennox
   Thunder Bay
   Atikokan
   GTA

**HYDROELECTRIC**
   Niagara Plant Group
   Northwest Plant Group
   Northeast Plant Group
   Evergreen
   Saunders GS
   Ottawa ST. Lawrence Plant Group (less Saunders)
   GTA

**CORPORATE**
   The site locations for Corporate will be all the locations defined for Nuclear, Fossil, and Hydroelectric where there are staff that report to Corporate Groups.
ii) In addition to the above, an employee's nuclear division work location will be deemed to be unchanged if the employee volunteers to relocate to the new worksite or if, within Durham Region, the employee's new worksite is equal to or less than 33.5 kilometres from the employee's existing worksite. Volunteers will be relocated before other affected employees are forced. The order of selection of individual employees who do not volunteer for redeployment in a non-surplus redeployment will be on the same basis as presently. Any employee redeployed in accordance with the above will be entitled to the benefit of the relocation provisions of the collective agreement if the requirements of these provisions are met.  

2.2.2 Confirm Incumbents (NO JROT)

The JRPT will confirm all incumbency decisions made by the Site Joint Implementation Teams. The Main Team will review all issues brought to it by the JIT’s and make final decisions with regard to who is an incumbent. Incumbents will not be allowed a JROT although the decision to make them incumbent is subject to grievance under The Society Collective Agreement.

2.2.3 Notify Incumbents/Non Incumbents (Appeal Process to Main Team after review by Site JIT)

The incumbents and non-incumbents will be notified of their status. They must appeal within 24 hours. Appeal based upon ensuring the job meets the definition of incumbency rules in 2.2.1 and to ensure suitability of the person for the duties and responsibilities.

2.2.4 Match Non Incumbents to Lateral Same Site Vacancy (Senior Qualified)

As a first step all non-incumbents will be matched to lateral vacancies in their home site organizations at their base location. (e.g. 700 University Ave, Nuclear East sites as defined in Article 105, Saunders, Nanticoke)

Matching Rules

In addition to the rules set out in the Collective Agreement, the following rules will apply to matching for same site vacancies:

Location (same)
Hours of work (same, then different)

---

14 As indicated in the arbitration award from Kevin Burkett, dated April 30, 2012.
2.2.5 Work Unit Viability Check – All Locations

Determine viability needs of receiving site. Check to determine if staff who volunteered to relocate from sending site can be released to off-site positions.

2.2.6 Match Releasable Sending site Volunteers to Off-site Lateral Vacancy

Those on the sending site who have volunteered to transfer off-site will be matched to off-site vacancies on a senior and qualified basis.

2.2.7 Match Releasable sending site volunteer demotions to off-site vacancies.

Those volunteers who have not been matched to lateral off-site vacancies and who volunteered to take a demotion to move off-site will be matched to demotional vacancies.

2.2.8 Match Unmatched Lateral Vacancy (Senior Qualified) On Sending Site

After the releasable volunteers have been matched, remaining unmatched employees will be matched to positions vacated by the releasable volunteers in the sending site on a senior and qualified basis.

2.2.9 Receiving Unit Viability Check

Determine if the volunteer matches from above, have resolved any of the viability concerns identified in 2.2.5.

2.2.10 Forced Matching

a) Force match unmatched non volunteers sending site staff to off-site lateral vacancies on a junior basis. The most junior employees who remain unmatched to positions at the sending site will be matched to lateral vacancies off-site.

b) Force match remaining unmatched staff at all locations into demotion vacancies. This will be done on a reverse order of seniority (junior) basis.

Parts a) and b) will be run concurrently. The JRPT will have to ensure the outcome of this step respects Seniority and Qualifications.
2.2.11 Viability Check – Sending Site

The JRPT will agree on how to meet viability requirements and will act to do so. If a viability concern continues to exist after the Mix and Match process is complete, the JRPT will then attempt to address the concern using one or more of the following options prior to forced matches: call for specific volunteers; Corporate-wide vacancies; hiring externally; forced rotations and/or relief assignments in order to bridge for training; external contractors.

Those employees who are force matched from the sending site and are eligible for assistance under Article 52 will not be force matched again through this work unit viability process in a way that would make them eligible for Article 52, for the duration of Part B of Article 64.

Those employees who are on forced rotation for viability reasons during the life of the collective agreement will be allowed to work the equivalent of 10 days in a 9 day period.

In the event of an unresolved dispute the JPRT will utilize the expedited dispute resolution process, Article 16.11, “Expediting Redeployment Grievances and Arbitrations”, to determine the viability issue and to meet viability based on a balance of fairness to affected employees and business needs of OPG.

2.2.12 Employment Equity Check

As in Article 64.15.8 of the Collective Agreement.

2.2.13 Issue Letters to staff identifying placement

After the process is complete staff will be issued letters identifying their placement.

2.2.14 Joint Reasonable Offer Team Process (Art. 64.23)

A Joint Reasonable Offer process will be established so that employees have an avenue to appeal offers made during the mix-and-match process. The JROIT will meet to render a decision within 3 working days of receipt of the appeal. The JROIT process will be per Article 64.23 except that there will be no surplus entitlements if an offer is found to be unreasonable. Instead, offers determined to be unreasonable will be substituted with a reasonable position by the JIT.

2.2.15 Schedule

Both parties will make their best efforts to complete the redeployment process as expeditiously as possible. The following schedule consists of milestones for the completion of the redeployment process. The parties will agree on target completion dates for each of the milestones below. It is recognized that many variables may affect the completion dates and the team will amend the target dates where it considers it necessary. Failure to meet these target dates are not to be construed as justification for invoking the defaults under Part A of Article 64.
## Milestones

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Timetable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activation of standing JRPT</td>
<td>X</td>
</tr>
<tr>
<td>Report #1 completed by the JRPT Members</td>
<td>Y</td>
</tr>
<tr>
<td>Report #1 reviewed and accepted by the C.N.O. or by Business Unit Vice-President</td>
<td>Y</td>
</tr>
<tr>
<td>Incumbency Process Complete</td>
<td>Y + 18 days</td>
</tr>
<tr>
<td>Mix and Match Process Complete</td>
<td>Y + 49 days</td>
</tr>
<tr>
<td>JROT Complete</td>
<td>Y + 57 days</td>
</tr>
<tr>
<td>Report #2 Signed by JRPT</td>
<td>Y + 64 days</td>
</tr>
<tr>
<td>Report #2 Approved</td>
<td>Y + 71 days</td>
</tr>
</tbody>
</table>

**X** = first day of activation of standing JRPT  
**Y** = **X** + **Z**  
**Z** = the period the standing JRPT agrees is required to produce report #1

## PART C  DECONTROL/ CHANGE OF EMPLOYER

64.38 Part C shall apply to any sale, lease, transfer or any other transaction between the Company and any other entity, by virtue of which the ownership or control over any part of the Company's business or assets becomes held by such other entity and some or all of the Company's employees become employees of a new employer as part of the commercial transaction.

64.39 The company recognizes the importance of securing for employees' opportunity for continuing employment with a new employer and are committed to securing such opportunity for employees in a business or asset to be decontrolled.

64.40 In addition to Article 11, the Company further agrees that it shall provide in writing to The Society at the earliest possible time prior to the transaction, but in any event at least sixty days before the transaction closure, all
available information relating to the new employer that is relevant to employees to the extent that circumstances reasonably permit. The Society agrees that confidentiality will be maintained.

64.41 Sequence of Events

Effective on the date the Company officially announces an intent to conduct a transaction in accordance with Article 64.38, the following will apply:

a) Until such time as staff positions and numbers to be transferred to the new employer are provided to The Society, employees may apply to vacancies in accordance with the collective agreement. All applications from employees in the affected businesses or assets for laterals and demotions will be processed and considered unless the move would seriously jeopardize the viability of the work unit. Applications for promotions will not be blocked under any circumstances. Disputes arising out of the blocking of applications will be dealt with via an expedited process.

b) Commencing on the date that affected staff, positions and numbers to be transferred to the new employer are provided to The Society, displacements into and selections into or out of the businesses or assets affected will cease.

c) The Company will make Article 64.6.4 (Voluntary Surplus) as applied to 64.27 available to employees in businesses or assets where the number of employees exceeds the new employer’s needs. With the agreement of The Society, Management may offer other voluntary separation incentives such as focused pension incentives, retirement bridges, etc.

d) The Company will make available a voluntary separation option to employees eligible for an undiscounted pension with a retirement allowance of 52 weeks.

e) Employees affected by the change of employer will be asked to state in writing their intention to accept continuing employment with the new employer.

f) Employees who indicate their willingness to accept continuing employment with the new employer but where there are fewer positions available than willing employees, will be placed through an expedited mix and match process involving the following steps with a viability check after each step:

i) Incumbent matching

ii) Matching to lateral vacancies in the same location (Volunteer/Force)
iii) Volunteering for location change and/or a demotion.

g) Employees who indicate their willingness to accept continuing employment and for whom a position is available will transfer to the new employer.

h) Employees who have indicated their willingness to accept continuing employment with the new employer and for whom there is no position available will be treated in accordance with Part A of Article 64.

i) Employees who indicate that they are not willing to continue employment with the new employer will be entitled to severance of two weeks per year of service, not to exceed 26 weeks. Employees may elect to take such severance as a lump sum amount, or in weekly amounts, during which time they will have recall rights to the company. Weekly payments will cease on the date an employee is recalled. Employees with recall rights will be considered for vacancies in the bargaining unit as per Article 65.6.3.1(f) of the Collective Agreement, including their right to grieve non-selection (refer to Subsection 65.6.3). Severance pay received prior to recall will be subtracted from any future severance pay entitlements under this Article.

All employees in this sub-section (i) will also be entitled to the following:

i) Coverage under OPG’s Health and Dental Plan for a period of six (6) months from the date of termination of employment or until the commencement of alternate employment whichever occurs first;

ii) Reimbursement for tuition fees and other associated expenses up to a maximum of $5000.00 upon production of receipts from an approved educational program within 12 months of his/her termination;

iii) Reimbursement of outplacement services up to a maximum value of two weeks salary (e.g. Outplacement counselling, legal or financial counselling, external job search expenses.), upon production of receipts.

j) Management may, in consultation with The Society, offer the voluntary severance package under Article 64.6.4 (voluntary surplus) as applied to 64.27 to an employee to avoid a displacement.
64.42 If, within eighteen months of the transfer, the new employer reduces the number of employees and the transferred employee is declared surplus and terminated the employee(s) laid off will be entitled to a one time lump sum payment of one week per year of service with OPG and the new employer. The obligation to pay the laid off employee is contingent upon the employee being severed from employment without recall rights with the new employer.

The additional payment of one week per year of service will not apply where the permanent layoff is due to:

i. Strike
ii. Lockout
iii. Accident or catastrophic event
iv. Force Majeure/natural disaster
v. Temporary Plant shutdown

The obligation to make the payment of one week per year of service will not apply if any employee has successfully challenged the layoff for any reason and has filed a grievance successfully seeking reinstatement.

For employees in a Change of Employer situation where the new employer is not a competitor of OPG who are subject to involuntary layoff by the new employer, in addition to the cash payment of one week per year of service, the employee may have recall rights in OPG for 26 weeks. Employees recalled within the 26 weeks must pay back the balance of any cash payments based on their service and the date of recall (e.g. a 20 year employee who is recalled at the 5 week mark would pay back 15 weeks).

65 Vacancies (Relief, Rotations and Selections)

65.1 Intent

To provide open, fair access to career opportunities and enable OPG to optimize staffing requirements over time.

65.2 Definitions

"Relief/Rotations" assignments are short assignments where an individual is assigned duties outside their normal job duties.

“Relief” assignments will mean short-term assignments (normally up to 3 months) where an individual is appointed to act temporarily in an ongoing position or which is expected to become an ongoing position. In some cases, the individual may not be required to perform all of the duties and responsibilities of the position.
"Rotations" will mean assignments normally greater than 3 months but not exceeding 2 years in duration in positions which are not expected to be ongoing.

65.3 Advance Planning

Prior to filling the work assignment of greater than five (5) working days duration, Management will meet with the local Society representative to discuss the nature of the requirement (e.g., relief, rotation) its expected duration, the selection process and whether there is an expectation that the work assignment will result in an ongoing position.

65.4 Relief

65.4.1 Relief is used to cover (a) short-term absences for vacation, sickness, relief absences, etc., (b) short-term bridging periods for selection or rotation, and (c) short-term emergency situations.

65.4.2 The process for selecting the employee to fill the relief assignment should be easy and quick and provide a fair opportunity to employees in the work unit to perform relief.

65.4.3 If there is mutual agreement between The Society Unit Director and Management prior to the beginning of the relief assignment, the relief assignment and the incumbent(s) can run for a period of up to one year. In the absence of mutual agreement, the relief assignment is limited to 90 days.

65.4.4 Relief assignments will not be used continuously to avoid advertising either a rotation or an ongoing position.

65.4.5 Pay treatment while on relief will be in accordance with Article 66.

65.5 Rotations Within the Bargaining Unit

(This Article does not apply to rotations outside the Society jurisdiction. Article 5 applies to rotations outside the Society jurisdiction.)

Rotations are used to accomplish work for situations that occur between short-term relief and ongoing positions. At the completion of the rotation, the employee will return to his/her original position or a comparable position normally within the sending unit, except in the circumstances where the employee is surplus (see Article 64).

65.5.1 Principles

Job rotations serve many purposes such as:
a) to provide development opportunities to employees consistent with their career objectives;

b) to allow Management to meet temporary work programs and work load requirements;

c) to manage work performance or to test skills and capabilities where it is believed that an employee's skills and capabilities may be better utilized in another position;

d) to broaden the experience of employees so that they may better perform their regular jobs;

e) to provide employees with the opportunity to develop new skills for career advancement or to enhance career options in the case of anticipated redeployment or technological change which could result in skill redundancy or obsolescence;

f) to meet OPG’s employment equity objectives;

g) to provide Management with flexibility in resourcing regular positions as a result of employees being provided rotational opportunities and temporary relief assignments.

65.5.2 Rotations which are expected to last six (6) months or longer in duration will be posted unless there is agreement with The Society. The scope of the posting will be determined by the receiving unit and may be within the Department, Division/Business Unit or OPG-wide. Unless there is mutual agreement, the rotation will not continue beyond two years except where the position is formally identified as an ongoing training position.

A job rotation posting should include basic information such as the position name and location, salary level, a description of required duties, starting date and proposed duration of the rotation.

65.5.3 The optimal selection process is one in which the employee's interest in the job rotation opportunity, the sending unit's ability to release the employee and the receiving unit's interest in the employee coincide. Rotations will be voluntary.

The selection process should include the use of formal selection criteria and interviews will be the responsibility of the receiving unit.

65.5.4 Employees selected for rotation will be provided with a letter in advance of the rotation stating the nature, terms and conditions of the assignment, including rotation duration and details of the
184 performance appraisal process. These terms and conditions should be mutually acceptable.

65.5.5 An employee, other than those who are surplus, who accepts a job rotation will be given a guarantee by the sending unit that he/she can return to his/her original position, if available, or to a comparable position normally with the sending unit.

65.5.6 Terms and working conditions while on a job rotation will comply with all applicable Articles in the Collective Agreement concerning pay treatment, overtime, performance appraisal process, moving expenses, travel expenses and related OPG policies.

65.5.7 Employees should not be restricted from applying to advertised vacancies or from being subsequently released from the rotational assignment if selected where the employee is surplus or the vacancy represents a promotion.

65.5.8 Performance feedback is an essential ingredient in any rotational assignment and should be provided during and upon completion of the rotation. A rotation should not normally have a negative effect on an employee's Incremental Pay Step.

65.6 Selections for Assignments Other Than Relief or Rotations

65.6.1 All vacancies for assignments which do not fall into the category of relief or rotations shall be advertised OPG-wide unless there is agreement with The Society Local Vice-President or the following conditions apply:

a) during implementation of Article 64;

b) laterals or demotions in the case of sickness; employees with disabilities or special needs; employees returning from rotations, LTD, leaves of absence, foreign assignments, secondments/assignments outside OPG;

c) performance management that takes place following consultation with The Society;

d) ongoing exceptions in specified organizational units where there has been joint agreement of the JSMC;

e) "Progression" within a Progression-In-Place Plan or a proposal which has the joint agreement of the JSMC in accordance with Subsection 33.3.1. Vacancies for positions in a Progression-In-Place Plan will be advertised in a manner which informs employees that the position is included in a Progression-In-Place Plan and that where the best candidate
does not satisfy the qualifications or experience required for the end position the employee may be offered the position at a lower rate and be progressed in place.

Employees in categories (a) to (e) in subsection 65.6.3 will be considered at all levels of the PIP prior to those employees in categories (f) to (h) and subject to unit viability. Unit viability which would alter this consideration will be discussed in advance of advertising the PIP.

Exceptions to provide for the advertising of the position at a lower rate than the end position will be permitted by joint agreement between The Society Unit Director and the Business Unit Leader based upon a balanced consideration of:

- future work planning needs
- providing developmental opportunities for lower-rated staff outside of the Progression-In-Place Plan
- current work requirements
- unit viability and the need to have sufficient number of staff in the end positions.

In such cases, the vacancy notice will state that the position is part of a PIP Plan and surplus employees will be considered for placement at a lateral level.

f) a regular position currently held by an employee where a job review has resulted in a change in Salary Band;

g) to fill vacancies with the same occupation code within six (6) months of the ongoing posting, in which case Management may select from the previous list of candidates, after checking that surplus employees have not become available for consideration since the vacancy was last advertised;

h) to meet legislative requirements.

65.6.2 All applications which represent a promotion must be processed.

When an application to an advertised vacancy represents a lateral or demotion to a non-surplus employee, the following will apply:

a) Applications from employees with less than three years’ service in their current position will be processed and considered
where the supervisor determines that the move on balance would be in the best interest of OPG and the employee.

b) Applications from employees with over three years’ service in their current position will normally be processed and considered unless the move seriously jeopardizes the viability of the work unit.

c) Applications to an advertised vacancy which represent a demotion with an increase in base hours of work to a non-surplus employee will be processed where the employee’s Director determines that the move on balance would be in the best interest of OPG and the employee.

65.6.3 Selection Priority for Vacancies

65.6.3.1 Selection Priority for Vacancies

If there is more than one applicant for a vacancy within The Society's jurisdiction, the applicants will be considered in the priority set out below:

a) Surplus Society-represented employees who have elected the priority consideration option in Subsection 64.17 (Declared Surplus - Significant Inequity Rights).

b) Surplus Society-represented applicants for whom the vacancy represents a lateral or demotion including surplus trainees applying for MP2 or equivalent and who were mixed and matched with employees who are not Management and Professional Trainees.

c) Surplus employees who are Management and Professional Trainees who were not mixed and matched with employees who are not Management and Professional Trainees and who have greater seniority than Surplus Applicants who are not Management and Professional Trainees will have priority consideration for MP2 and equivalent vacancies before the applications from all other individuals other than those in (a) and (b) above.

d) Surplus applicants from positions that are excluded from The Society (i.e. Society Equivalent Management Group Jobs (formerly MF)) and for whom the vacancy represents a lateral or demotion.

e) Society-represented employees and Society Equivalent Management Group Jobs (formerly MF) applicants from a
A business unit that has invoked Article 64 and a JRPT has not completed its mix and match for whom the vacancy represents a lateral or demotion.

f) Selection on a “best qualified” applicant basis from among regular Society-represented applicants, regular Society Equivalent Management Group Jobs (formerly MF) applicants, and applicants with recall rights under Article 64.30 or 64.41 (i).

g) Selection on a “best qualified” applicant basis from among all other regular applicants from OPG.

h) Selection on a “best qualified” applicant basis from among temporary employee applicants with OPG.

i) External to OPG.

Assessment of the suitability of a surplus employee for a lateral or lower level placement opportunity will include education, experience, personal contribution factors and potential for training to perform the job requirements within a reasonable period of time (e.g. up to six (6) months). A surplus employee who is placed and who requires additional training to perform the job requirements with assistance to obtain the necessary training and development to perform the new job requirements. OPG will restructure the cost of retraining so it mitigates the disincentive in the redeployment of surplus staff.

A determination that none of the applicants in category (a) is qualified or qualifiable within a reasonable period of time is required before considering the applicants from the next category. The same is true with respect to categories (b), (c), (d), and (e).

See subsection 65.6.1 for priority consideration of applicants to Progression-In-Place Plan vacancies.

OPG agrees to grant priority to Society-represented employees in the business organization corresponding to The Society’s bargaining unit who are surplus and to those who fall within subsection 65.6.3(e) who apply for positions excluded from all union jurisdictions and for whom the vacancy represents a lateral or demotion, after the consideration of surplus applicants in the business organization corresponding to The Society’s bargaining unit who are excluded from all unions for whom the vacancy represents a lateral or demotion and prior to consideration of all other applicants.
In determining who is the best qualified candidate for positions, in each category of subsection 65.6.3, the primary basis for the selection of employees is their assessed capability to perform the necessary work. The selection criteria would normally include but not be limited to the following:

a) requirements including skill, knowledge, education, experience, transferable/generic skills such as analytical skills, communications skills, project management skills, consulting skills, self-management skills, accountability, responsibility, etc.;

b) the candidate's past track record and what she/he brings to the position;

c) the candidate's potential to develop competence for more senior positions;

d) the need to meet legislative requirements;

e) the need to balance the overall requirements of the work unit.

Employee selection measures which are used as aids in selection decisions shall be job related and be used in a manner that is fair and equitable to the individuals being assessed. Individuals will be entitled to prior knowledge of the selection criteria and be entitled to information with respect to their performance in the selection process upon request.

Some flexibility should be exercised in accepting late applications to advertised vacancies after the closing date in order to permit employees a fair opportunity to continue employment yet still allowing the Business Unit to resource expeditiously.

Where the closing date is FIRM, it must be stated clearly in the vacancy posting that late applications will not be considered.

a) Surplus and non surplus employees are normally expected to have made application to a vacancy by the closing date.

b) It is recognized that in some instances, there will be applications filed after the official closing date. In these cases, unless the closing date is FIRM, late applications must be filed with the advertising location NOT later than the date that the "short list" of applicants is finalized for formal consideration.

- The term “Short List” refers to the first list of applicants who Management plans to interview for a vacancy.
c) Employees who have applied for vacancies and are later declared surplus have until the “short list” date to notify the advertising location of the change in their status.

65.6.7 Applicants to advertised vacancies are to be advised of the status of the vacancy (and of their applications) within a reasonable period of time for each successive step they qualify for.

65.6.8 When outstanding vacancies remain unfilled for longer than six months, employees in the work unit concerned should be advised of the reason for not filling such vacancies.

65.6.9 All positions on Salary Schedules 01, 02, 03, 04, 05, 08, 09, 10, 11, 12, 13, 15, 22 which are excluded under the Recognition Clause and first-level ESR vacancies including rotational opportunities expected to last longer than six months will be posted on appropriate bulletin boards (and through electronic means where possible).

65.6.10 Release of Employees Selected to a Vacancy

Intent:

(a) OPG will strive to facilitate the expeditious release of employees who are selected to a vacancy.

(b) Normally, employees should be released within 90 days of the vacancy selection. In the event that a release date greater than 90 days appears likely, Management will discuss the reasons for the delay and a release date with The Society.

66 Salary Treatment For Promotions, Temporary Assignments, Lateral Transfers and Demotions

66.1 Definitions

Band Hierarchy (low to high): MP-2, MP-3, MP-4, MP-5, MP-6

For further clarity:

- Schedules 03 and 09 shall be treated as lateral pay schedules for the purpose of movement of employees between these two schedules under the Collective Agreement when considering two positions at the same salary band/step.

- A change of position that results in a change in step and/or band will be considered “a job change” per
Article 23 and will reset the annual progression date to the effective date in the position.

"Promotion":

This occurs when an employee is appointed to a position in a higher band.

"Lateral Transfer":

This occurs when an employee is appointed to a position in the same band.

"Demotion":

This occurs when an employee is appointed to a position in a lower band.

The parties recognize that employees in PIP positions accepting positions outside of their present PIP family will receive the equivalent treatment insofar as promotions, lateral transfer and demotions as if their status in their PIP (MP 2, MP 3 or MP 4) was on the corresponding band. The parties further agree that progression in a PIP will not be considered a promotion.

66.2 Promotion

66.2.1 It is normally expected that an employee will receive a salary increase upon promotion to compensate for the greater demands and responsibilities of the new, or revised job.

66.2.2 A grandfathered employee may receive a promotional increase when selected to a position in a higher band, and this increase may result in the employee being still above the band in the new position.

66.3 Reclassification as a Result of a Job Re-evaluation

66.3.1 Reclassification may occur under several circumstances:

a) when the salary band for a job increases with no change in the employee’s actual job duties/responsibilities;

b) when the employee has been and will continue to perform additional job duties/responsibilities;

c) when additional job duties/responsibilities are to be added to the job.
d) Reclassification as a result of (a) or (b) above will result in the employee being placed in the step nearest to a 6.6% increase in the higher salary band. 

15

e) Reclassification as a result of (c) above will be considered a promotion.

However, at his/her next automatic annual progression the employee will be eligible to be placed at the appropriate step as before the reclassification, that represents a salary increase at the step nearest to a 6.6% increase in the higher salary band. 

16

f) A grandfathered employee shall receive the reclassification increases in points d) and e) above. These increases may result in the employee being still above the band in the reclassified position.

g) Positions reclassified under this Article shall retain their previous automatic progression date.

66.3.2 Short-term increases in the employee’s actual job duties/responsibilities do not require reclassification but may be subject to the relief provisions of this Collective Agreement.

66.3.3 Retroactive payments, if any, that result from reclassification either because of a Management or employee-initiated job review will be limited to a maximum of one year prior to the date of the job review request. The employee must have performed the relevant duties and responsibilities which resulted in the reclassification during this period in order to qualify for retroactivity.

66.3.4 Retroactivity which results from a reclassification decision will be paid within 60 calendar days of the final decision on the rating.

66.4 Temporary Assignment in a Higher-Rated Job

66.4.1 From the first working day performing in a higher-rated job an employee shall receive:

a) a salary increase whereby, as a minimum, the employee is placed on the step nearest to a 3% increase when assigned to

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15 The reference to 6.6% in Article 66.3.1 d) shall be interpreted as 6.6% per band of reclassification. Note: as per grievance settlement for OPG 1399/OPGI-2009-2618 signed August 2010.

16 The reference to 6.6% in Article 66.3.1 e) shall be interpreted as 6.6%, regardless of level of reclassification. Note: as per grievance settlement for OPG 1399/OPGI-2009-2618 signed August 2010.
work in a position one or two bands higher than the employee's normal job;

b) a salary increase whereby, as a minimum, the employee is placed on the step nearest to a 5% increase when assigned to work in a position more than two bands higher than the employee's normal job.

66.4.2 To be eligible for the payments above:

a) the position must be filled to satisfy operating requirements; and

b) the employee must perform all or most of the normal job duties of the position as expected during the course of the assignment.

Where a temporary assignment to a higher-rated position is discretionary and optional for the employee, pay treatment is also discretionary. Discretionary means that the temporary assignment is not required to be filled to satisfy operating requirements, in the opinion of OPG, and represents a developmental opportunity.

66.5 Lateral Transfer

Normally, an employee who is appointed to a lateral position should receive no increase in current pay.

66.6 Demotions

An employee who voluntarily accepts placement in a lower rated position will result in an individual being brought across at the same step in the new band. In the event that the employee is paid above the top step of the band the individual will have his/her current base salary dollars frozen until the employee's current pay entitlement as determined by the salary band and step exceeds the frozen level. An employee may apply to The Society in advance of submitting a job application and/or acceptance of a job offer for an exemption from this provision. Exceptions that occur as a result of performance management (Clause 65.6.1 (c)) require advance consultation with The Society.

67 Purchased Services Agreement (PSA)

Except as indicated by Letter of Understanding (LOU) 188, Article 67 and LOU's 122, 124, 125, 126 and 175 are suspended for the term of LOU 188. Purchased Services for this term are governed by LOU 188.
1. During the term of LOU 188 there shall be no involuntary layoff of any Society represented employees as a result of contracting out.

67.1 Scope

This Agreement was developed jointly in a spirit of co-operation and trust. It is intended to provide a joint approach to making good business decisions which involve the use of purchased services. Its application calls for these decisions to be made in the same spirit of co-operation and trust.

What follows is based upon the belief that there is value and benefit to the employee, the Company and the customer if:

- There is a greater involvement and therefore responsibility by employees in all aspects of the decision making process.
- There is an improved understanding as to why purchased services are used.
- Employment security and career opportunities are enhanced by a productive, healthy and cost effective organization.
- We collectively strive for excellence by continuously improving whatever we do and by fully utilizing the capabilities of all employees.
- The Society and Management work together and act responsibly balancing the interests of the customer, the Company and the employee in decisions relating to the use of purchased services.

This is a way of deciding how work gets done. It is not intended to hinder getting work done.

67.2 Assignment of Work

67.2.1 Philosophy

It is the Company’s intent to use Society represented staff to perform most of its work where they are able to perform it well and effectively. Furthermore, the Company will strive to provide regular staff with stability of employment.

The parties agree that a consistent, managed, joint approach to the assignment of work within the Company is necessary to provide security and career opportunities for employees, a more effective, productive organization and an excellent product for the consumer.
67.2.2 Principles

The following principles apply to the relationship between the Company and The Society with respect to the work performed by Society represented staff.

a) We will within OPG have all work conducted as effectively as possible.

b) We will measure the effectiveness of all work by its impact on staff, on the business, on the environment and by its ultimate impact on our customers.

c) We will do most work with Society represented employees if they can perform it well and effectively.

d) We will determine when work is to be done by non-Society represented staff through a joint decision making process and the results of these decisions will be a joint responsibility.

e) We will use the enhanced surplus staff agreement for employees who are surplus as a result of contracting the work they normally would have performed.

f) We will use a team and consensus approach when making decisions and any issues arising will be resolved internally, where possible.

g) We will consult and make timely decisions consistent with the need to get work done.

h) We will develop, implement and continue a joint process of communications and education.

i) We will achieve consistency through the use of these principles versus policy and procedure.

67.3 Decision Process

67.3.1 Responsibility for Decisions

The persons who are responsible for applying the decision process, including making timely decisions and taking responsibility for them are the Company representative with the appropriate decision authority and The Society representative designated by The Society. It is recognized that a given decision may require the involvement of more than these two persons.
67.3.2 Opportunity

The parties recognize that work may be done more effectively internally or externally. Opportunities for the application of this Article to new or existing work can be initiated by Management and/or The Society. It is intended that joint discussion should commence as soon as possible and before detailed definition of the need to have new or existing work done by purchased services.

67.3.3 Definition of Need

The parties will consider what work must be done and why and include such dimensions as:

- when it must commence and the duration of the work; the quantity of resources required;
- the quality of the results;
- the skills required and their availability internally and externally; and
- safety requirements.

67.3.4 Alternatives

The parties will consider such alternatives as:

- do the work internally;
- do the work internally and plan to do it externally in future;
- do part of the work internally and part externally;
- do the work externally and agree to acquire capability to do the work internally in future; or
- do the work externally.

67.3.5 Evaluation

The parties will evaluate the alternatives considering the impact on the customer, employees and the business. The total effectiveness of the alternatives will be evaluated considering both the short and long-term impacts. In given situations, certain criteria may be given a greater or lesser degree of importance. Such criteria as:

- reliability of service to the customer,
- responsiveness to customers,
- community impact,
- Corporate relations impact,
- external stakeholder interests,
- employment continuity,
- career opportunities,
ability to perform work,
degree of overtime required for the work,
availability of resources,
cost,
timeliness,
quality,
need for control over results,
safety, and
impact on environment will be assessed.

67.3.6 Decisions to use purchased services will be made on a consensus basis. Both parties must consider all the relevant criteria with the mutual goal of selecting the most effective option. When appropriate, consideration should be given to developing implementation plans.

The parties agree that disputes arising out of this process must be resolved internally, where possible. Where the parties cannot reach agreement, the parties will apply the dispute resolution process set out in 67.4.

67.4 Dispute Resolution Process

67.4.1 Joint Resolution Committee (JRC)

The purpose of this Joint Committee is to resolve disagreements or disputes between the parties on a consensus basis in a timely and expeditious manner. In its deliberations, the JRC will consider the factors in items 67.1, 67.2 and 67.3.

Prior to a meeting of the JRC, the Company will provide The Society with the following information related to the proposed purchased service.

- copies of the Tender or Request for Proposal documents, if there are any;
- an accurate description of the work which is the subject of the proposed purchase service;
- accurate details on bids, e.g., price, scope of the work as set forth in the bid;
- a full cost benefit analysis including incremental costs but excluding overhead costs which would be incurred.

67.4.2 Membership

The membership of the JRC shall be as follows:
(a) William Kaplan shall act as Chairperson of the JRC and as a
facilitator/arbitrator. The Chairperson shall assist the parties
to resolve all issues of application and interpretation of this
Article with the power and authority of an arbitrator under the
Ontario Labour Relations Act but not subject to the Arbitrators’
Act.

(b) One Management and one Society representative plus
additional resources as required.

(c) In the event of the parties not being able to reach a
consensus decision the facilitator/arbitrator will have the
power to make decisions and will have the authority to make
such orders as he/she deems appropriate to give full effect to
his/her decision(s) and to deal with any consequences his/her
decision(s) might have in the workplace.

(d) Where either party wishes to proceed with a Purchased
Services discussion, the parties will endeavour to complete
discussion within 10 days of notice to The Society in the
prescribed form and that full resolution, including review by
the JRC, will occur within 30 days of notification.

(e) Where the Company proceeds unilaterally on the basis that
an emergency exists, The Society may request that the JRC
and/or the facilitator/arbitrator review the matter, provided that
a request for review is made within 3 days of receipt of the
information as per 67.4.1 above. If the facilitator/arbitrator
determines that an emergency did not exist he/she may
impose such remedy as may be appropriate in the
circumstances.

(f) The Society will not be prejudiced in any subsequent case by
a particular purchase of services. Similarly, the Company will
not be prejudiced by any decision not to purchase services.

67.4.3 It is understood that emergencies are in a different category. In
the case of an emergency, the joint decision provisions of this
Article need not be applied. The Company will notify The Society
as soon as it has determined that an emergency exists and that it
will proceed unilaterally. The JRC and/or the facilitator/arbitrator
may review the decisions made by the Company that an
emergency existed.

67.5 Structure

67.5.1 Joint Society Management Committee (JSMC)
The JSMC has overall responsibility for this Article and its success. It is responsible for ensuring that the Article is implemented and applied in a manner which is consistent with the philosophy and principles outlined in Sections 67.2.1 and 67.2.2. It will conduct a periodic assessment and evaluation of this Article and determine the need for any improvements and changes. The committee will strive for continuous improvement of the process contained herein.

67.5.2 Joint Purchased Services Team

The Joint Purchased Services Team will assist the JSMC in achieving its mandate relative to the use of purchased services. It will be responsible for developing and delivering training and awareness programs and ongoing measurement of the process and results.

67.6 Application

67.6.1 The parties will jointly develop implementation plans for approval by the senior management of the Company and The Society. These implementation plans will include a plan for training employees involved in the decision process.

67.6.2 Where a service is obtained for the OPG bargaining unit from a business which has Society-represented employees who are providing the service, The Society will agree to waive the application of Article 67 (Purchased Services Agreement – PSA) provided that such purchased service does not directly result in a surplus of Society-represented staff in OPG. Article 67 shall be applied in the service provider bargaining unit or business where the service provider wishes to purchase external services in order to provide service to another OPG bargaining unit.

67.6.3 OPG and The Society agree to consider waivers of Article 67 for those organizations, partnerships and service providers who will in the long term enhance OPG competitiveness through cost reductions and productivity improvements.

68 Hours of Work

68.1 The Salary Schedule 03 applies to 35 hours of work per week, with regular scheduled hours between 35 and 39 hours per week paid on a prorated basis. Schedule 09 applies to 40 hours of work per week.
Schedules 03 and 09 shall be treated as lateral pay schedules for the purpose of movement of employees between these two schedules under the Collective Agreement when considering two positions at the same salary band/step.

68.2 OPG will comply with legislative requirements regarding hours of work.

68.3 Reduction of Hours of Work

An employee who is selected to a vacancy having less hours than their present position, or the standard hours of their present position are reduced by management, shall have their hours of work reduced in accordance with article 64.26.2.

69 Article 69 (Formerly the RWE Article) has been deleted

70 Alternate Hours of Work Arrangements

70.1 Principles

70.1.1 That any alternative arrangements will positively affect our customers. That cost, quality, service and value are key to our success.

70.1.2 That work is best achieved when individuals manage their own time and accept the accountability and the responsibility for the results.

70.1.3 That processes for negotiating and establishing hours of work arrangements will be uniform across OPG, and accessible to all. The processes will be designed to ensure equitable treatment. However the results of applying the processes may differ from location to location and unit to unit.

70.1.4 That decisions should be made at the most appropriate level that is closest to the work being done.

70.1.5 That individual concerns will be factored into group proposals and wherever possible, participation in changed hours of work will be on a voluntary basis.

70.2 Application

The procedure described in this Article applies to all forms of alternate hours of work arrangements.
Definitions

"STANDARD HOURS OF WORK" are to be worked to provide coverage for the business hours. For people assigned to day work, the standard hours of work shall not begin before 7:00 a.m. nor end after 6:00 p.m. They are:

- for 35 hour/week staff - Monday through Friday, 7 hours per day; and
- for 37.5 hour/week staff - Monday through Thursday, 8 hours/day and 5.5 hours on Friday; and
- for 40 hour/week staff - 8 hours per day, Monday through Friday.

In the absence of any other agreed upon arrangements these are the hours which will be worked. In situations where there is need for 24 hour and/or 7 day/week coverage the hours of work will be a matter of local arrangement.

"NORMAL HOURS OF WORK" are either the standard hours of work or another arrangement as agreed upon using this process.

"STANDARD BUSINESS HOURS" are determined by the needs of the business and the customers.

"NORMAL BUSINESS HOURS" are either the standard business hours or another arrangement as agreed upon using this process. The normal business hours are just a variation on the standard business hours. They would normally arise from a change in customer needs.

FLOW CHART OF THE PROCESS

Normal hours of work/business hours
↓
Identify need for change
↓
Communicate need
↓
Develop options
↓
Analysis
↓
Decision
↓
Negotiations/Approvals
↓
Implementation
↓
Monitoring
70.4 Overtime

Hours worked in excess of the normal hours of work will be considered to be overtime except where there has been agreement between the supervisor and the employee for the employee to work in excess of normal hours to make up time.

The pay treatment for Saturday and Sunday will form part of the Agreement which establishes the normal hours of work.

70.5 Process

70.5.1 Identify Need for Change

Identification of the desire for change can come from Management, an individual or a group. A request to change business hours would normally come from Management whereas a request to change working hours would normally come from an individual or group. Where a change to the hours of work for a group is being considered, The Society will be informed and involved in the discussions.

70.5.2 Communicate Need for Change

A request for a change should be communicated to the other party in order that deliberations can begin. Requests will be actively considered by the other party within a reasonable period of time. The process will be joint (Society and Management) and will use a collaborative approach in which the needs and interests of the parties are discussed in an open and honest manner and decisions are made by consensus.

70.5.3 Develop Options

A list of options will be jointly developed and agreed upon. As a minimum, the following criteria will be considered when analyzing the options:

- customer needs
- business needs
- maximum/minimum number of hours that can be worked daily
- overtime/premium provisions
- employee needs
- health and safety considerations
- legal and contractual considerations
70.5.4 Analysis

All options should be analyzed using appropriate tools and measures. The analysis should include a discussion of the options considered, their relative merits and the rationale for the recommendation.

70.5.5 Decision

All decisions will be reached by consensus. If consensus is not achieved then the existing "normal" hours remain in effect.

Consensus means everyone can live with and publicly support the outcome.

70.5.6 Negotiations/Approvals

Negotiations and/or approvals should occur at the appropriate level closest to the situation. The line Director will determine the appropriate level of Management approval and in all cases the Management approval must be outside of the bargaining unit. If necessary, Letters of Understanding will be established between Management and The Society to document normal hours of work or normal business hours.

All parties to negotiations under Article 70 should negotiate with the support of principals who will ultimately approve negotiated conditions.

70.5.7 Implementation

Implementation will be on a trial basis initially for an agreed upon length of time and with appropriate cancellation provisions. Criteria for success/failure must be established.

70.5.8 Monitor

The trial will be monitored and evaluated against the criteria. The accountable manager is responsible for monitoring the arrangement.

Following a successful trial period the hours (business hours of work) used in the trial period will become the new normal hours.

Monitoring of key indicators will continue to ensure that the arrangement remains viable.

In the event that the viability ceases to be realized, as determined by either party, the hours of work will revert to the previous
"normal" hours unless the parties can jointly find another mutually acceptable alternative. When either party is making a determination about viability it must consider the previously established criteria for success/failure.

### 71 Reduced Hours of Work (RHOW) Arrangements

#### 71.1 Principles

- **71.1.1** Employees working RHOW are regular employees and have equal access to all OPG policies and agreements (e.g. employment continuity).

- **71.1.2** The RHOW arrangement must be mutually beneficial and acceptable to both the employee(s) and to OPG.

- **71.1.3** The benefit entitlement will be prorated, wherever possible and appropriate.

#### 71.2 Definitions

A "REDUCED HOURS OF WORK (RHOW) AGREEMENT" is a formal arrangement which individual employees can enter into with Management to perform work over a period of time by working less than the base hours for a full-time position. A RHOW agreement could apply to one individual or two or more in a job sharing arrangement.

"WORK UNIT" is an organizational grouping of employees and may be as small as a crew or as large as a Business Unit.

"BASE HOURS" are used to establish the rate for a full-time position; such as 35, 37.5, or 40 hours per week.

"NORMAL (SCHEDULED REDUCED) HOURS" are the agreed upon reduced hours of work, which are less than the base hours, and form the basis for prorating benefits.

#### 71.3 Guidelines

In determining if a RHOW arrangement is acceptable, the following factors will be considered:

Productivity levels will be maintained or improved. There should be identification of how this change will potentially affect the productivity of the work unit (including assumptions and rationale used to assess the impact), and identification of the proposed method for follow-up and measurement of productivity impact(s) resulting from the change.
The need to maintain staff capability on an ongoing basis is to be taken into account. Identification of the staff capabilities required by the work unit to maintain effective operations, and how the reduced hours of work arrangement will accommodate or improve this capability should occur.

The appropriate level of service to both external customers and internal customers/clients should be provided. There should be identification of the customers/clients of the work unit and the service provided by the work unit to these customers/clients, and anticipation of the impact of the reduced hours of work arrangement on the service provided.

Effective work flow among work units will be maintained. Other work units impacted by the change, and the anticipated impact of the reduced hours of work arrangement on the work flow among the work units should be identified.

Requirements for supervision must be taken into account. Potential issues relating to supervision (e.g., span of hours), and how the work unit plans to deal with these issues should be determined.

The change to reduced hours should be agreeable to both Management and the employee(s) involved. A written Reduced Hours of Work Agreement must be signed to confirm that this matter has been agreed upon by the parties involved.

71.4 General Conditions - Reduced Hours Arrangements

71.4.1 Advertised Vacancies, and Employment Continuity

Employees who are on Reduced Hours are regular employees and will be treated accordingly. Therefore, they will be: (a) eligible to apply and be considered for advertised vacancies; (b) given annual performance reviews; (c) have access to the Employment Continuity Article.

71.4.2 Established Commencement Date (ECD)

ECD will be manually adjusted at the beginning of each year, to reflect the normal (scheduled reduced) hours worked in the previous year while on Reduced Hours, or at such intervals as may be necessary, to reflect the equivalent full years worked. ECD will not be adjusted for sick leave purposes.

71.4.3 Vacation Credit Date (VCD)

The VCD will not be adjusted. It will reflect calendar years. This date affects vacation bonus entitlement for all eligible staff and includes all Hydro service regardless of breaks. It may be different from the ECD.
71.4.4 Service Recognition Date (SRD)

For recognition of 5, 15, 25, and 40 years of service with OPG and consistent with the provisions of section 9.3 of the 2006-2010 Collective Agreement, the SRD will not be adjusted.

71.4.5 Wages

Reduced hours employees will be paid for normal (scheduled reduced) hours worked, based on the hourly rate for their base hours. Wages will be prorated based on the proportion of the normal (scheduled reduced) hours of work compared to the base hours of the work unit or the appropriate full-time position.

Example:  
Base Hours = 35 per week.
Base Salary = $700.00 per week.
Normal (Scheduled Reduced) Hours = 21 per week.
Normal (Scheduled Reduced) Hours Salary = $700.00 \times \frac{21}{35} = $420.00 per week.

71.4.6 Pension Plan

71.4.6.1 Pension Plan Membership

New employees working reduced hours must apply for membership in the Pension Plan after completing 24 months of continuous service, subject to the following conditions:

- accumulated earnings, including overtime, must equal 35\% of the Year's Maximum Pensionable Earnings (YMPE);
  
  and/or

- all accumulated hours, including overtime, must equal 700 (scheduled reduced) hours in each of the two previous calendar years.

71.4.6.2 Pension Plan Deductions

Once qualified as above, Pension Plan deductions for Regular Reduced Hours employees will be based on base earnings for the position and then pro-rated in
proportion to the ratio of normal (scheduled reduced) hours to base hours.

Example:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Base rate (earnings)</td>
<td>$45,000</td>
</tr>
<tr>
<td>Base hours</td>
<td>35</td>
</tr>
<tr>
<td>Normal hours</td>
<td>20</td>
</tr>
<tr>
<td>YMPE for year</td>
<td>$32,000</td>
</tr>
</tbody>
</table>

Calculate 7% of the base earnings \((7/100 \times 45,000 = 3150)\)

Calculate proportional Pension Plan contributions \((3,150)\) \((20/35 \times 3,150 = 1,800)\).

Calendar service will be used to determine eligibility for retirement and death benefits (currently for pension purposes as Eligible Service or Continuous Employment).

Service credit to define the years of Pension Plan membership (years of membership in the Pension Plan) for pension calculation purposes (currently defined by the Effective Date on Pension and Insurance) is prorated. See pension calculation example below.

The Service Credit starts from the date of joining the Pension Plan.

Service for termination benefits is to be credited on a calendar basis starting with the date of hire and is not prorated.

### 71.4.6.3 Pension Calculation

The following is an example of how the pension of an employee in a Reduced Hours of Work arrangement would be calculated. Assume an employee has the following years of employment: 20 years full-time, followed by 5 years of 50% part-time, and then 10 years full-time.

For pension eligibility purposes the employee has 35 years' service, i.e. \(20 + 5 + 10\) to calculate the amount of pension to be received the part-time years are pro-rated.

\[20 + \frac{5}{2} + 10 = 32.5\text{ years pensionable service}\]

\[30 + \frac{5}{2} \times 2\% = 65\%\text{ pension.}\]
If the reduced hours years were the last five years, i.e. 30 years full-time + 5 last years at 50% part-time, the part-time earnings would be annualized as follows, assuming the part-time earnings are $25,000 or 50% of the yearly rate of $50,000 for the last three years of employment.

The calculation is as follows:

\[(30 + 5/2) \times 2\% = 65\%\] pension
annualized pension is $50,000 \times 65\% = $32,500/year.

**71.4.7 Life Insurance**

Coverage is dependent upon being a member of the Pension & Insurance Plan. The basic insurance (2 times salary) plus any additional term insurance will be prorated in accordance with the prorating of wages above.

**71.4.8 Health and Dental Benefits**

Employees will have the option of receiving full benefit coverage for semi-private hospital, extended health benefits, and/or dental benefits, by using payroll deduction to reimburse OPG the cost consistent with the appropriate pro-ration. For example:

If an employee works 21 hours per week, he/she would be subsidized for 21/35 or 60% of the costs and he/she would pay the remaining 40%. If an employee chooses not to pay the remaining prorated percentage, there will be no coverage.

**71.4.9 Sick Leave**

Restoration of sick leave credits for days used will be in accordance with the Sick Leave Plan provisions.

Sick leave should accumulate at the regular times (January 1 or July 1). While ECD is adjusted for other purposes, sick leave accumulation and restoration dates should remain unchanged.

Annual sick leave credits will be prorated, based on normal hours worked.

**Example**

100% Entitlement Accumulation

- Employee works 21 hours per week 21/35 x 8 days = 4.8 days, rounded to 5 days.
75% Entitlement Accumulation

- Employee works 21 hours per week \(21/35 \times 15 = 9\) days.

Rounding should be to the nearest half day. Time Reporting for vacation, sickness, accident and overtime, etc. will be the same as for any other regular employee.

71.4.10 Long Term Disability (LTD)

LTD is dependent upon being a member of the Pension & Insurance Plan and benefits will be based on the employee's normal (scheduled reduced) earnings, excluding overtime and allowances.

71.4.11 Accident Insurance

Employees are eligible for 100% benefit.

71.4.12 Statutory Holidays

Both the entitlement to statutory holidays and the payment for the statutory holidays will be prorated. The following table illustrates the entitlement:

<table>
<thead>
<tr>
<th>Days Worked Per Week</th>
<th>Number of Days Entitled to Per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>9(^{17})</td>
</tr>
<tr>
<td>5</td>
<td>11</td>
</tr>
</tbody>
</table>

The pay on a statutory holiday will be equal to the pay for the average daily hours of the RHOW employee. For example:

An employee works 4 days per week @ 5 hours per day. In accordance with the entitlement table above the employee is entitled to 9 statutory holidays per year. Payment for each statutory holiday will be for 5 hours since that is the average of the 4 days per week the employee works.

\(^{17}\) Updated due to the addition of Family Day to Statutory Holidays
71.4.13 Floating Holidays

These will be prorated in the same manner as statutory holidays, i.e. both the entitlement and the payment on the days will be prorated. For example, an employee who works 3 days per week and 7 hours on each day worked will receive:

\[
\frac{3}{5} \times 3 \text{ days} = 1.8 \text{ rounded to nearest half day} = 2 \text{ days}
\]

the payment for each day will be for 7 hours since that is the average hours per day the employee works.

71.4.14 Vacation

A. Less than 1 year - 4% of accumulated wages.

B. For one year, or more:

Vacation entitlement will be based on calendar years (i.e. VCD). The entitlement in any given year will be prorated based on the average number of days worked per week and the actual payment for those days will be based on the average number of hours worked per day.

Example - (a)

A regular full-time employee who commences RHOW on January 1 and who otherwise would be entitled to 20 days' vacation, contracts to work 3 days per week at 7 hours per day (21 hours per week), for the full vacation year, while the remainder of the work unit works 35. The vacation entitlement will then be:

\[
20 \times \frac{3}{5} = 12 \text{ scheduled days off.}
\]

The payment on each of the 12 days would be for 7 hours pay since that is the average number of hours the employee works per day. Therefore the total pay will be 12 days @ 7 hours pay = 84 hours pay.

Example (b)

An employee who works 5 days per week but works only 4 hours per day.

\[
20 \times \frac{5}{5} = 20 \text{ scheduled days off}
\]

The payment for each day would be for 4 hours since that is the average number of hours the employee works per day. Therefore the total pay will be 20 days x 4 hours pay = 80 hours pay.
71.4.15 Overtime

The normal lieu time provisions will apply. Overtime will be paid at appropriate rates for:

- hours worked beyond the base full-time hours on a day (unless additional hours are part of the RHOW arrangement);
- hours worked beyond the base full-time hours in a week;
- hours worked on a Saturday, Sunday or statutory holiday that is not a normally scheduled day.

71.4.16 Pregnancy/Parental Leave

Employees will be eligible for pregnancy/parental benefits. Coverage will be based on normal (scheduled reduced) earnings and normal (scheduled reduced) hours.

71.4.17 Unemployment Insurance Contributions

This is based on gross earnings (which includes overtime premiums, shift differential, etc.).

71.4.18 Canada Pension Plan (CPP)

CPP contributions are based on gross earnings.

71.4.19 Workers’ Compensation Benefits

Entitled to 90% of normal weekly net earnings, plus a supplementary grant (total is 100% of normal weekly net earnings).

71.5 Termination of the RHOW Agreement

The initial period of a RHOW arrangement will be considered to be a trial period. The length of the trial period is to be determined by the parties but will not normally be longer than 1 year. If problems are encountered during this period, the employee(s) and the supervisor will attempt to find a solution(s). In the event that these efforts are not successful the RHOW arrangement can be cancelled by either party with 30 days’ notice.

After the trial period, situations may arise where the RHOW is no longer working or the workload has increased or decreased. In such situations alternate arrangements can be tried. These could include offering additional hours/days (if there is some) to the RHOW employee, or advertising another RHOW arrangement to make up any difference.
In situations where the workload increases, the employee working the reduced hours will have the first option of working the additional hours. The employee could choose not to work the additional hours. If satisfactory alternative arrangements are not found, Article 64 will be applied.

An employee who wishes to terminate the arrangement has the same rights to vacancies as full-time employees. If unsuccessful in obtaining another position or in negotiating a new arrangement with Management, and the employee terminates the arrangements, the employee will be considered to have resigned from OPG.

(SAMPLE) REDUCED HOURS OF WORK AGREEMENT

To: __________ Department: ______________ Effective date:  __________________

Type of Arrangement: ___Individual    ___ Job Sharing    ___Temporary Work

The following information is pertinent to your Reduced Hours of Work Agreement with OPG.

1. Hours of work: ________  days (_____ hours) per week, __________ hours per day.

2. Salary: Weekly salary will be $ __________ per week based on scheduled reduced hours of per week at Schedule ____ Grade ______.

3. Health and Dental Benefits:

Indicate, by circling the appropriate "yes" or "no", whether or not you are exercising the option of receiving full benefit coverage for semi-private hospital coverage, extended health benefits, and/or dental benefits, using payroll deductions to reimburse OPG for the cost consistent with the appropriate proration. Should you elect health and/or dental benefits, the monthly cost will be as follows:

Elected Coverage:
Semi-private hospital coverage   _____% $_______Yes / No
Extended Health Benefits    _____% $_______Yes / No
Dental Benefits    _____% $_______Yes / No

4. All other terms and conditions will be in accordance with the Article on Reduced Hours of Work for Society Represented staff.

The trial period will be for ____ months. The parties agree that the Agreement can be terminated with one month's notice during this trial period in the event the arrangement is unsuccessful.

If you agree with the conditions set out above, please sign one copy of this Agreement for your Personnel File. Also, please indicate if you wish to be covered by any, or all, of the above health and dental benefits.

Manager: ________________________ Employee: _______________________

Date signed: ______________________ Date Signed: ______________________
71.6 Responsibilities

The Employee(s):

The employee(s) should discuss his/her interest in a Reduced Hours of Work Agreement with the manager/supervisor. An employee who wishes to work Reduced Hours should prepare a proposal for doing so. The proposal should include a current job description and ways in which the job requirements could be met under a Reduced Hours of Work Agreement. It should include suggestions for methods of communication among Regular staff members, their managers/supervisor, customers and clients with whom the job interfaces, as per the Guidelines (Section 71.3).

The Manager/Supervisor:

The Manager/Supervisor is responsible for determining if a Reduced Hours of Work Agreement is appropriate and in certain instances may initiate action to implement such an arrangement. The Manager/Supervisor will discuss the possibility of a Reduced Hours of Work Agreement with interested employees to assist them in establishing appropriate arrangements. The Manager/Supervisor will identify issues specific to the job which need to be addressed, inform employees of their entitlements and approve the proposed Reduced Hours of Work Agreement after the appropriate review.

The Manager/Supervisor is responsible for ensuring that the productivity in the work unit does not deteriorate as the result of a Reduced Hours of Work Agreement. If productivity is seen to decline, the supervisor should work with the incumbent(s) to identify ways to improve the situation.

72 Peak Demand Hours Arrangements / Project Crews

72.1 Intent – Peak Demand Hours

The intent of this Article is to establish a framework of treatment of employees who by the nature of their jobs, are likely required to work Peak Demand Hours that are more than their normal work week and/or hours different from their normal hours during peak work load periods of the year, and less than the total hours in a normal work week during other parts of the year.

Once it has been decided to apply this Article within a business unit, Management will meet with The Society to jointly agree on the formation of
a joint team. The application of this Article will be done by local joint teams which will determine how best to apply these guidelines in their particular situation. That plan could involve staffing the arrangement with volunteers on a test basis. The volunteers would have to volunteer for the full 12 month cycle. The fact that an individual did not volunteer will not negatively reflect on his/her performance evaluation. The results of that test application could be reviewed by the local joint team. This review might result in revisions to the arrangement. The local teams are not required to rigidly adhere to the guidelines below and may revise them as they deem appropriate.

Any disputes concerning the application or implementation of Article 72 shall be referred to the JSMC for resolution. Any resolution by the JSMC shall be final and binding but if the JSMC is unable to resolve the issues, either party might refer the item to “interest” arbitration for resolution.

It is expected that ultimately the arrangement would become a Letter of Understanding.

The following are definitions and guidelines for the implementation of peak demand hour arrangements.

72.1.1 Definitions

**Normal Work Week:** For purposes of this Article, a normal work week will mean the total of the standard hours normally worked during a pay period, outside of the peak work load periods.

**Normal Hours:** Normal hours worked outside of a peak work load period (as per Article 70).

**Peak Work Load Period(s):** One or more periods during the year in which the expected magnitude or nature of the work to be performed reasonably requires employees to work more than their normal work week, and/or hours different from their normal hours. Peak work load periods may be the result of a need to minimize equipment downtime, or other factors which are expected to occur every year.

**Peak Demand Workers:** Employees who are likely required to work more than their normal work week, and/or hours different from their normal hours during peak work load periods, and less than their normal work week during other periods of the year.

72.1.2 Intent

a) Peak demand workers may be required to work normal hours, or scheduled hours on a work and/or shift schedule which are different from their normal hours, and which, in total, may exceed their normal work week during peak work load periods. Scheduled hours worked in
excess of the normal work week will be “banked” and taken as time off (consistent with the conditions outlined in this Article), during periods of the year when the work load may not require all of the normal hours available.

b) Work and/or shift schedules, and all other administrative matters regarding the hours of work for peak demand workers will be determined within the business unit, subject to the conditions contained in this Article.

c) The design of work and/or shift schedules and other hours of work arrangements will give consideration of the requirement to perform work in the most effective, efficient and safe manner.

d) The design of work and/or shift schedules and other hours of work arrangement will give consideration of the need to maintain good working relationships within the affected group and the relativity to other employees not covered by this Article.

72.1.3 Conditions

a) The peak work load periods will be declared prior to the start of the year for the entire year. The declared peak work load periods for the year will not be less than four weeks’ cumulative duration (or normal conditions for the employee will apply). The declared peak work load periods will not exceed 26 weeks of the year cumulative duration. For purposes of this Appendix, the year may be any designated fiscal year which will not be changed for the work group once established.

b) Peak demand workers may be assigned to normal hours, work and/or shift schedules that average more than the normal work week during the declared peak work load periods. Other articles in this Collective Agreement regarding shift work, hours of work, and standard hours do not apply during declared peak work load periods, except:

Articles 59.3, 60.4, 61.2 and 61.3 regarding shift allowance for work schedules on weekends, and nights; and special conditions for 12 hour shifts as per Article 61.6.

c) Management will strive to provide at least seven days’ notice of an assignment to a work or shift schedule that requires work outside of normal hours during the declared peak work load periods. However, any hours worked outside of normal hours without at least three days’ notice will not be considered scheduled work for purposes of this Article.

d) Work performed outside of scheduled hours is overtime and will be compensated at the appropriate overtime rate(s).
e) During the declared peak work load periods, an amount equal to the number of scheduled hours worked each week in excess of the normal work week will be “banked”. The banked time will be taken as time off at straight time during times of the year outside of the declared peak work load periods, subject to meeting work requirements. When possible, the time off will be scheduled by mutual agreement between the employee and Management. If work requirements have prevented an employee from taking his/her “banked” time off, the time remaining will be compensated as follows: for positive balances in the time bank remaining at the end of the year, the employee will receive payment at time and one-half for 50% of the hours and double-time for the balance.

f) An employee's base wages will be maintained throughout the year, regardless of the number of scheduled hours worked per week during the declared peak work load periods, or hours taken off at straight time from the time balance “bank” during other periods of the year.

g) The design of work and/or shift schedules used during the declared peak work load periods will be flexible to meet work requirements and consistent with the limitations of the appropriate legislation. Specific rules to be adopted for the design of work and/or shift schedules for peak demand workers may include:

1. The length of a scheduled shift or extended work day cannot exceed 12 hours.

2. No more than 48 hours of work may be scheduled (i.e., exclusive of overtime) in a week.

3. The start of a scheduled shift or work period must be at least 24 hours following the start of the previous scheduled shift or work period.

4. At least eight hours of time off will be provided between work periods including overtime.

5. Although the content, preparation, costing and administration of work and/or shift schedules is the sole responsibility of the Corporation, the preference of the majority of peak demand workers to be assigned in the affected work group will be considered in designing the work and/or shift schedule.

6. Every attempt will be made to assign employees from those in the appropriate work group, to a work and/or shift schedule under this Appendix, on a voluntary basis. However, in the absence of sufficient qualified volunteers, the Corporation may assign specific individuals to perform the work.
72.2 Intent - Project Crews

The intent of this Article is to establish the treatment of employees who are required to work on Project Crews.

Once it has been decided to apply this Article within a business unit, Management will meet with The Society to discuss how best to apply these guidelines in their particular situation.

The following are the provisions in establishing the implementation of Project Crews:

72.2.1 To the extent possible, project crews will be staffed on a voluntary basis. The sequence for staffing will be as follows:
   
a) Posted vacancy – senior best-qualified consideration of Society-represented applicants – Nuclear Business Organization;
   b) Posted vacancy – senior best-qualified consideration of Society-represented applicants – all other Business Organizations;
   c) Posted vacancy – best-qualified consideration of all other applicants;
   d) Failing a), b) and c) above and after consultation with the Society, OPG may force the junior qualified Society-represented employee on the site.

72.2.2 Employees on Project Crews are considered to be regular employees with all the terms and conditions and benefits as per the collective agreement, except as noted in these provisions.

72.2.3 Management will review the proposed use of the project crews with the Society and solicit input on the project crew(s) size, composition, source of staff for crew(s), proposed peak work times, etc.

72.2.4 Employees on the Project Crews will be entitled to the same number of yearly hours as a regular employee and be paid for those hours at straight time on the same basis as a non-Project Crew employee.

72.2.5 Each employee on the Project Crew may have a different number of hours available to work, due to the application of vacation rights, floating holidays, and statutory holidays. (e.g. 2080 hrs minus statutory holidays 80 hrs, minus 3 floating holidays 24 hrs, and appropriate vacation 2/3/4/5/6 weeks).

72.2.6 Employees may be required to work days or shift work on 8/10/12 hour schedules up to 60 hours per week and a minimum of 40
217

hours per week. Any overtime required will be paid at the appropriate premium rate.

72.2.7 Shift differential and payment for scheduled work on weekends and statutory holidays will be paid out on an as worked basis.

72.2.8 Management will post the project crew work schedule September 1 for the following year. This schedule will illustrate the blocks of time when and where employees will be required to work. The work schedule may be changed by providing affected employees with a minimum of 7 days notice in advance of the change. The adjustment can be no more than 14 days in either direction. Adjustments beyond 14 days may be made with either another notice or with Society agreement to the original notice. Failure to provide this notice will result in premium rates for only those days within the notice period that the employee had not been previously expected to work.

Employees will be entitled to establish blocks of time, up to vacation allowance, when they will be unavailable for work assignment(s). This time off cannot conflict with the likely periods required for them to work.

72.2.9 The classifications required for project crews will be determined by the Company.

72.2.10 Any future hires to project crews beyond the signing of the Collective Agreement will be discussed with the Society Local Vice-President prior to their implementation.

73 Work Sharing

73.1 “Work sharing” occurs when sufficient members of a work unit agree to work fewer hours for reduced compensation in order to accommodate a temporary reduction in work load and to help maintain employment continuity in the event of an adverse impact situation under Article 64 - Employment Continuity.

73.2 Work sharing is a temporary arrangement. A work sharing arrangement will normally not exceed one year in duration but can be extended by mutual agreement. Beyond a period of one year, a work share arrangement will normally be governed by the terms and conditions of Article 71 - Reduced Hours of Work (RHOW) Arrangements.

73.3 The Society will be involved in the discussion and negotiation of the work sharing arrangement.
The size of the work unit involved in the work share will be the subject of joint agreement between OPG and The Society. The agreement of the employees participating in the work sharing arrangement must be obtained prior to implementation. A sufficient number of employees in the work unit must participate in order to make the work share a viable working arrangement.

Either party to a work sharing arrangement will have the right to terminate it with 30 days’ written notice. Following termination of a work sharing arrangement, the previous hours of work arrangement will be reinstated. Reduction in the number of employees in a work sharing arrangement through attrition, promotion, etc. will result in a joint review in order to ascertain the continued viability of the work share.

Employees participating in a work sharing arrangement remain regular employees.

Reduction in hours of work pursuant to a work sharing arrangement will not exceed 20% of regular hours and will be matched by an equivalent reduction in salary for a maximum of one year.

Employees participating in a work sharing arrangement will retain full benefits coverage during the term of the work sharing arrangement up to a maximum period of one year.

Pension, life insurance and LTD coverage will continue to be calculated against regular base earnings during the term of a work sharing arrangement up to a maximum period of one year.

Employees will not be declared surplus while participating in a work sharing arrangement. This section will be suspended during the operation of Article 64.

Article 74 has been deleted

Teleworking

Definition of Teleworking:

Telework refers to an OPG employee who:
- Is working out of an office in his/her home;
- Does not normally have another office at OPG;
- Is not working at home on an occasional or casual basis.
75.2 Collective Agreement Standards:

Where OPG determines that teleworking may be implemented, the following provisions will apply:

a) The arrangement will be mutually agreed upon and will be documented prior to commencement of teleworking;
b) The terms and conditions of the Collective Agreement will apply except where modified by agreement among OPG, The Society and the employee;
c) Teleworkers will not be required to meet with customers or other OPG employees in their home;
d) Teleworking arrangements will be voluntary, and are subject to cancellation as locally agreed;
e) Teleworking will not change the employment status of the teleworker;
f) OPG will provide appropriate health & safety advice and guidance to the teleworker;
g) OPG will provide appropriate business and personal security advice to the teleworker;
h) OPG shall provide all furnishings/equipment it deems necessary to meet job expectations;
i) OPG will pay for additional insurance costs, if required;
j) If the teleworking arrangement is terminated then the employee will be entitled to relocation assistance as provided in the Collective Agreement;
k) It is agreed that The Society represents employees who fall within The Society recognition clause of the Collective Agreement and who are teleworking;
l) OPG will provide in a timely manner The Society with the names, business phone number and business address of teleworkers.

75.3 Local Agreements

Local management, the employee and The Society will agree on these items as part of a local agreement:

- performance measures
- relevant terms and conditions (e.g. travel)
- training where appropriate
- sunset (with a minimum term)
- cancellation

76 Direct Deposit

76.1 Employees will be paid bi-weekly by means of electronic deposit. Time exceptions (e.g. overtime) will continue to have a time lag. Such time lag
will only be for the period required for the effective operation of the time reporting centers and pay processes.

76.2 Transition pay to be repaid to OPG deducting $20 per pay period, commencing as soon as practical in 2006, from the gross pay of each employee until the transition week is fully repaid. If the employee’s employment terminates prior to full repayment, any balance owing will be deducted from the employee’s final pay.

### 77 Crossing Picket Lines of Other Unions

77.1 Employees will be required to cross picket lines of other unions in order to perform work at their regular/temporary work headquarters.

77.2 During such picket action, some flexibility with respect to the normal scheduled hours of work on the part of both Management and the employee is particularly desirable.

77.3 Normally, an employee who is prevented from arriving at work for his/her normal starting time due to such picket action will have his/her salary maintained without the requirement to make up the hours missed, subject to the following guidelines:

- **a)** An employee is expected to make a reasonable attempt to arrive at work at their normal starting time.

- **b)** If an employee who is late for work should have been able to cross the picket line without being late, the no work - no pay principle will apply.

### 78 The Provision of French Language Services

This Article provides the terms and conditions under which OPG complies with the French language Services Act (RSO 1986) as it applies to employees in the bargaining unit.

#### 78.1 Designated Positions

OPG will designate positions that require French language capability, to the extent required by the Act. OPG shall determine the actual number of positions to be designated and which positions will be designated.

Changes to the designated positions require joint agreement between the local Contact Supervisor/Human Resources Manager and the Unit Director. Whenever a change is made to the designated positions list, the Contact Supervisor/Human Resources Manager will provide written notification of the addition to The Society office and Labour Relations, OPG Human Resources. Labour Relations, OPG Human Resources will issue an up-to-
date version of the designated positions list annually to The Society. A position can only be removed or modified when it is vacant.

78.2 Job Security

The implementation and operation of this Article will not result in any declarations of surplus, lay-offs, displacements, forced geographic relocations or financial losses.

78.3 Training

OPG will not impose any mandatory training for the purpose of complying with the Act. Any person wishing to take optional external training to obtain French language capability will be provided 100% financial support, so long as the request is in accordance with Article 85 - Extramural Training. In locations where extramural training in French is not available, OPG will provide, at no cost to the employee(s), self-paced learning packages in order to assist interested staff to become qualified in French.

78.4 Posting and Selection

French language capability is deemed to be a legitimate selection criterion, in addition to the normal selection criteria, for officially designated positions. The job documents for designated positions will not be amended to include French language proficiency as a duty and/or evaluation factor pending future discussions with The Society.

A notice of posting for a designated position will contain the following wording:

"This position requires the ability to communicate in French. This ability is deemed to be a qualification for the purposes of selection."

French language capability will only be used as a selection criterion when the number of qualified incumbents in a designated position falls below the number specified in this Article. Specific qualifications and requirements must be posted and reasons given for non-selection in writing.

In cases where a location has more than the required number of qualified incumbents in a designated position, the officially designated employee(s) shall be those who are senior and qualified.

78.5 Surplus Staff

When a surplus employee applies to a designated position he/she shall receive the selection priorities established in Article 65 to the extent that the organizational unit retains the capability to meet the requirements of the Act.
78.6 Allowance

OPG will pay an allowance of $18.00 gross weekly. It is recognized that the allowance may be paid to all qualified employees in a designated position in a location, rather than just the employees who officially occupy the designated position. This allowance is the same regardless of the number of hours an employee works per week.

The allowance will be paid only while the incumbent is in a designated classification. The payment of this allowance will cease once the employee has been absent for two months. Transfer to an undesignated position, or removal of a position from the designated positions list, will cause immediate stoppage of the allowance.

An employee who relieves in a designated position must have the French language capability required by the position in order to receive the allowance.

79 Article 79 has been deleted

80 Special Clothing

80.1 Employees are responsible for providing, at their own expense, suitable clothing for the performance of their regular duties. Subject to certain conditions, outlined below, special clothing may be obtained at the expense of OPG for issue to employees.

80.2 A limited number of rainproof coats and hats may be obtained and kept available at construction headquarters etc., for persons who normally work indoors, but who are occasionally required to work out of doors under adverse weather conditions.

80.3 Safety items that are designed exclusively for such safety purposes will be provided to employees required to perform certain types of work, at no cost to the employee.

80.4 All clothing issued by OPG will remain the property of OPG. Employees may be required to replace item(s) lost or destroyed as a result of their own carelessness.

80.5 Staff will be reimbursed for the cost of up to two pairs of protective footwear per year where such footwear is required by OPG as follows:

- Safety boots/shoes - 50% of actual cost to a maximum of $75/pair;
- Electric Shock Resistant Footwear - 75% of actual cost for one or two pairs per calendar year to a total annual maximum of $250.
80.6 Requests for special items of clothing not specifically mentioned, but which might be reasonably supplied under the conditions set out above, will be considered, each case on its own merits. Such clothing must be kept available for any employee who may require it for OPG work.

81 Payment for Use of Personal Vehicle

81.1 Where an employee is authorized to use his/her personal vehicle for OPG related business/travel, the rate of reimbursement will be based on the Private Transportation Component of the Canadian CPI as reported by Statistics Canada. The rate of **$0.54** per kilometre took effect on November 1, 2012.

81.2 Future increases of one cent/km will occur with each additional 10% increase in the Private Transportation Index - 1986 = 100. A decline in the Index below a previously surpassed trigger point for two or more consecutive months will result in a reduction by the appropriate amount of the rate paid.

If the OPG business/travel involves the hauling of household trailers, an additional $0.09/km will be paid. For the hauling of smaller trailers (Camper, Ski-doo, boat etc.), the amount will be $0.03/km. The above rates will apply on a province-wide basis.

81.3 By virtue of receiving the above kilometre rates, the employee is responsible for any expenses incurred involving his/her vehicle while on OPG business. This would include such items as insurance premiums, license fees, traffic/parking violations, maintenance costs, any repairs or replacement of parts, fuel, lubricants and the like. The employee is further responsible for informing his/her insurance company that the vehicle is being used for business purposes, and for paying any additional premium that the insurance company deems fit.

82 Bush Fire Fighting and Volunteer Fire Brigades

82.1 Employees who are conscripted by the Ministry of Natural Resources for bush fire fighting or employees who participate in local Fire Brigades may be granted time off work with pay subject to the following conditions:

82.1.1 Regular and Probationary Employees - Bush Fighting

Regular and probationary employees will have their normal base pay maintained.
82.1.2 Temporary Employees - Bush Fighting

Temporary employees will have their normal base pay maintained for a maximum of five working days or to the end of the intended employment period, whichever comes first. If the fire fighting period extends beyond five working days, the employee will be placed on an unpaid leave of absence until he/she returns to work, or to the end of the originally intended employment period.

82.1.3 Volunteer Fire Brigades

Employees who are registered volunteer fire fighters may be granted leave of absence with pay if called to service while at work.

83 Retirement Bonus

Employees who have completed 10 years or more of continuous employment shall be given, upon retirement, a cash bonus equal to one month's pay. The retirement bonus may be paid in cash or by transfer to an employee's Registered Retirement Savings Plan (RRSP), at the employee's option.

84 Extreme Winter Weather Conditions

In the event of extreme winter weather conditions, employees will normally receive pay for hours worked.

84.1 Make Up Time

Employees who, due to extreme winter weather conditions, arrive late, miss work or receive approval to leave early, may seek approval to make up lost time by working back the missed hours by:

a) using a vacation day;

b) using a floating holiday;

c) using a lieu day (or banked time where applicable).

84.1.1 For employees who receive approval to work back the lost time, their pay will be maintained for the number of normal scheduled daily hours lost, provided there is work available to be performed.

84.1.2 Employees will work at straight time rate of pay while working back the lost hours.
84.1.3 Time lost due to extreme weather conditions will be worked back within the pay week period. Any lost time not worked back by the end of the pay period will be deducted from the employee's pay.

84.1.4 Senior Management at the location have the discretion to maintain some or all of an employee's normal base pay if they are satisfied that every reasonable effort was made to report to work on time.

84.2 Closure

Employees included in an authorized closure will have their pay maintained for the number of hours between closure and normal quitting time.

84.3 Stranded Employees

Employees who are confined at a regular work location which is an acceptable shelter, will have their normal base pay maintained for their normal scheduled hours of work.

84.3.1 Payment for time worked in excess of normal scheduled hours will be made only if approval was given in advance for such work.

84.3.2 Employees will be reimbursed for reasonable expenses for food and shelter, and will have normal base pay maintained when stranded away from their residence headquarters while on OPG business.

84.3.3 Employees working in a location where a minimum level of acceptable shelter does not exist shall be considered as still being at work until acceptable shelter can be reached.

85 Extramural Training

In order to enhance a regular employee’s job performance now, or in the future, OPG may provide financial support for external training activities consistent with OPG Policy, subject to the following conditions:

Reasonable costs for the purpose of this Article are defined as registration/tuition fees and costs for textbooks.

a) The employee is expected to obtain prior approval from his/her supervisor prior to registering in the training course.

b) The external training should normally be completed outside normal working hours. Where this is not possible, time off with pay to attend external training programs will be at the discretion of the employee’s supervisor. In no circumstances will the external training exceed six weeks if the employee is required to be absent from work.
c) 100% of reasonable costs paid by the employee for external training courses will be reimbursed where:

- the training course will create or maintain the employee’s capability related to current job performance;
- the training course develops an employee’s capability for a position identified in a succession, retraining, or redeployment plan.

d) 75% of registration/tuition fees and learning material costs will be paid for external training courses which improve an employee’s capability for future jobs within OPG.

e) An employee will be reimbursed for reasonable costs subject to:

1. Satisfactory course completion and a passing grade where applicable, except where the course is taken upon the request of Management.
2. Costs will not be reimbursed if the employee has given notice of resignation prior to completion of the course.
3. All approved costs will be reimbursed for courses which cannot be completed due to the employee being transferred to another location.

86 Meal Expenses

Normally, employees are expected to provide their own meals. Where there is a requirement for a meal as a result of legitimate business functions, employees will be entitled to be reimbursed for reasonable out-of-pocket expenses.
PART XIV - ADMINISTRATION

87 Representation on OPG Committees

The parties recognize the roles and responsibilities of appointees to committees and task forces, i.e., as a representative of Management on the one hand, and The Society, on the other. When an employee represented by The Society is appointed by Management, his/her responsibility is to Management. When he/she is appointed by The Society, his/her responsibility is to The Society. This role distinction should be made clear at the time of appointment. Notwithstanding the above, and in keeping with Subsection 2.4 (Supervisory Employees - Code of Ethics), Management will endeavour to appoint its representatives having regard to The Society’s interests in effective representation.

88 Article 88 has been deleted

89 Tripartite Agreement on Joint Health and Safety Committees

OPG and The Society agree to adhere to the Tripartite Agreement below:

TRIPARTITE AGREEMENT ON JOINT HEALTH AND SAFETY COMMITTEES

PRINCIPLES OF AGREEMENT between the employer, the Power Workers Union and The Society concerning the establishment or modification of Joint Health and Safety Committees to meet the requirements and intent of The Occupational Health and Safety Act, as amended by Bill 208.

1. SIZE AND COMPOSITION OF JOINT HEALTH AND SAFETY COMMITTEES

That the size of JHSCs will be determined through discussions and agreement between the three parties.

That the PWU and The Society shall comprise a minimum of 75% of the JHSC membership with the relative percentage of PWU and Society JHSC members being determined by these two parties based on criteria including but not limited to representation by population and historical make-up. Neither union shall have less than 25% of the total number of Committee representatives nor more than 50%. Disputes regarding numbers shall be referred to the Executive level of the PWU and Society for resolution and if agreement is not reached, to an arbitrator mutually agreed upon by the parties for binding resolution.

That Management’s Committee representatives will be from outside of PWU and Society jurisdiction.

That the status, rights and treatment of all representatives on the JHSCs will be equal.
That the meetings of the JHSC will be chaired on a rotating basis by the Co-Chair of each party represented on the committee.

2. TRAINING AND CERTIFICATION

That all JHSC members will be trained and certified. Training and certification will be jointly determined and in accordance with legal requirements and the PWU and Society Authority to Stop Work Agreements, with the costs to be borne by the employer.

3. POLICY COMMITTEE (NON-LEGISLATED)

That a corporate-level Health and Safety Policy Committee shall be established to participate in the formation and evaluation of health and safety strategy and policy, to resolve policy-level issues impacting on tripartite health and safety initiatives including the Work Protection Code and Corporate Safety Rules

That the Policy Committee be comprised of an equal number of senior representatives from The Society, the PWU and Management.

That the parties will each select their respective committee members.

That the Policy Committee shall meet at least once per quarter.

That the employer shall provide the resources and training that the Policy Committee deems necessary with costs to be borne by the employer. Training development and delivery will be jointly determined.

That the Policy Committee shall receive a formal response to its input to policies/programming within 30 days.

4. ANNUAL EXPERIENCE REVIEW

That each year, upon request by any one of the parties to this Agreement, an experience review be undertaken by the parties of the benefits and difficulties of implementation of the Agreement and the impacts of organizational changes.

5. AMENDMENTS TO THE AGREEMENT

Amendments to the Agreement may be made at any time by the parties with mutual agreement in writing. If mutual agreement cannot be reached, the parties will refer to an arbitrator, mutually agreed upon by the parties, for binding resolution.
90  Authority to Stop Work

90.1 Authority to Stop Work

90.1.1 Where a workplace is unsafe, a certified worker and management member of the local Joint Health and Safety Committee (JHSC) can jointly prevent the start of the work or stop the work.

90.1.2 Where there is a disagreement between the certified worker or certified management member of the local JHSC that the workplace is unsafe, the issue shall be immediately presented to the local JHSC for review and resolution.

90.1.3 Where “dangerous circumstances”* exist, a certified worker or management member of the local JHSC can stop the work. After calling the work stoppage the certified worker or management member must contact the respective counterpart immediately and seek to obtain joint agreement on the stoppage as soon as possible. If joint agreement cannot be reached the issue shall be presented to the local JHSC for review and resolution.

90.1.4 In cases where the JHSC cannot resolve issues arising from 2 or 3 above, the Ministry of Labour Inspector shall be called in for resolution. Where necessary, the Ministry of Labour may call the Canadian Nuclear Safety Commission (CNSC).

* Dangerous Circumstances: as defined by the Occupational Health and Safety Act, Section 44.

90.2 Training/Certification

90.2.1 The Joint Health and Safety Working Committee shall fully participate in and approve the development of any specialized training program for all members of the Joint Health and Safety Committees (JHSCs).

90.2.2 The Joint Health and Safety Working Committee shall fully participate in and approve the development, implementation and administration of testing and re-testing standards for all members of the JHSCs.

90.2.3 The Joint Health and Safety Working Committee shall fully participate in and approve the establishment of a specific Training/Certification program for members of the JHSCs.
90.2.4 The Joint Health and Safety Advisory Working Committee shall fully participate in and approve the development, implementation and administration of testing and re-testing standards for accrediting JHSC members into the Certification program. Such standards shall be equal to or greater than those established by regulatory standards.

90.3 Responsibility and Accountability

There shall be a shared responsibility and accountability by the unions and Management for the actions of the certified members of the JHSCs.

90.4 Compensation and Discipline

It is understood that employees directly or indirectly affected by the application of this policy will not suffer any loss of wages or disciplinary action.

90.5 Decertification

Should a certified member fail to act in good faith, the Joint Health and Safety Working Committee shall review the representative’s action and make appropriate decisions.

Where there is disagreement regarding the action of the certified member at the Joint Health and Safety Working Committee, the issue shall be taken to the Tripartite Health and Safety Policy Committee for resolution.

90.6 Assessment

The Tripartite Health and Safety Policy Committee shall authorize the assessment of the effectiveness of this agreement from time to time.

91 Health and Safety Disputes

91.1 Except for disputes involving the principles set out in the Tripartite Agreement on Joint Health and Safety Committees, all other disputes involving allegations that the employer has violated the provisions of the Occupational Health and Safety Act (OHSA) will not be subject to the provisions of the grievance/arbitration procedure except where provided for by the legislation itself. The parties will attempt to resolve such disputes at the lowest level possible. Failing resolution, the dispute may be forwarded to the Ministry of Labour for final resolution.

91.2 Disputes which involve interpretations about Sections of the OHSA, or any of its associated regulations will be resolved in accordance with the
procedure set out in the joint agreement "Handling Legislative and Regulatory Impasses Pertaining to the Occupational Health and Safety Act and its Associated Regulations" dated December 5, 1991.

### 92 Joint Health and Safety Committees

**92.1** The employer will provide a Joint Policy Committee in which Society representatives are able to address the health and safety concerns of employees with Management of various levels.

**92.2** All Society-represented employees are entitled to representation on joint health and safety committees and to associated training.

**92.3** There are to be three levels of representation:

- OPG/Board level (JSMC)
- Corporate Health and Safety/Society working committee level (based on the following Terms of Reference)
- Local workplace level health and safety committees

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**Terms of Reference - September 27, 1989**

**Joint Working Committee on Health and Safety**

1.0 **Goal**

Provide recommendations to assist the Health and Safety Division in the development, implementation and evaluation of OPG employee health and safety policy and programs.

2.0 **Personnel**

Director, Safety, and other Management staff as deemed necessary from time-to-time.

Chairperson of Society Health and Safety Committee and other Society members or a staff advisor to a maximum of five.

The Chair will rotate between the Director, Safety, and Chair of The Society Health and Safety Committee.

3.0 **Function**

Participate in the identification and resolution of problems and issues of OPG significance in employee health and safety policy and practice.

Participate in the development, promotion and implementation of OPG health and safety programs.
Meet the provisions of 90.5, 90.8 and 90.9.\textsuperscript{18}

The Committee will meet quarterly or as mutually agreed.

OPG will pay the expenses related to jointly agreed projects undertaken by or on behalf of the Joint Working Committee on Health and Safety.

92.4 Employee Health and Wellness

The parties are currently involved in a tripartite Corporate Health Team that is examining and implementing recommendations related to employee wellness. If this committee disbands, a joint sub-team will be established to provide information and recommendations to JSMC on employee health and wellness.

92.5 Employee Family Assistance Program (EFAP)

The Society will have input into management’s review of EFAP programs.

92.6 OPG agrees to consult with The Society regarding new health and safety policies and procedures and regarding changes to existing health and safety policies or procedures except where provided for by the legislation itself. The Society will be given a reasonable amount of time to comment prior to implementation.

92.7 It is understood that Health and Safety representatives will be afforded the necessary time to perform duties in accordance with the Ontario Occupational Health & Safety Act, Letters of Understanding and all other relevant documents which may or may not form part of the collective agreement (such as Tripartite Agreements and Corporate Policies) without loss of wages.

Absence from work due to the representative’s involvement should not negatively impact on his/her performance appraisal.

92.8 Incident Rating

i) The union representatives on the Joint Health and Safety Committee shall be provided with the opportunity for input into incident Maximum Reasonable Potential for Harm (MRPH) ratings.

\textsuperscript{18} These references are now 90.2, 90.5 and 90.6 respectively
ii) Where the rating of an incident is in dispute, line management or Joint Health and Safety Committee members can seek timely resolution of the dispute through adjudication by the Director, Corporate Safety.

92.9 Incident Investigation

All incidents shall be investigated. Whenever a team is appointed to investigate an incident, the affected bargaining units shall be invited to participate on the investigation team, and shall select their representative.

93 Joint Society-Management Committee (JSMC)

Negotiations between OPG and The Society shall take place through a Joint Society-Management Committee (JSMC) to which each body will appoint an equal number of representatives. Negotiations shall be conducted in good faith and both parties shall make every reasonable effort to reach agreement on matters of mutual interest as expeditiously as possible. This Committee shall meet quarterly unless otherwise agreed to by the parties.

94 Problem-Solving Teams

94.1 The parties agreed that during the term of the Collective Agreement, problem-solving teams will be established in order to examine the following issues:

a) Pension Governance and Control

The parties agree to establish a committee to have access to reasonable pension plan and pension fund information (subject to the understanding that certain confidential information will not be available, and such confidential information that is supplied will be maintained in confidence by the committee/resource persons), and to explore the feasibility and advisability of:

i) a new governance framework;
ii) creation of a pension plan/fund for Society members only;
iii) obtaining information that may be relevant to successorship issues;
iv) obtaining information provided to the Board Finance and Audit Committee dealing with the Pension Plan and Fund.

The committee shall be composed of six members, three to be selected by OPG and three to be selected by The Society. Each party shall have the right to have resource persons attend meetings and assist the members of the committee with their deliberations.
Publication of Collective Agreement

All Society-represented staff should have personal access to a copy of the Collective Agreement. The preferred method is to provide access to this Agreement via an electronic basis such as Intranet. Where there is no access to Intranet the document could be distributed via disc.

OPG agrees to print sufficient copies for distribution to all elected Society representatives and to those employees without access to computer technology. The cost of printing the copies that are required (to be determined by joint agreement) will be shared on the following basis: 75% OPG; 25% (Society).

Use of OPG Computer Facilities

96.1 The Society may make use of any of the services provided by Information Systems Group to OPG line units.

96.2 The Society will be treated identically to OPG line with respect to service standards, procedures and support.

96.3 The price charged for the service will be the published rates of the Computer Centre plus the charge for administration, referred to as General Overhead which may change.

96.4 Information regarding these services, e.g., technical support, manuals, billing structure, training, etc., may be obtained from the ISG.

96.5 The Society will seek approval from the appropriate authorities prior to accessing or attempting to access any line units application programs or data. Any infringement of this condition by a Society member will be grounds for cancellation of this Article.

96.6 The services provided under this Article are to be used only for the purposes of assisting in the conduct of normal Society business and for provisions of service to its members.

96.7 Society data and programs may be protected from access by others by taking advantage of existing password mechanisms. It is The Society’s responsibility to make arrangements to utilize such mechanisms.

Status of Certain Corporate Policies and Procedures

97.1 OPG will not terminate or alter the terms of the OPG policies and procedures listed below without the agreement of The Society during the term of this Agreement. Prior to December 31, 2000, the parties will review the language of these policies and procedures for possible inclusion in the Collective Agreement.
97.2 The following policies and procedures are subject to the grievance/arbitration provision of the Collective Agreement (Article 16).

The corresponding Human Resources Policies and Procedures reference and policy date are given in parentheses.

a) Personal Accident Insurance Plan (03-05-01, December 1988)
b) Remembrance Day (02-02-01, p.5, May 1981)
c) World Class Sports Events (02-03-13, May 1979)
d) Educational Leave (02-03-02, October 1982)
e) Annual Training - Reserve Forces (02-03-10, August 1991)
f) Report and Recommendations of Total Compensation Team (October 1992)
g) Self-funded Sabbaticals (08-02-03, October 1987)

98 Code of Conduct

Where OPG develops a Code of Conduct, it shall make reasonable efforts to apprise The Society and employees of the contents thereof prior to implementing the same.

99 Letters of Understanding

99.1 Letters of Understanding will form part of this Collective Agreement. Letters of Understanding are found in Part XVI.

99.2 Letter of Understanding

99.2.1 Intent

A Letter of Understanding may serve the following purposes:

- amend or add to the current provisions of the Agreement;
- elaborate/clarify the intentions of a provision of the Collective Agreement;
- establish provisions for issues not covered by the Agreement.

99.2.2 Grievance/Arbitration

Letters of Understanding are subject to the same grievance and arbitration provisions as are other items in the Collective Agreement.
99.2.3 Approval

Letters of Understanding must bear the signatures of both the Co-Chairs of the JSMC or their designates.

99.2.4 Duration

The parties agree that, for the most part, Letters of Understanding should contain “sunset clauses”. In those cases where such a clause has not been put into a Letter of Understanding, The Society and OPG will at some time during Collective Agreement negotiations determine the status of each such Letter of Understanding (e.g., incorporate in to the Collective Agreement, delete it, extend it, etc.).

99.3 Note to Letters of Understanding

OPG and The Society have not amended all Letters of Understanding to reflect the change to OPG. It is agreed that the commitments, terms and conditions in these Letters of Understanding will be binding on OPG in the same manner as they were applied to Ontario Hydro, to the extent that they are applicable to OPG.

100 Article 100 has been deleted

101 Note to Part XV - Appendices

OPG and The Society have not amended all the Appendices in Part XV to reflect the change to OPG. In particular, the Appendices dealing with the Voluntary Recognition Agreement and subsequent amendments are historic documents and, therefore, references to “Ontario Hydro” have been maintained. It is agreed, however, that the commitments, terms and conditions in these Appendices shall apply to OPG in the same manner as they were applied to Ontario Hydro, to the extent that they are applicable to OPG.

102 DECONTROL/ CHANGE OF EMPLOYER

Article 102 has been moved to Part C of Article 64.

103 Change of Employer Transition Provisions

On or after January 1, 2005, any employee who is made subject to a “Change of Employer” under Article 64 Part C and who is a successful applicant to a position in OPG within three years of being transferred to the new employer shall be entitled to restoration of the following:
o Sick Leave Credits and entitlement to LTD (under their previous Sick Leave/LTD plan);
o Restoration of ECD and SRD and all entitlements which are linked to service credits except as noted below;

Restoration will be based on the value or length of service as of the date of transfer to the new employer, plus service and sick leave credits accrued with the new employer. For further clarity, the total of such service and credits would not exceed the amount the employee would have if they had remained with OPG.

The employee’s EEV, if any, shall be based on their original date of hire with OPG or Ontario Hydro. Furthermore, the employee will not be required to serve a probationary period.

Pension transferability will be governed by Reciprocal Pension transfer agreements, if any.

104 Station Closure

Where possible the Society shall be notified at least 120 days in advance of a station closure. The parties will meet to discuss the impact of the closure on the bargaining unit and the collective agreement impacts.

105 Change of Work Headquarters – Nuclear Unit of Application

The Nuclear East sites will be defined as:

105.1 Pickering including a 5km radius around the station and including the following locations:
  o 675 Sandy Beach Road
  o 1400 Bayly Street
  o 1480 Bayly Street (NTD)
  o 1315 Pickering Parkway (Picore)
  o 777 Brock Road
  o 813 Brock Road
  o 889 Brock Road
  o 100 Westney Road
  o 230 Westney Road South
  o 339 Westney Road South
  o 1105 Kingston Road
  o 1175 Squires Beach Road
  o 1910 Clements Road
105.2 Darlington including a 10km\textsuperscript{19} radius around the station and including the following location:

- 1908 Colonel Sam Drive

105.3 Whitby Health Services including a 5km radius around the site and including the following locations:

- 55 Athol St.,
- 1549 Victoria St. E.,
- 2255 Forbes Street
- 1600 Champlain Avenue,

105.4 Wesleyville including a 5km radius around the site

105.5 Employees may be moved from an over complement at one Work Headquarters to an under complement at another Work Headquarters within classifications on a Senior Choice/Junior Force basis subject to unit viability.

OPG will inform the Society prior to initiating a transfer. The Society may provide input into the process. Management will make the final decision.

106 Corporate Restructure

106.1 As of the date of ratification of the 2006-2010 Collective Agreement employees working in the Nuclear Business organization will all be part of that organization.

106.2 On an annual basis, the parties will meet to discuss any changes to the organization and realignments as necessary.

107 Outage Bonus

107.1 Society-represented supervisors who volunteer, or are assigned through the application of LOU #183, to supervise PWU crews working on an outage will be eligible to receive a bonus. This bonus will be paid only where the following conditions are met:

i) The Society-represented supervisor is responsible for the direct supervision of the PWU crew during the outage;

and

\textsuperscript{19} Note: Relocation assistance under Part XI of the collective agreement will continue to be applied as if a 5-kilometre radius is in effect.
ii) The PWU crew members on the outage are eligible for and receive payment of a bonus for the outage.

The amount of the bonus paid to the Society-represented supervisor and the other conditions surrounding eligibility, which will be determined by Management and communicated prior to soliciting for volunteers, shall be the same as for the PWU crew members.
PART XV - APPENDICES

Appendix I - Re: Utilization and Advancement of Professional Engineers and Scientists

OPG and The Society agree the following principles will govern the utilization and advancement of professional engineers and scientists in OPG.

1.0 The terms "professional engineers" and "scientists" shall include the employees' categories identified in Attachment A.

2.0 The MP2/FMP12 level of work shall normally be considered as a developmental stage for professional engineers and scientists performing engineering or scientific work.

3.0 The MP4/FMP14 level of work shall be considered as the "normal expectancy" level for fully qualified and competent engineers, or scientists in OPG. MP3/FMP13 may continue to be a "journeyperson" level for engineers and scientists in some areas of activity.

4.0 Every effort should be made to provide professional engineers and scientists with an opportunity for advancement to MP4/FMP14, when they are capable of performing work at this level and such work is available.

5.0 Where an individual has demonstrated the willingness and capability to advance, and where advancement is impeded by lack of opportunity in the work area, every effort should be made to assist the individual in career advancement. This could include specific action steps such as training, job transfers, and rotations which will provide greater promotional opportunity.

6.0 Greater emphasis is required on the screening of professional staff at an early stage in their careers for both their potential capability to perform work at the MP4/FMP14 level and their suitability for further employment in OPG.

ATTACHMENT A

UTILIZATION AND ADVANCEMENT OF PROFESSIONAL ENGINEERS AND SCIENTISTS

Professional Engineers

Incumbents of jobs with 600000 or 860000 occupation codes who are:

a) Licensed to practice engineering by the Association of Professional Engineers of Ontario (APEO)

or

b) University graduates in one of the following engineering disciplines:

Aeronautical Engineering (Aero Space, etc.)   Engineering General
Agricultural Engineering                    Engineering Science (Physics)
Chemical Engineering                        Geological Engineering
Civil Engineering                           Mechanical Engineering
Electrical Engineering                      Mining Engineering
Electrical Engineering                      Metallurgy & Material Science
Electronics Engineering                     Nuclear Engineering
Engineering Business (Industrial)           Water Resources Engineering

Scientists

Incumbents of jobs with 600000 or 860000 occupation codes who are university graduates in one of the Natural Sciences, the Applied Sciences, Mathematics or Computer Science and who are not classified as professional engineers.
Appendix II - Re: Input To Association of Professional Engineers of The Province of Ontario (APEO) Salary Survey

It is agreed that the method of input to the APEO Salary Survey of Employers and the analysis and use of the survey shall be in accordance with the following.

1.0 Data Input

1.1 The salary rates input to the survey shall be the rates paid for normally scheduled hours of work.

1.2 Such salaries shall be input for all OPG engineers at Bachelor and/or post-graduate levels in engineering disciplines, who are engaged in engineering or scientific work (incumbents of M&P 600000 series jobs and of FM&P 860000 series jobs, who are represented by The Society), including engineering trainees who are registered (or eligible for registration) by the APEO.

2.0 Method of Input

2.1 Level A
Engineers whose Bachelor graduation occurred during the current or two previous calendar years, who are not incumbents of jobs classified as MP4 and FMP14 or higher.

2.2 Level B
Engineers whose Bachelor graduation occurred during the third, fourth or fifth calendar year prior to the current year, who are not incumbents of jobs classified as MP4 or FMP14 or higher.

2.3 Level C
Engineers in jobs classified as MP2, MP3, FMP12 or FMP13 who have sufficient years of experience to exempt them from the requirement to be input to Levels A or B.

2.4 Level D
Engineers in jobs classified as MP4, MP5, FMP14, FMP15.

2.5 Level E
Engineers in jobs classified as MP6, FMP16.

3.0 Annual Relative Standing
OPG data will be excluded from the APEO survey data when making comparisons of OPG’s position relative to the community.

Appendix IV – Re: Application of the Purchased Services Agreement to AECL

1. **Preamble**
   As a part of the approval process of the Purchased Services Agreement (PSA), the parties agreed to develop a Framework Agreement which would recognize the special status of the relationship between OPG and AECL and govern the day-to-day transactions between the two companies.

2. **Scope**
   This Framework Agreement for applying the PSA to OPG's relationship with AECL applies only to those purchased services which are not funded through the CANDU Owners’ Group (COG) Agreement.

3. **Intent**
   This Agreement describes a decision-making process where only certain decisions regarding the purchase of services by OPG from AECL are subject to the full transactional application of the PSA. Those decisions which are not subject to a full transactional application of the PSA are subject to the periodic review process described in Section 6.

4. **Definition**
   *Work:* means a work package which is a clearly defined scope of services that requires the formal approval of OPG prior to proceeding.

5. **Decision-Making Process**
   5.1 The decision-making process described in this section is also presented in diagram form (diagram included as a part of this Agreement). Should there be inconsistencies between the written and diagrammatic descriptions of the decision-making process, the written description will take precedence.

   5.2 The process begins with OPG proposing that services be purchased from AECL or a Centre of Excellence [i.e., Reactor Engineering Services Department (RESD) or the Centre for Heat Exchanger Engineering Sciences and Technology (CHEEST)].

   5.3 If the work is to be assigned to a Centre of Excellence (i.e., RESD or CHEEST), then the PSA will not be applied [see also Section 6.4(e)]. The Centre of Excellence would not be permitted to subcontract more than 30 percent of the labour component of the work.

   5.4 If the answer to one or more of the following questions is in the affirmative, OPG Management may proceed to issue a contract to AECL:

   a) *Is the work emergency work?* Emergency situations will be as identified by the OPG manager with the appropriate decision-making authority. The review of such decisions will form a part of the scope of the periodic review process (see Section 6).

   b) *Is there a regulatory requirement (e.g., from the Ministry of Consumer and Commercial Relations or the Atomic Energy Control Board) that the work must be performed by AECL?*

   c) *Has the PSA already been applied to the work?*
If work is not assigned to a Centre of Excellence (per 5.3) and all of the questions in Section 5.4 are answered in the negative, but the answer to one or more of the following questions is in the affirmative, the PSA will be fully applied to the work on a transactional basis:

a) Are there surplus Society-represented employees with the requisite skill sets in OPG?
b) Does the labour component of the proposed work exceed 1,500 person hours?
c) Does the duration of the proposed work exceed twelve (12) months?
d) Does a sub-contract(s) need 30 percent of the total person hours of the work?

If none of the questions in 5.5 a) - d) is answered affirmatively, then OPG Management may proceed to issue a contract to AECL.

6. Periodic Review

6.1 The parties agree to establish an AECL Purchased Services Review Team (Review Team) within ten (10) working days of this Agreement coming into effect.

6.2 The Review Team will be composed of three Management representatives and three Society representatives to be appointed by the parties through the Joint Society Management Committee (JSMC).

6.3 The Review Team initially will meet quarterly, but may change the frequency of its meetings by mutual agreement of the team members. With reasonable notice, the JSMC may also convene meetings of the Review Team.

6.4 The Review Team will be responsible for reviewing all transactions between AECL and OPG which have taken place since the last meeting of the team to confirm that the intent of this Agreement continues to be met. All the documentation necessary to facilitate this review will be collected and made available to the Review Team. The review specifically will include:

a) the extent to which the criteria (see 5.3, 5.4 and 5.5) in the decision-making process are being met;
b) whether the criteria (see 5.3, 5.4, and 5.5) in the decision-making process continue to be the appropriate ones based on experience;
c) the extent to which contracts which were issued to AECL were specific to AECL’s nuclear capabilities;
d) an assessment of any work placed by emergency decision [per section 5.4 a)] or mandated by regulators [per Section 5.4 b)];
e) any changes to the Terms of Reference of existing Centres of Excellence (i.e., CHEEST or RESD) or any request that a new Centre of Excellence be added to Section 5.3;
f) an assessment of whether there has been any misuse of the decision-making process;
g) an assessment of the overall effectiveness of this Agreement and its decision-making process.
6.5 The Review Team will make any recommendations it may have for changes to this Agreement to the JSMC. Any such recommendations will be arrived at by consensus. If consensus cannot be reached, the team will report the divergent views of the members of the team to the JSMC.

7. **Grievability/Arbitrability**

The lack of application of this Framework Agreement in a given situation is subject to the grievance/arbitration process.

8. **Effective Date**

This Framework Agreement takes effect on the date of signing by the representatives of the parties.

---

**AECL Purchased Services Model**

- Work proposed for AECL or Centre of Excellence
  - Centre of Excellence work?
    - NO
      - Is the Work emergency work? Or Mandated by Regulators? Or Already PSA
      - YES
        - Periodic Review of contract by Review Team
    - YES
      - Do subcontracts exceed 30% of the contracted total person-hours?
        - NO
        - Management issues contract
        - YES
          - Are there any OPG Society-rep employees with the requisite skills currently surplus?
            - NO
            - YES
              - PSA Applied
  - YES
    - Management issues contract

(signed by Chris Cragg for The Society and Brian Story for Ontario Hydro, December 20, 1994 - revised in the 2006-2010 Collective Agreement)
Appendix VII - Re: Outline of Negotiating Process for Collective Agreement

The parties agreed to make their best efforts to adhere to the following schedule for negotiating amendments to the Collective Agreement. Failure to adhere to this schedule shall not jeopardize the bargaining rights of either party. Dates refer to the calendar year in which Collective Agreement expires.

1. The JSMC will meet prior to January 31, of the last year of the Agreement to prepare a detailed work plan for negotiating the outstanding tasks set out in the Agreement (Articles 94, 97, etc.). The work plan will include a schedule of priority items, target dates, primary responsibilities, and resources.

2. By June 1, the parties will:
   a) select their representatives for the main negotiating committee;
   c) determine the schedule for main committee negotiating meetings;
   d) select a mediator-arbitrator and determine the dates for mediation-arbitration;
   e) receive progress reports on items under (1) above.

3. By August 1, the parties will, if required:
   a) identify those issues which will be referred to sub-committees;
   b) establish the terms of reference for the sub-committees and the target dates these sub-committees are to submit their final reports/recommendations to the main committee;
   c) select their representatives on the sub-committees. The parties shall each appoint at least one representative from their main negotiating committee to serve on these sub-committees.

4. Sub-committees will begin meeting no later than September 1 and submit progress reports by October 15 and a final report no later than October 31 (unless specifically provided with a time extension by the JSMC).

5. Main committee negotiations will begin no later than October 15.

6. Main committee negotiations will conclude no later than December 1.

7. Mediation meetings with the mediator-arbitrator, if necessary, will conclude no later than December 15, unless further meetings are required to address issues which arise in the course of drafting contract language or if a tentative settlement fails ratification.

8. If necessary, an Arbitration Hearing will be conducted prior to January 31, in the year after the Agreement expires.
Appendix VIII Re: Amendment to the Voluntary Recognition Agreement (VRA)

In light of major changes that have occurred since the Voluntary Recognition Agreement (VRA) came into effect on January 14, 1992, including significant Corporate restructuring, the parties’ agreement to conduct a joint internal relativity project, and the need to clarify The Society’s historical jurisdiction, The Society and OPG agree to replace Sections 1.0 and 2.0 of the VRA with Article 2 of their Collective Agreement as amended by the Framework Agreement dated October 4, 1994.

The parties further confirm that the terms of the VRA as amended in the Collective Agreement remain applicable in all respects, including the agreed upon dispute resolution processes, to all provincially and federally regulated employees, subject only to previously agreed amendments and this amendment.

Appendix IX - Re: Article 2 - Recognition Clause

OPG and The Society confirm the following understanding with respect to their agreement to amend Article 2 ("Recognition Clause") of their Collective Agreement:

1. The parties agree that the Voluntary Recognition Agreement (Attachment A), subsequent amendments to the VRA and correspondence between the parties concerning jurisdictional matters will be admissible in the event of any future interpretation disputes concerning The Society's recognition clause.

2. The parties agree that the intent of these amendments is to clarify The Society's historic jurisdiction as the exclusive bargaining representative for the broad mix of professional and supervisory employees that comprise the M&P/FM&P and TMS/TS/OSS/SEI salary classifications on salary schedules 01, 02, 03, 04, 05, 06, 07, 08, 09, 13 and 18 except where such persons are performing managerial functions or are employed in a confidential capacity. As such, these amendments constitute a reconfirmation by OPG of the commitments made by D.B. MacCarthy regarding The Society's jurisdiction in his April 18, 1994 letter to P.T. Suchanek, Registrar of the Canadian Labour Relations Board.

3. The Society acknowledges that OPG has consented to the deletion of the following subparagraphs from the bargaining unit description on the basis of the assurance of The Society contained in paragraph 4 below:
   - those persons included on the Executive Salary Roll and above;
   - employees whose full-time duties are security work;
   - employees in the Executive Office;
   - employees in the Office of the General Counsel and Secretary including the Law Division except Corporate Official Records Analysts, Corporate Archivists and Corporate Records Centre Supervisors.

4. The Society assures OPG that this Agreement, to delete the sub-paragraphs contained in paragraph 3 above, does not extend the previously agreed upon jurisdiction of The Society, except upon consent of the parties, beyond that jurisdiction identified in the Voluntary Recognition Agreement. However, should jurisdictional claims be made by any other bargaining agent for the classifications referred to in paragraph 3 above, The Society may assert a parallel or related claim.

5. The parties acknowledge that there are thirteen jurisdictional grievances filed by The Society pending resolution (listed in Addendum A) and that these amendments are not intended to prejudice the outcome of these disputes.

6. The parties acknowledge that the definition "associated employees" in Subsection 2.3.2 includes, but is not limited to, positions listed in Addendum B, and other similar positions created in the future.

(signed by B.R. Story and C.B. Cragg - October 4, 1994) - Revised in 2006-2010 Collective Agreement
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ATTACHMENT A

VOLUNTARY RECOGNITION AGREEMENT

This Agreement including the accompanying Framework Agreement, included as Schedule A, resolves all issues raised during proceedings at the Ontario Labour Relations Board, regarding The Society's Applications for Certification (dated November 5, 1986 and October 2, 1990) or otherwise arising as to the status of the Master Agreement as a Collective Agreement before such Board or the Courts. This Voluntary Recognition Agreement is entered pursuant to the Ontario Labour Relations Act and is acknowledged to be enforceable pursuant to that Act. The parties agree that the Memorandum of Agreement, June 19, 1991, known as the Letter of Understanding, is no longer in force or effect.

1.0 Recognition Clause

Pursuant to section 16(3) of the Ontario Labour Relations Act, Ontario Hydro agrees to recognize The Society as the exclusive bargaining agent for the "employees" defined as follows:

"All employees employed by Ontario Hydro in the Province of Ontario as supervisors, professional engineers, engineers-in-training, scientists, professional, administrative and associated employees save and except:

a) those persons included on the Executive Salary Roll and above;

b) employees in bargaining units for which any trade union holds bargaining rights as of the signing of this Agreement;

c) those persons who perform managerial functions as distinct from supervisory functions. An employee is performing managerial functions if:

i) she/he performs managerial functions such as hiring, promotion, performance increase, discharge, etc. over other employees in the bargaining unit and;

she/he is required to spend the majority of his/her time performing managerial duties and;

she/he supervises at least seven (7) employees (directly or indirectly) on a regular and continuous basis.

ii) she/he supervises employees who are excluded from The Society under (c) (i), (d), (e) or (f);
d) employees who are primarily employed in a confidential capacity affecting the terms and conditions of employment for Ontario Hydro staff;

e) employees whose full-time duties are security work;

f) employees who are members of a profession entitled to practice in Ontario and who are employed in a professional capacity where the Ontario Labour Relations Act excludes such persons from coming under the Act by virtue of their profession.“

2.0 Clarity Notes

For the purposes of clarity, the bargaining unit set out above:

2.1 Includes:

a) All regular, probationary, part-time and temporary employees whose functions are included in the classifications paid from Salary Schedules 01, 02, 04, 05, 07, 08, 09, and 18; and

b) All employees paid from Salary Schedule 13 (Nurses), Salary Schedule 03 (System Control Operators) and Salary Schedule 06 (Helicopter Operator Supervisors), except employees excluded by virtue of 1.0 of this Agreement, will be entitled to vote to determine if they wish to be represented by The Society. If the majority of eligible employees voting on any schedule vote in favour of being represented by The Society, eligible employees on that schedule will be represented by The Society. The vote will be conducted by The Society and Ontario Hydro by secret ballot.

2.2 Excludes employees in accordance with 1.0 (c) above as follows:

a) M&P (Schedule 01) - in salary classification MP4 (or higher) rated by the Plan A Point System of Job Evaluation January 1988 (“Plan A”), or its equivalent, carrying “Nature of Supervision” Degree 4 (or higher) or its equivalent and “Numbers Supervised” Degree 3 (or higher) or its equivalent who normally supervise other Society represented employees.

b) FM&P (Schedule 02) - who normally supervise other FM&P employees and who normally supervise at least seven (7) employees directly or indirectly.

c) TMS and TS (Schedules 08 and 07) - who normally supervise other TMS or TS positions and who normally supervise at least seven (7) employees directly or indirectly.
d) OSS (Schedule 05) - who normally supervise other OSS positions and who normally supervise at least seven (7) employees directly or indirectly.

e) Supervising Electrical Inspectors (Schedule 09) - who normally supervise other SEI positions and who normally supervise at least seven (7) employees directly or indirectly.

f) Area Managers.

2.3 Excludes employees in accordance with 1.0 (d) above as follows:

a) Employees paid from Salary Schedule 01 rated under Plan A as having “Staff Responsibility” Degree 4 (or higher) or its equivalent and MP6 employees as having “Staff Responsibility” Degree 3 (or higher) or its equivalent.

b) Employees in the Executive Office.

c) Employees in the Office of the General Counsel and Secretary including the Law Division except Corporate Official Records Analysts.

d) Positions currently listed in Agreement RS-1 dated October 11, 1990.

e) Human Resource trainee positions on Schedule 04.

3.0 The grievance and arbitration procedure may be used to challenge any unreasonable, arbitrary or bad faith action taken by Ontario Hydro which results in the exclusion of any employee or position from the bargaining unit.

4.0 Arbitration

4.1 Future contract negotiations disputes shall be resolved by binding arbitration in accordance with Section 38 of the Ontario Labour Relations Act and the negotiating process for resolving such disputes shall be set out in full in the Collective Agreement.

The dispute resolution process shall be mediation-arbitration using the same individual as both the mediator and arbitrator.

The mediator-arbitrator shall consider the following issues as relevant to the determination of the award on monetary issues:

a) a balanced assessment of internal relativities, general economic conditions, external relativities;
b) Ontario Hydro’s need to retain, motivate and recruit qualified staff;
c) the cost of changes and their impact on total compensation;
d) the financial soundness of Ontario Hydro and its ability to pay.

A mediator-arbitrator shall have the power to settle or decide such matters as are referred to mediation-arbitration in any way he/she deems fair and reasonable based on the evidence presented by representatives of Ontario Hydro or The Society in light of the criteria in items (a) to (d) and his/her decision shall be final and binding.

4.2 The parties will hereby undertake to develop appropriate internal comparisons, an external community for comparison and criteria for measuring total compensation by no later than September 1, 1992 and failing such agreement either party may refer the outstanding differences to an arbitrator for a final and binding decision. This undertaking and its referral to arbitration shall be enforceable under the Arbitrations Act.

5.0 No Strike/No Lockout

The Collective Agreement will recognize that The Society, employees within the scope of the bargaining unit, and the Corporation are pledged to the effective and efficient operation of Ontario Hydro and that they pledges themselves, individually and collectively, to refrain from taking part in strikes, lockouts or sympathy strikes and other interference with work or production as long as the terms and conditions in section 4.0 continue.

6.0 Supervisory Employees

For the purposes of section 9.0, the parties agree that Supervisory positions are those that are not excluded under section 1.0 above and that satisfy the following criteria:

a) Employees on Salary Schedule 01 who have under Plan A “Nature of Supervision” Degree 3 (or higher) or its equivalent;
b) Employees on Schedules 07, 08, 02, 05 and 09 on condition they normally supervise other employees.

7.0 Enforcement

The primary method of enforcement of this Agreement shall be pursuant to the grievance and arbitration provision of the parties’ Collective Agreement. However, should the Collective Agreement not be in operation or applicable to the dispute, either party shall have the right to refer to final and binding arbitration any differences between the parties arising from the interpretation, application, administration or alleged violation of this
Voluntary Recognition Agreement, including any question as to whether a matter is arbitrable.

The arbitrator shall have all of the powers of an arbitrator pursuant to section 44 of the Ontario Labour Relations Act or the Arbitrations Act as the case may be.

Subject to the conditions of this Agreement, if a mediator or arbitrator is not appointed within 30 days of a matter being referred to mediation and/or arbitration, either The Society or Ontario Hydro shall have the right to refer the matter to the Minister of Labour or the Chief Justice of the Ontario Court of Justice and the Minister or Chief Justice shall appoint a mediator and/or arbitrator.

8.0 Selection of Mediators and Arbitrators

Mediators and arbitrators shall be selected from a list of mutually acceptable persons which are to be set out in the Collective Agreement and the costs of using them will be shared equally by Ontario Hydro and The Society.

9.0 Duration

The Agreement shall come into effect on the date of ratification and shall remain in effect thereafter except for section 4.0 and 5.0 which may be terminated by written notice by either party not less than six months prior to the expiry of the Collective Agreement in operation on January 1, 2001 or any subsequent Collective Agreement. In the event that The Society provides notice of termination of sections 4.0 and 5.0, Ontario Hydro may require that the supervisors defined in this Agreement form a separate bargaining unit for which The Society shall be recognized as the bargaining agent and for which there shall be a separate Collective Agreement. In addition, The Society shall continue to be recognized as the bargaining agent for non-supervisory staff defined in this Voluntary Recognition Agreement. Disputes on the identification of supervisors shall be submitted to a mutually-acceptable arbitrator for settlement. If the parties fail to agree to appoint an arbitrator, either party may refer the matter to the Minister of Labour or the Chief Justice who shall appoint an arbitrator. If Ontario Hydro provides notice of termination of sections 4.0 and 5.0, it shall continue to recognize The Society as representing all employees in one bargaining unit per this Voluntary Recognition Agreement and ensuing Collective Agreements.

In the event that either party desires to amend this Agreement on or after January 1, 2001, it must notify the other party in writing not less than six months prior to the expiry of the Collective Agreement in effect on January 1, 2001 or thereafter six months prior to the expiration of any subsequent Collective Agreement. In such circumstances the parties will have the right, if either party so chooses, to appoint a mutually-agreeable mediator for the
purpose of reaching a settlement of the issues and where there is mutual agreement the mediator shall arbitrate outstanding matters in dispute.

Notwithstanding the above, the parties may mutually agree to amend this Agreement at any time.

10.0 **Federal Jurisdiction**

In the event that nuclear workers are found to be covered under the Canada Labour Code and The Society applies to represent these employees, Ontario Hydro will not oppose certification for any employee represented by The Society under this Agreement.

11.0 **Ratification**

The Society Executive recommends acceptance of this Agreement to its members and the Agreement shall become effective upon the date of ratification. Persons eligible to vote will include all employees who will be represented by The Society under this Voluntary Recognition Agreement. The vote will be conducted by secret ballot.

12.0 Effective upon the date of ratification or as soon as reasonably practical, Ontario Hydro undertakes to make available to those employees excluded under 1.0(c) and 1.0(d) an enhanced Redress Procedure for Management Function staff, which includes the right to representation of their choice, and as a final step in the process, to binding arbitration by an external third party acceptable to the employee and to Ontario Hydro.

13.0 Until the terms of a first Collective Agreement are reached, Ontario Hydro agrees to adhere to the terms and conditions of employment found in the existing Master Agreement, Subsidiary Agreements and Memoranda of Understanding with respect to the agreed upon bargaining unit. Applicable sections of the Manual of Human Resources Policies and Procedures will act as a supplement to the aforementioned joint documents.

14.0 Effective the first month following the date of ratification, Ontario Hydro shall deduct dues from each employee in the unit and remit this amount to The Society forthwith.

This Agreement was arrived at with the assistance of and under the auspices of George Adams as mediator.

[signed by C. Cragg for W. Hirst (Society) and W.S. O’Neill (Ontario Hydro), November 13, 1991.]
Memorandum of Understanding for a Framework Agreement

Ontario Hydro and The Society of Ontario Hydro Professional and Administrative Employees agree as part of the Voluntary Recognition Agreement to be bound by the following principles and practices and agree that the negotiation and operation of all Collective Agreements ensuing from the Voluntary Recognition Agreement will be in accordance with this memorandum unless otherwise mutually agreed.

1.0 Society Interests vs. Corporate Interests

The object of this Agreement is to promote harmonious relations between employer and employees consistent with the preamble of the Ontario Labour Relations Act and in recognition of the need for the successful accomplishment of the public purposes for which Ontario Hydro has been established as set forth in the Power Corporation Act and enunciated in the Corporate Direction.

The objective of the parties is to facilitate the peaceful adjustment of salaries and benefits, working conditions, issues of fair treatment, all disputes and grievances, and to prevent inefficiencies and avoidable expenses and to reduce unnecessary delays.

Ontario Hydro’s mission is to contribute to the enhancement of the quality of life of the people of Ontario by serving their energy needs. The Society’s mission is to strive to ensure the best rewards, career opportunities and working conditions for its members. The Society recognizes a responsibility for providing an essential service to the people of Ontario and in working towards the continued viability and continuity of Ontario Hydro as the provincial electrical utility. Both parties recognize the fundamental importance of service to the Corporation’s customers.

The parties recognize that situations may arise where their missions, objectives, or actions come into conflict. These conflicts may impact on the bargaining unit and particularly on supervisory employees represented by The Society. The parties agree that supervisors will be able to participate fully as members and perform supervisory responsibilities without fear of reprisal or recrimination by either party.

Provided nothing in this Framework Agreement is intended to interfere with the exercise of lawful economic sanctions by any member of the bargaining unit or bargaining units as the case may be or by The Society itself should either party to the Agreement elect to terminate sections 4.0 and 5.0 of the Voluntary Recognition Agreement.

2.0 Collective Agreement

The Collective Agreement between the parties will include sections 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 8.0 of the Voluntary Recognition Agreement, in addition to
section 1.0 of Schedule A and the principles set out in sections 3.0 to 7.0 as noted below.

3.0 Supervisory Employees - Code of Ethics

Ontario Hydro agrees to include supervisory employees in the bargaining unit on the condition that the parties recognize that supervisory employees will continue to exercise key functions in the control and operation of Ontario Hydro. As members of Ontario Hydro’s managerial staff, supervisors use judgment to express and make operative the decisions of Management. They are responsible for fostering a healthy work environment. The parties recognize the responsibility of supervisors to discharge their supervisory duties in good faith. The Society and Ontario Hydro will identify, minimize and/or avoid the conflicts/perceived conflicts of interest that may arise concerning the relationship between supervisors, The Society and Ontario Hydro.

It is recognized that supervisory employees may be disciplined for failure to act in good faith as a representative of Management and fulfilling their responsibilities including abuse of supervisory position and breach of trust.

3.1 Grievance Procedure

The Collective Agreement will have a grievance procedure which will recognize:

- access by either party for disputes arising from the administration of the Collective Agreement and from the application of section 1.0. If such disputes proceed to arbitration, the arbitrator will consider the principles contained in section 1.0;
- the role of supervisors in resolving disputes before they reach the formal procedure;
- that The Society agrees not to discriminate against supervisors who represent Management in Society grievances;
- that The Society will exclude supervisors directly involved in a particular grievance from the decisions on the referral of the grievance through the formal process;
- that supervisors will not act on behalf of The Society in matters associated with a particular grievance where the grievance has been lodged by another member(s) who reports to the particular supervisor.

4.0 Representation on Corporate Committees

The Collective Agreement will recognize the roles and responsibilities of appointees to committees and task forces, i.e., as a representative of
Management on the one hand, and The Society, on the other. When an employee represented by The Society is appointed by Management, his/her responsibility is to Management. When he/she is appointed by The Society, his/her responsibility is to The Society. This role distinction should be made clear at the time of appointment. Notwithstanding the above, and in keeping with section 3.0, Management will endeavour to appoint its representatives having regard to The Society’s interests in effective representation.

5.0 Selection of Supervisors

The Collective Agreement will incorporate the existing practices for selecting the “best qualified candidate” in filling supervisory positions.

6.0 Membership in The Society

The Society agrees to permit members to withdraw membership in The Society.

7.0 Dues Deduction (Rand Formula)

The Collective Agreement will provide for Society dues, as prescribed by the Constitution, or an equivalent amount, to be deducted monthly (or more frequently if agreed) by Ontario Hydro by compulsory payroll deductions from all Society-represented employees and to be forwarded to The Society on their behalf with a list of appropriate employee information.

The Society confirms it will respect the provision of section 47 of the Ontario Labour Relations Act with respect to bona fide religious convictions or beliefs.

(signed by C. Cragg for W. Hirst [Society] and W.S. O’Neill [Ontario Hydro], November 13, 1991)
Appendix X - Re: Conflict of Interest - Security Staff

February 24, 1995

Mr. C. Cragg
President
The Society of Ontario Hydro
Professional and Administrative Employees
Suite 630, 525 University Avenue
Toronto, Ontario
M5G 2L3

Dear Chris:

Conflict of Interest - Security Staff

This will confirm the intent of the internal and external confidential review/resolution process in Article 2, Subsection 2.4. This process does not deny the parties access to the grievance/arbitration process but recognizes that conflict of interest situations may require an alternate forum for resolution. The issues that may give rise to a conflict of interest between the duties and responsibilities of the Security Staff and their membership in The Society may involve sensitive and confidential security matters that would not be appropriate to the usual grievance/arbitration process. The parties may desire to deal with these issues in camera or with the immediate involvement of other representatives who are not usual participants in the grievance/arbitration process. The employee is entitled to Society representation in this process and in the event that the process is not successful or results in discipline or other actions directly affecting any of the parties, all parties would maintain the right to pursue these actions through the grievance/arbitration process.

(signed by B.R. Story - February 24, 1995)
Appendix XII – Re: Guidelines for Applying Burkett Overtime Award

As a result of continuing questions concerning the Burkett overtime award, The Society and OPG have agreed to issue these guidelines to assist local representatives in interpreting this award.

Employees found eligible for compensation under this award are entitled to receive compensation equivalent to PWU overtime premiums for all overtime worked, retroactive to January 1, 1993. This entitlement applies to all PWU overtime premiums, including double-time Saturdays, double-time for all work performed outside of their first four clock hours after normal quitting time Monday to Friday inclusive and minimum payments for emergency and scheduled overtime. It does not apply to travel time outside of normal scheduled hours.

To determine compensation eligibility under this award:

First, determine which employees are eligible to receive the PWU equivalent overtime premium. A list of eligible employees should be developed locally using the statement of intent in Part A and the employee eligibility guidelines set out in Part B. Local Society representatives should be involved in developing the list of eligible employees to minimize the possibility of disputes.

Second, decide whether an employee deemed eligible in step one will be compensated with PWU equivalent overtime premiums on an ongoing or on an assignment-by-assignment basis. This decision is Management’s prerogative. If the decision is made to compensate on an assignment-by-assignment basis, the guidelines set out in the statement of intent in Part A and the guidelines in Parts C and D should be followed to determine when an eligible Society-represented employee qualifies to receive the applicable PWU equivalent overtime premium. Local Society representatives should be involved in the development of local adaptations of these guidelines to ensure fair and consistent employee treatment and to minimize disputes.

Part A - Intent of the Award

The intent of the award is to correct the internal “relativity rub” that arises when Society-represented staff are required to directly supervise or work beside PWU-represented employees performing overtime work in a field environment or facility while receiving less providential overtime provisions than these employees. It is not intended to address internal relativity problems other than those that specifically arise when members of both employee groups work overtime.
Part B - Conditions of Employee Eligibility

1. The following conditions must be satisfied before an employee is eligible to receive award compensation:
   a) an employee must work in a field environment/facility (=“field condition”);
   and
   b) he/she must directly supervise or work beside PWU-represented employees (=“interface condition”).

2. To meet the “field condition”, an employee must be “directly involved in the operations, maintenance or construction of production, transmission, or distribution facilities”.

3. “Head office” refer to non-production, non-transmission or non-distribution facilities and, as of January 1,1993, includes the following locations: 700 University, 393 University, Murray Street, College Park, Place Nouveau and the Atrium. When performing overtime work at these locations, employees do not meet the “field condition”. Local Society and Management representatives should assess whether or not employees, when performing overtime work at other locations, meet the “field condition” on a case-by-case basis, by examining the nature of the employee’s work in light of the statement of intent in Part A and the guidelines contained in this section. In the event of disagreements, the matter should be referred to the JSMC.

4. Employees whose regular work headquarters are “field” locations (i.e., those not included under guideline #2 above) and who train PWU-represented staff meet the “field condition”. Employees who satisfy this condition include those who work at the Orangeville C&D Centre and the Nuclear and Thermal training centres.

5. Employees whose overtime work at their regular work headquarters does not meet the “field condition” (e.g., head office staff) shall be deemed to meet this condition for overtime work performed at “field” locations when they directly supervise or work beside employees involved in the operation, maintenance or construction of production, transmission or distribution facilities (e.g., research, telecommunications or information systems work performed at stations).

6. Employees “work beside” PWU-represented staff if they work at the same time as PWU-represented staff on the same projects/task assignments and this is a normal feature of their work and necessary to carry out their job responsibilities (e.g., P&C Engineers). To determine employee eligibility in this regard, the nature of the Society-represented employee’s job responsibilities, rather than the frequency of his/her actual contact with PWU-represented staff, should be the primary consideration.
Part C - Conditions That Trigger Award Compensation

(Management has the discretion to compensate employees who are deemed eligible under Part B above with the equivalent to PWU overtime premiums on an ongoing or on an assignment-by-assignment basis. If Management chooses to compensate on an ongoing basis, the sole condition that must be satisfied for award compensation to trigger is the eligible employee’s performance of overtime work. If Management chooses to compensate on an assignment-by-assignment basis, then the guidelines below apply. NB. An individual guideline does not stand alone: all conditions set out in this Part must be satisfied before an eligible employee qualifies for award compensation.)

Both The Society-represented employee and the PWU-represented employee whom he/she supervises or works beside must be on overtime. Example: if a Society-represented employee who normally works days Monday to Friday works on a Saturday with a PWU-represented employee who is working on his/her normal scheduled shift (and does not work beyond the scheduled hours), The Society-represented employee does not qualify for award compensation.

Award compensation applies to the period of time when The Society-represented employee is “rubbed” by an unfavourable overtime premium differential. Example: if a Society-represented employee who normally works days Monday to Friday works on a Saturday from 7:00 a.m. to 3:00 p.m. with a PWU-represented shift employee (for whom the Saturday is a scheduled work day) whose shift ends at 7:00 a.m. but who continues to work (on overtime) until 3:00 p.m., The Society-represented employee qualifies for double-time from 11:00 a.m. until 3:00 p.m., i.e., when the PWU-represented employee received double-time for overtime work.

The presence of a Society-represented employee for the overtime in question must be necessary for the work to progress (i.e., if the employee was not there, then the task could not proceed). In most cases, this condition is met if the other conditions set out in the Part are also satisfied.

A direct supervisory or “working beside” interface must exist between Society-represented and PWU-represented employees during the overtime in question. The mere presence of a PWU-represented employee on overtime at the same location and at the same time as a Society-represented employee is working overtime does not trigger the award. Example: if a number of eligible Society-represented supervisors work overtime at the same time as PWU-represented employee works overtime, only the supervisor to whom the PWU-represented employee reports during the overtime in question qualifies for award compensation.

This, however, does not preclude another Society member who is not a supervisor but meets the “working beside” criteria from receiving this compensation.
Part D - Clarifications

1. Even if only one PWU-represented employee is on overtime for a particular assignment, and the other (PWU-represented) members of his/her crew or task group are not, assuming the other conditions are met, The Society-represented employee on overtime with him/her qualifies for award compensation.

2. Normal shift turnover work of less than 30 minutes does not qualify for coverage under this award, but rather is compensated in accordance with Article 62 ("Shift Turnover") in the Collective Agreement. Shift turnover work of 30 minutes or longer performed outside of normal working hours, however, as well as work other than shift turnover work an employee is required to perform prior to normal starting time are eligible for compensation under this award provided that: a) the employee directly supervises or works beside a PWU-represented employee; and b) both are on overtime; and c) an overtime premium rub exists.

(dated February 28, 1994 – revised in the 2006-2010 Collective Agreement)
December 4, 1998

Mr. John Wilson, President
The Society of Ontario Hydro Professional
and Administrative Employees
525 University Avenue, Suite 630
Toronto, Ontario
M5G 2L3

Dear Mr. Wilson:

This will confirm certain understandings reached during collective bargaining, concerning the Pension Plan:

a) The employees represented by The Society constitute a separate class within the Ontario Hydro Pension Plan;

b) The committee established as a result of the Memorandum of Settlement for the 1997-1998 Collective Agreement shall continue to have access to reasonable pension plan and pension fund information, which shall include reasonable information related to the allocation and transfer of pension funds from the Ontario Hydro Financial Corporation Pension Plan to a successor pension plan as contemplated by S. 100 of the Energy Competition Act. Prior to its publication, the committee will review any brochure, which provides a summary of the pension plan and any specific provisions and entitlements of The Society pension class;

c) In the event of a division of the Ontario Hydro Pension Plan into two or more successor pension plans, the provisions of this letter are applicable in respect of each successor pension plan.

d) The employer confirms it remains responsible in respect of all rights and benefits under Article 50 of the Collective Agreement.

Yours truly,

Steve Strome
Vice President, Labour Relations
Corporate Human Resources
Letter from Brian Story to Jim Blair and Gary Knowles
The Society of Energy Professionals
525 University Avenue, Suite 630
Toronto, Ontario
M5G 2L3

Re: Clarification of Article 37

This is to clarify our understanding about the application of Article 37 of The Society's Collective Agreement, Release of Society Representatives.

Management acknowledges that Society Unit Directors (UD) duties may require up to 100 percent paid release time, in recognition of normal UD work plus significant participation in joint and tripartite processes and other business related to Society-Management relations. If a Unit Director is not involved significantly in these kinds of activities and processes then the release time required would normally be 50%.

Unit Directors will keep local management apprised of their Society responsibilities and commitments in order to resolve release time issues, to the greatest extent possible, at the local level. Any disputes with respect to whether 50% or 100% release time is required will be resolved at the JSMC level.

Society Unit Directors will become signatories to the Partnership Agreement between OPG and The Society and Power Workers' Union to reinforce The Society’s commitment to maintaining a constructive approach to resolving issues.

Brian Story
Vice President, Labour Relations
Corporate Human Resources
APPENDIX XV – RE: Tripartite Agreement with Respect to Jurisdictional Disputes

Between
The Power Workers’ Union ("The PWU")
and
Ontario Power Generation Inc. ("OPGI") and
The Society of Energy Professionals ("The Society")

1. Each of the PWU and the Society may refer any grievance filed under its collective agreements, or any issue arising from a grievance, that concerns competing claims by the PWU and Society to the assignment of work or positions, to the expedited arbitration process described herein.

2. The referral shall be made by the referring union delivering a brief to the other parties setting out the facts and evidence on which it relies. Responding parties shall deliver responding briefs within 30 days thereafter, and the referring union may file a reply brief within a further 10 days after receipt of the responding briefs.

3. If a party does not deliver its brief within these time lines, it may only file its brief and lead evidence at arbitration with leave of the arbitrator, on such terms as the arbitrator may impose.

4. Arbitrations will be held in an expedited med/arb format. The arbitrators will be selected from the following group:

   Jules Bloch
   Gerald Charney
   Robert Herman

5. This roster of arbitrators will be reviewed by the parties every year that this agreement continues. Prehearing issues may be referred to Jules Bloch or his designate for resolution.

6. Arbitrations will be based primarily on written briefs, which are prima facie evidence of the truth of their contents. Oral evidence will be limited to matters on which the arbitrator so directs, and no party shall introduce oral evidence of matters that are not contained in their brief, except with leave of the arbitrator. Prior settlements made without prejudice and without precedent shall not be determinative of any grievance.

7. In addition to jurisdiction under the collective agreement under which the dispute was filed, the arbitrator shall have the jurisdiction set out in s.99 of the
Labour Relations Act, 1995, except the arbitrator shall not have power to alter a bargaining unit determined in a certificate or defined in a collective agreement, or otherwise amend the collective agreement.

8. Arbitration awards will be precedent setting.

9. The arbitrator's fees and associated costs shall be shared equally by OPGI and the referring union.

10. Any party may withdraw from this agreement on six months notice to the other parties.

Brian Story
Gary Knowles and Jim Blair
Ontario Power Generation Inc. The Society

May 2000
Appendix XVI - “Shime Award” Re: Jurisdictional Issues

In the matter of a Mediation/Arbitration

- Between –

Ontario Power Generation Inc.

-and-

The Society of Energy Professionals

Owen B. Shime Q.C., Chair

This is my award to fully and finally resolve all matters in dispute reflected in the Memorandum of Agreement dated August 22, 2003 regarding jurisdictional issues.

1. Where OPG changes a Society position or creates a new borderline ESR position so that it is excluded from the bargaining unit, the following shall apply:

   a. Management shall advise the appropriate Society Local Vice-President at least five (5) working days before (b) below that they intend to either create a new borderline ESR position or change the jurisdiction of an existing Society position. During this period Management will be available to meet with the Society and share all documentation and information related to the position in question. The parties will endeavour to come to an agreement on any issues in dispute on the applicable position.

   b. Failing agreement management shall fax to the Society Local Vice-President any revisions to the job document, Plan “A” rating including rationale, an approved current and proposed organizational chart, request for exclusion form (Article 2.6), Plan ‘A” relativity list and a cover letter that differ from those delivered at step 1a. above or will notify The Society Local Vice-President that there are no revisions.

   c. On or before the expiry of 10 working days after receipt of the job document and documentations referred to in (b), the Society shall provide its arbitration brief to the VP Compensation and Benefits in support of its position that the position is properly within the bargaining unit; if no brief is provided within the 10 working day period, the position shall be deemed to be a non-bargaining unit position;

   d. On or before the expiry of 10 working days after receipt of the Society’s brief as referred to in (c) above OPG shall provide its arbitration brief to the Society-designated contact in support of its position that the position is properly a non-bargaining unit position; if no brief is provided within the 10 working day period, the position shall be deemed to be a bargaining unit position;

   e. After the exchange of briefs, the matter shall be referred to expedited arbitration as provided in LOU #179. The Arbitrator shall hear the matter
and release a decision within 10 days of the matter being referred to him or her. The arbitrator shall not have jurisdiction to consider evidence of any hardship OPG may face as a result of having to convert a position from ESR to Society jurisdiction. The Arbitrator shall only be allowed to consider the evidence as to whether or not the position is appropriately outside or inside the jurisdiction.

f. During the period up to and including the provision of a brief by OPG as referred to in (d), the position shall not be filled unless an incumbent is already in the position, in which case the incumbent shall remain in the bargaining unit subject to these provisions;

g. After the expiry of 10 working days from the exchange of briefs management may fill a newly created Borderline ESR position as a non-bargaining-unit position, provided that if the arbitrator rules that the position is a bargaining-unit position, then, unless the parties agree otherwise the incumbent shall be removed and the job shall be re-rated as per the arbitrator’s decision. In the case of a proposed change to the jurisdiction of an existing Society represented position, if there is a dispute the position shall remain within the Society bargaining unit until such a time as either the parties agree otherwise or an arbitrator has ruled on the matter and has deemed the position as appropriately being outside the Society’s jurisdiction.

h. In the event that the arbitration results in positions being declared non-bargaining unit positions, the incumbent will be given the choice as to whether he or she wishes to remain in the bargaining unit in a Society-represented role. He/she will remain in the non-bargaining unit position until such time as an appropriate Society vacancy becomes available.

i. It is understood that if the organizational chart referred to in (a) is changed during this process, the job shall be re-rated and the process will start anew if the position rating is disputed.

2. On a quarterly basis, a joint team shall review the process provided for in paragraph 1, and the experience under such process. After one-year from the date of execution of this memorandum, the parties shall undertake a comprehensive review of the process.

3. Where an exclusion from the bargaining unit occurs as a result of the number of reports, the following shall apply:

a. Where there was an existing Society position and there is a change in the number of reports, the position shall remain a Society position until the requisite initial reports are in place. If the reports are not in place after a period of six months, the position shall be re-rated. The position shall be deemed to be Society represented if rated below 335 points. The Society reserves the right to use the process in paragraph 1 above if the position is rated above 335 points.
b. In all other cases, the provisions of paragraph 1 apply, provided that in the case of a new position which is filled by a non-bargaining unit person, in the event that the requisite reports are not in place at the end of a six-month period, the matter may be referred to the expedited arbitration process provided for in LOU #179.

4. There shall be a single point of contact for the Society for Job Evaluation issues within each Bargaining Unit. OPG agrees to train 1 Society designated representative for each bargaining unit.

5. With respect to outstanding challenges of positions alleged to be in the bargaining unit:
   a. Within 60 days, the Society shall advise OPG in writing as to which positions remain subject to challenge.
   b. The parties will exchange briefs in accordance with the process in LOU #179.
   c. Any outstanding case that is not pursued, by way of a written brief, within 180 days of January 1, 2006 shall be considered withdrawn.

6. It is understood that consequential amendments to Article 2.5, LOU #179, and perhaps other provisions, will be required in order to incorporate the foregoing.

7. I shall remain seized with respect to contract language.

8. Subject to the foregoing all other matters in dispute reflected in the Memorandum of Agreement dated August 22, 2003 are deemed to be resolved.

Dated at Toronto this 10th day of September 2004.

Revised in the 2006-2010 Collective Agreement

Owen B. Shime Q.C.
Mediator/Arbitrator
Appendix XVII – Notice Items for 2011-2012 Collective Bargaining

With respect to “notice of intent” practices identified by OPG as part of its bargaining agenda for the 2011-2012 agreement, except with respect to vacation carryover that was awarded upon, the parties agree to be bound by their respective interpretations of the collective agreement language and not rely upon the past practice.
PART XVI - LETTERS OF UNDERSTANDING

In Accordance with Item #24 of the October 27, 2005 Memorandum of Settlement the parties have reviewed all Letters of Understanding and Mid-Term agreements.

The following Appendices, Letters of Understanding and Mid Term Agreements have been either deleted, moved or renumbered:

<table>
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<tr>
<th>Appendix</th>
<th>Action</th>
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<tbody>
<tr>
<td>Appendix III - Default Units of Application (Combine with Article 64)</td>
<td>Moved to Article 64.9.10</td>
</tr>
<tr>
<td>Appendix V</td>
<td>Moved to Article 14</td>
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<tr>
<td>APPENDIX VI - PROJECT CREW ARRANGEMENTS</td>
<td>Moved to Article 72.2</td>
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<tr>
<td>Appendix XI - Re: Peak Demand Hour Arrangements</td>
<td>Move to Article 72.1</td>
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<td>Appendix XIII - Clarification Notes for Article 74</td>
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<td>Appendix XIV - Side Letters</td>
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<td>- Allocation and Redeployment issues</td>
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<td>- Side letter Re Package Agreement on Group 5</td>
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<td>- Article 41 Pregnancy Leave Extension (Unpaid)</td>
<td>- Moved to Article 41</td>
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<tr>
<th>Letter of Understanding</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 Re: Compensation and Working Conditions - Essential Duty Assignments</td>
<td>Deleted</td>
</tr>
<tr>
<td>#2 Re: Peak Work Hours Arrangements</td>
<td>Moved to Article 72.1</td>
</tr>
<tr>
<td>#4 Re: Pre-Mix and Match Surplus Declarations (Combine with Article 64)</td>
<td>Moved to Article 64.14</td>
</tr>
<tr>
<td>#8 Re: Shift Differential</td>
<td>Deleted</td>
</tr>
<tr>
<td>#9 Re: Expediting Redeployment Grievances and Arbitrations</td>
<td>Moved to Article 16.11</td>
</tr>
<tr>
<td>#13 Re: Surplus Staff On Rotations</td>
<td>Moved to Article 64.21.3</td>
</tr>
<tr>
<td>#15 Re: Article 20.1(b) Performance Pay</td>
<td>Deleted* (* refer to LOU # 180 for any</td>
</tr>
<tr>
<td>Grievance Process</td>
<td>performance pay complaints arising from the 2005 year payout of the performance Pay Plan</td>
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</tr>
<tr>
<td>#23 Re: Redeployment of Society-Represented Employees in OHN During NAOP</td>
<td>Moved to Part B of Article 64</td>
</tr>
<tr>
<td>#24 Re: Reimbursement for BNPD Home Equity Loss</td>
<td>Deleted</td>
</tr>
<tr>
<td>#73 Re: Expediting Society/OPG Jurisdictional Arbitrations (Nuclear), and #73GEN Re: Expediting Society/OPG Jurisdictional Arbitrations (Non-Nuclear)</td>
<td>Moved to LOU #179 Re: Expediting Society/OPG Jurisdictional Arbitrations</td>
</tr>
<tr>
<td>#77 Re: Settlement of PPM Policy Grievance (December 3, 1996) and Negotiation of New Performance Pay Plan and Job Evaluation Plan</td>
<td>Deleted</td>
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<tr>
<td>#84 Re: Compensation for CRSSs, CRSOsSs and SSITs</td>
<td>Moved to LOU #178 Re. Band N</td>
</tr>
<tr>
<td>#99 Re: TSSD Authorization Training Supervisors (ATS’s) and Discussion of the Training Supervisor - Simulator Based Training (U0 TS’s) Positions for the Purpose of Conducting Simulator-Based Training Courses on Shift</td>
<td>Moved to LOU #178 Re. Band N</td>
</tr>
<tr>
<td>#112 Re: New Process for Employee Initiated Job Reviews</td>
<td>Moved to Article 19.1</td>
</tr>
<tr>
<td>#119 CRSS, CRSOS, ATS, and UOTS and SSIT Compensation</td>
<td>Moved to LOU #178 Re. Band N</td>
</tr>
<tr>
<td>#133 Re: Authority to Stop Work and Joint Health and Safety Committee Training</td>
<td>Moved to Article 90</td>
</tr>
<tr>
<td>#134 Re: Incident Rating and Investigations</td>
<td>Moved to Article 92</td>
</tr>
<tr>
<td>#135 Re: Article 72.2- Project Crews</td>
<td>Moved to Article 72.2</td>
</tr>
<tr>
<td>#141 Grievance Backlog Resolution Process</td>
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</tr>
<tr>
<td>#142 Re: Amendments to LOU #119</td>
<td>Moved to LOU #178 Re. Band N</td>
</tr>
<tr>
<td>#146 Re: Amendments to LOU #141 - Grievance Backlog Resolution Process</td>
<td>Deleted</td>
</tr>
<tr>
<td>#149 Re: Amendments to LOU #119</td>
<td>Moved to LOU #178 Re. Band N</td>
</tr>
<tr>
<td>#151 Re: EARLY HOUSEHOLD RELOCATION FOR NUCLEAR STAFF TRANSFERRING TO DURHAM HEADQUARTERS</td>
<td>Deleted</td>
</tr>
<tr>
<td>#153 Re: Purchased Service for OPG and Society Involvement in the OPG Business</td>
<td>Moved to LOU #175 Re: Purchased Services Agreement (PSA) Nuclear</td>
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<tr>
<td>#</td>
<td>Description</td>
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<tr>
<td>154</td>
<td>Re: Lakeview Closure</td>
</tr>
<tr>
<td>155</td>
<td>Re: Hours of Work Reduction</td>
</tr>
<tr>
<td>157</td>
<td>Compensation Systems</td>
</tr>
<tr>
<td>158</td>
<td>- Bruce Relocation Assistance</td>
</tr>
<tr>
<td>159</td>
<td>Hours of Work Reduction (Combine with Article 64)</td>
</tr>
<tr>
<td>160</td>
<td>Re: Amendments to LOU #119</td>
</tr>
<tr>
<td>167</td>
<td>Re: Treatment of Schedule 04 Management and Professional Trainees</td>
</tr>
<tr>
<td>170</td>
<td>Re: Addendum to Letters of Understanding #73</td>
</tr>
<tr>
<td>172</td>
<td>Re: Revisions to LOU #167 Re: Treatment of Schedule 04 Management and Professional Trainees</td>
</tr>
<tr>
<td>173</td>
<td>Re: Trainee Expenses – Modification to LOU #167</td>
</tr>
<tr>
<td></td>
<td>Business Unit Mid-Term Action</td>
</tr>
<tr>
<td>2</td>
<td>Re: Nuclear Unit of Application - Future Downsizing (Combine with Article 64)</td>
</tr>
<tr>
<td>10</td>
<td>Re: PND Local Agreement for #1 Shift Coverage by Society-Represented Employees Assigned to Days</td>
</tr>
<tr>
<td>12</td>
<td>Re: Compensation &amp; Working Conditions - 12-Hour Shift Schedule</td>
</tr>
<tr>
<td>13</td>
<td>Re: Society Represented Employees in NTS - Periodic Assignment to Shift Work (Final)</td>
</tr>
<tr>
<td></td>
<td>Business Unit Mid-Term #14 Re: Society Representation of Authorized Nuclear Operators in Rotations</td>
</tr>
</tbody>
</table>
LETTER OF UNDERSTANDING
#5 Re: Society-Management Function/ESR Boundary Issues

Intent

This LOU seeks to clarify employee rights during the operation of Article 64 related to positions at or near to the boundary between The Society and Management Function and provide an equitable means for employees to participate in competitions or a mix and match and follow their work where it has been transferred in or out of The Society’s jurisdiction as a result of a reorganization. It is not intended to provide enhanced employment continuity rights in comparison to employees whose work has not changed jurisdiction.

The Problem

1. Position X is in the old organization and is in The Society. The duties change very little in the new organization but the change is sufficient to alter the jurisdiction of the position (e.g., the span of supervision and control is expanded and there will be more Society direct reports).

   Under the current rules The Society-represented employees currently in position X will not be permitted to compete for the position in the new organization during a mix and match.

2. There is a converse of 1. Position Y is currently excluded from The Society (i.e., MF or ESR). In the new organization the position is substantially the same but the jurisdiction of the job will move to The Society’s jurisdiction. Once again, the change is minimal (e.g., there is reduced supervision and fewer or no Society direct reports).

3. Position Z is being formed in the new organization. It appears that it will be excluded/included but there is uncertainty about some factors (e.g., the number of direct reports). Therefore, the jurisdiction is uncertain and may eventually change.

   In this case, Management could make an arbitrary designation as excluded and The Society could challenge the designation later. If Management were to do this, then The Society-represented employees would not be able to compete for the position during a mix and match process. If the ultimate jurisdiction was within The Society, it could be that the selection process would have to be repeated.

   If Management were to designate the position as included in The Society then MF and ESR would be excluded from a mix and match process. A similar result could occur, if the jurisdiction were to subsequently change.
The Solution

A joint process for identifying positions X, Y and Z will be established as follows:

1. Management will identify the X, Y and Z positions and identify the employees who could be adversely affected. The Society will have approval/veto rights. (Note: This is intended to ensure X, Y and Z positions are legitimate and not intended to increase the opportunities for MF and ESR employees or reduce the opportunities for Society represented employees to exercise their seniority rights in the mix and match process.)

2. Category X - These positions will be filled in the MF mix and match or advertised OPG wide using the normal vacancy process if not filled in the mix and match. Society represented employees identified under paragraph 1 will be treated equally to MF employees during a mix and match but may only be selected for Position X. If the position is advertised OPG wide, then the employee will be treated preferentially (i.e., be granted the same priority as surplus MF or ESR) for the specified position only. If the employee is not selected, then the employee can exercise all of his/her normal rights under Article 64. Where the employee is not selected for the position, The Society and the employee will be advised of the selection criteria and provided with reasons for non selection.

3. Category Y - These positions will be filled in The Society mix and match or advertised OPG wide using the normal vacancy process if not filled in the mix and match. MF or ESR employees identified under paragraph 1 will be treated equally to Society employees during a mix and match but can only be selected providing they meet the senior qualified criteria for Position Y (i.e., such employees cannot be placed in any other position or displace Society-represented employees). If the position is advertised OPG wide, then the employee will be treated preferentially (i.e., be granted the same priority as surplus Society) for the specified Y position only. If the employee is not selected, then the employee will be treated similarly to other MF/ESR staff in all other respects and have no additional rights.

4. Category Z - The parties will attempt to reach consensus on the jurisdiction of the position based on all available information (which will include an organization chart showing reporting relationships, selection criteria, and description of duties) prior to the selection process. Where consensus is not reached, Management will determine the jurisdiction and The Society will have the right to grieve.

5. The rights of The Society to grieve the jurisdiction of positions are unaffected by agreements reached under this process.


______________________________  ______________________________
J. Wilson                          S. Strome
for The Society                   for OPGI–Nuclear

Revised in the 2006-2010 Collective Agreement
LETTER OF UNDERSTANDING
#10 Re: Extended Health Benefits

The undersigned parties recognize and accept the fact that OPG’s Extended Health Benefits (EHB) plan is a negotiated plan which can only be revised through negotiations. In an attempt, however, to overcome the inflexibility of this plan on a case by case basis, and on a “without prejudice” basis, the parties also recognize that there may be some situations where a business case can be made that an alternative/different treatment to that allowed by the strict wording of the plan may be mutually beneficial.

As such, the parties agree that where a business case supports such action, and where it is mutually agreeable between OPG and The Society, OPG and individual employees may enter into agreements signed by the employee and a Society Principal Officer or Society Staff Officer on a “without prejudice” basis, whereby, for a limited period of time, employees may waive their rights under the EHB Plan and opt for a different or alternative treatment as agreed to by the parties. It is the intention of both parties that this would be done infrequently and only in cases where special requests have been made by individual employees for a different type of coverage. It is further agreed that while employees have no negotiated right to such treatment, the Tripartite Health and Benefits Committee Terms of Reference [i.e. (c)] would allow it to review the experience under this Letter of Understanding when considering adding or subtracting specific entitlements under the EHB Plan in keeping with the progress of medical science. It is further agreed that this Letter of Understanding would not restrict OPG from considering special treatment on an individual basis in the case of serious hardship.

The individual agreements should contain the following information:

1. the duration of the arrangement;
2. current coverage under the EHB plan;
3. the option chosen;
4. where appropriate, a clear statement to the effect that the employee is aware that they are opting out of specific items of coverage under the EHB Plan in lieu of alternative or different treatment;
5. that the arrangement is being entered into on a “without prejudice” basis.

As stated earlier, this Letter of Understanding does not bestow on employees any right under the Collective Agreement to special arrangements, but merely serves to allow, on a case by case basis, where there is mutual agreement, for special requests to be accommodated without increasing the cost of, or entitlements under, the EHB Plan. As such, neither the provisions within the individual agreements or a decision by any party not to enter into such an arrangement are grievable.

This Letter of Understanding expires on December 31, 2000.

J. Wilson (for The Society)  S. Strome (for OPGI–Nuclear)
LETTER OF UNDERSTANDING

#14 Re: Hours of Work for Field Management and Professional (FM&P) Staff

The undersigned Parties agree to the following changes to hours of work for Society-represented FM&P staff affected by the 1995-98 EPSCA agreements. The assignment of employees to the provisions under this Agreement will be done by Management on a project-site basis.

1. All relevant policies and agreements, including Article 69, which apply to employees will continue to apply unless specifically stated otherwise in this Agreement.

2. Normal hours of work shall consist of forty hours per week, worked between Monday and Friday, on the following terms:

   (a) Normal hours of work may be scheduled as 5 days by 8 hours/day or as 4 days by ten hours/day either Monday – Thursday or Tuesday – Friday, but not concurrently on the same project.
   (b) Each project site will notify The Society Unit Director of the hours of work that the site has elected to work (4 days by 10 ours/day or 5 days by 8 hours/day). Normal hours of work will be established for a minimum period of thirty (30) days. If a project site intends to change the normal hours of work, a minimum of fifteen (15) days written notice shall be sent to the Unit Director.
   (c) Day Work
   The standard start-time for the day work shall be 8:00 am with a possible one hour variance either way.
   (d) Shift Work
   Shift work assignments shall be in accordance with Article 60.

Collective Agreement provisions for time off shall apply except as modified for the following Special Circumstances:

On 10 hour day/shifts the following items will be credited for pay purposes on an hour-for-hour basis:

   i. Vacation
   ii. Floating Holidays
   iii. Sick Leave
   iv. Leave of Absence/Unpaid Time Off
   v. Travel Time
   vi. Medical and Dental Consultations – Periods of less than four hours shall not be deducted from sick leave credits

(a) In the application of the above-noted items (I), (ii) and (iii), a “day’s” entitlement will mean eight hours, i.e., a 10-hour day/shift will constitute one day and two hours deducted from credits.
(b) When an employee is scheduled to work a 10-hour day/shift and one of the under-noted conditions occurs, a “day” will be considered to be 10 hours.

i. Jury duty and attendance at court
ii. Funerals
iii. Moving Day
iv. Time Charges for Attendance at Delegates’ Council and meetings of The Society’s Board of Directors

(c) On a 10-hour day/shift, basic statutory holiday and special time off provisions remain unchanged in that time off and pay entitlements will continue to be calculated on an eight-hour basis. Staff shall be given the opportunity to recover two hours when a statutory holiday falls on a scheduled 10-hour day/shift and the employee is not given the opportunity to work. Such hours shall be worked at straight time and shall be scheduled by mutual agreement between the employee and his/her supervisor.

(d) On a 10-hour day/shift, authorized overtime beyond 10 hours work on scheduled workdays and all hours worked on scheduled days off shall be compensated in accordance with the overtime provisions of the Collective Agreement (Article 57).

Any local modification to the conditions surrounding the scheduling of normal hours of work shall be by mutual agreement according to the terms of Article 70.

General Foremen, Supervising Field Technicians, and Field Engineers who are redeployed as a result of Article 64 will do so on the following terms:

(a) the Unit of Application shall be OPG–wide
(b) the Parties agree to formation of a standing JRPT to expedite occasional or ongoing redeployment of the above.

This Agreement operates until December 31, 2000 and shall continue thereafter subject to 90 days written notice of cancellation by either party not before October 1, 2000.

This Agreement is without prejudice to either Party’s position, and does not create a precedent, in respect of the fairness or appropriateness of any future unit of application, rights relating to hours of work, or any other matter.

______________________________  ______________________________
J. Wilson                        S. Strome
for The Society                 for OPG–Nuclear
The parties agree to maintain commitments with respect to the jurisdiction of First Line Management Supervisory positions (TMS) as set out in the following Letter of Understanding, which is in other respects terminated as complete:

(a) Implementation of the Retail Systems Agreement (August 16, 1995);

(b) Interim agreement on the Reclassification of Hydroelectric BU TMS’s (January 30, 1996);

(c) The Implementation of the Grid System Agreement on TMS (January 30, 1996);

(d) The Reclassification of the Heavy Water & Support Services Division (HWSSD) Trades Management Supervisors (TMS’s) and Trades Supervisors (TS’s) (December 3, 1997);

(e) Fossil Business Unit Local Agreement on Implementation of Requisite Organization (November 19, 1996).

______________________________  ______________________________
J. Wilson                      S. Strome
for The Society               for OPGI–Nuclear
LETTER OF UNDERSTANDING
#30 Re: Process for Updating the Drug Formulary to December 31, 2000

NEW DRUGS REQUIRING A PRESCRIPTION BY LAW

- New “generic substitutes” for “name brand drugs” already listed on the Formulary will automatically be added to the Formulary as soon as they are approved for use in Canada.

- New “strengths/dosages/forms” for drugs listed on the Formulary will automatically be added to the Formulary as soon as they are approved for use in Canada.

- Out-of-country drugs with the same chemical base as drugs listed on the Formulary will automatically be added to the Formulary as the need arises.

- The Chief Physician (or other employer-designated decision-maker) shall review all drugs that have been newly approved for use in Canada and advise the employer whether the drug is commonly and customarily recognized throughout the physician’s profession as appropriate in the treatment of a patient’s diagnosed sickness, injury or condition. The employer will make all reasonable efforts to make this determination as soon as possible after the drug has been approved for use in Canada. When a drug is deemed by the Chief Physician (or other employer-designated decision-maker) to meet this criteria, the drug shall be added to the formulary.

- Any drug on the Formulary that is no longer approved for use in Canada will automatically be deleted from the Formulary effective the date federal approval is withdrawn.

A. OVER-THE-COUNTER (OTC) PRODUCTS

1. A new OTC product (excluding Vitamins and Minerals) that has been approved for use in Canada, that falls into the following categories.
   
   (a) for allergies
   (b) for chronic illness
   (c) considered life sustaining
   (d) previously “requiring a prescription by law” and already on the Formulary
   (e) different strengths or repackaging of products already on the Formulary (same product/same company)
   (f) products already on the Formulary whose DINs may have changes as a result of a company takeover or reorganization shall be reviewed by the Chief Physician (or other employer-designated decision-maker). The Chief Physician (or other employer-designated decision-maker) will advise the employer whether” (a) the OTC product is commonly and customarily recognized throughout the physician’s profession as appropriate in the treatment of a patient’s diagnosed sickness, injury
or condition; and, (b) Best Average Pricing (i.e., Manufacturer’s wholesale price to the carrier) is available for the product. When the OTC product is deemed by the Chief Physician (or other employer-designated decision-maker) to meet this criteria, the product shall be added to the formulary.

When Best Average Pricing information is not available for an OTC product, a paper claim will be reimbursed subject to determination by the Chief Physician (or other employer-designated decision-maker) that there is no reasonable alternative product on the existing formulary and that the product is commonly and customarily recognized throughout the physician’s profession as appropriate in the treatment of a patient’s diagnosed sickness, injury or condition.

1. Vitamins and Minerals which have been approved for use in Canada and which have the same chemical base as items currently on the Formulary will be added to the Formulary effective the date Best Available Pricing information is made available to the Carrier (i.e. Manufacturers’ wholesale price).

B. MISCELLANEOUS.

1. The Corporation agrees to provide the following to The Society: a full and complete copy of the list of new drugs approved for use in Canada, as received from the Carrier (usually monthly); a list of (prescription and OTC) items added to the Formulary (including, where applicable, what country it applies to); and, upon written request from The Society, a written rationale for not including a drug on the formulary.

2. Notification of the employer’s decision to not add a drug to the Formulary, and any ensuing discussion with respect to the employer’s rationale for not doing so:
   
   Shall not be deemed to trigger timelines under article 16 of the Collective Agreement
   Shall be without prejudice to The Society’s position with respect to whether the drug meets the “reasonable and Customary” standard; and,
   Shall not prejudice The Society’s entitlement, or the entitlement of any Society-represented employee(s), to grieve the employer’s decision at a later date.

3. The Corporation agrees to provide The Society with an electronic copy of the complete Drug Formulary on a quarterly basis (calendar year).

4. The Corporation agrees to install, and update on a quarterly basis, the complete Drug Formulary on the Intranet.
LETTER OF UNDERSTANDING
#68 Re: Centralization of the Organization Reporting to the Chief Information Officer

1. Purpose/Scope

1.1 To transfer identified employees (see section 3 below) to the organization reporting to the Chief Information Officer (CIO) and to deal with matters related to those transfers.

1.2 Except as expressly modified in this Letter of Understanding, all provisions of the Collective Agreement shall continue to be applicable.

2. Preamble

2.1 The vision for the CIO's organization is to:

- provide the most reliable and cost effective information technology systems to Ontario Power Generation Inc. (OPG);
- plan to support all current OPG and new generation assets in North America;
- understand that in a competitive energy environment "joint operating agreements" are common and that the best Information Technology (IT) organization will support a generation asset, regardless of who owns the electricity output;
- ideally, perform work internally where employees can perform it well and effectively.

2.2 OPG and The Society of Ontario Hydro Professional and Administrative Employees (The Society) agree that the CIO's vision shall be pursued having due regard for the need to:

- treat Society represented employees in a fair and equitable manner;
- protect, to the greatest extent possible, the employment security of Society represented employees;
- vigorously pursue training and career development for Society represented employees so that they remain a valuable asset of the CIO organization.

3. Organization Transfers

Employees identified in the attached organization charts and lists, which charts and lists shall form part of this Letter of Understanding, will be transferred to the CIO organization and the OPG (non-nuclear) bargaining unit effective the date of approval of this Letter of Understanding. Society represented IT employees in what is currently known as Ontario Power Technologies (OPT) will have the opportunity to be transferred to the CIO organization.

3.1 Transferring Employees After the Implementation of the CIO Organization
All Society represented employees dedicated fully to Information Technology (IT), including employees currently assigned to Y2K projects, will be transferred to the CIO organization effective the date of approval of this Letter of Understanding. Should other Society represented IT employees be identified after the date of approval of this Letter of Understanding, they will be transferred to the CIO organization following discussions with and the agreement of the Society.

3.2 The CIO Organization

The CIO organization includes employees involved in Information Technology (IT) as described below.

Definition

Information Technology is any business solution that supports an organization to achieve its business objectives; for example:

- business applications development and support;
- call centre support;
- centralized computer system configuration and management;
- mainframe data centre configuration and support;
- distributed computing (e.g., desktop, LAN shared services and peripherals);
- database technology;
- voice technology and network.

4. Unit of Application

For the duration of this Letter of Understanding, there will be one unit of application for all employees reporting to the CIO.

5 Other Commitments

Management shall complete the commitments set out below in 5.1 and 5.2.

5.1 Review of Job Documents

- Rewrite job documents to move toward more generic job documents.
- Rationalize pay grades.
- Review internal relativity and make changes/improvements where necessary.
- Develop a limited set of job descriptions.
- Review and revise, as necessary, the Promotion in Place (PIP) documents that are currently in operation in the CIO organization.
- Where PIPs are not in place, management will identify advancement criteria from one pay grade to another and integrate those advancement criteria with the Personal Development Plans (PDPs - see 5.2 below) of Society represented employees. The identification of advancement criteria and their
integration with PDPs will not guarantee advancement/promotion, but will identify for employees what is required of them to be advanced/promoted.

It is expected that the commitments in 5.1 will be completed by August 31, 1999.

5.2 Employee Training and Development

- It is important to keep employees' skills current.
- On average, every employee will receive a minimum of 20 hours of IT specific technical training per year. Over a three-year period, an employee will be provided with, on average, 120 hours of technical training. This commitment does not provide a guarantee for any specific employee, but is an average for the CIO organization that will be maintained. These commitments to provide training become effective June 1, 1999.
- Non-technical training will be provided to employees where it is required for their career development. The commitment to provide non-technical training is separate from and in addition to the required amount of technical training.
- Training will be linked to, and integrated with, both the employees' Personal Development Plans (PDPs) and the CIO organization's business plans.
- Management will begin the process of developing Personal Development Plans for all employees.
- Every Society represented employee in IT will have a PDP and his/her training needs identified no later than October 1, 1999.
- A joint review of training will take place in January, 2000. The purpose of the review is to ensure that training has taken place and is scheduled to take place in accordance with the commitments set out in 5.2.

6. Article 64

Article 64 will not be invoked in the CIO organization until:

- the commitments in 5.1 have been met; and,
- the commitments in 5.2 have been demonstrated to be in place or satisfactorily in progress*; or,
- the expiration of the 1999-2000 Collective Agreement.

* The three-year training commitment set out in 5.2 will be deemed to be "satisfactorily in progress" and this management commitment to have been satisfied if by December 31, 1999 Society represented employees in the CIO organization have been provided, on average, with 10 hours of technical training.

7. Purchased Services

7.1 Management will identify all contractors performing work in the CIO organization. All current contracts will be jointly examined no later than June 30, 1999 to determine the extent of the use of purchased services in the CIO organization.
7.2 A new purchased services implementation plan will be jointly developed for the CIO organization (pursuant to subsection 67.6.1 of the collective agreement) that will guide management and Society decision-makers. The new implementation plan will be developed in keeping with the CIO's perspective on the appropriate use of purchased services.

8. Relocation Assistance

All of the entitlements described in paragraphs 5 and 6 of the Letter of Understanding "Redeployment of Society Represented Employees in OPGIN During NAOP" shall continue to apply to employees at the Bruce site. The letter dated June 19, 1998 from the Vice President - Labour Relations (Corporate Human Resources) to John Wilson, President of The Society of Ontario Hydro Professional and Administrative Employees and captioned "Bruce Nuclear Redeployment" shall also continue to apply to employees located at the Bruce site.

9. Duration

This Letter of Understanding shall operate until December 31, 2000 and shall continue thereafter subject to 90 days' written notice of cancellation by either Party.

Brian Story
For Ontario Power Generation Inc.
May 18/99

John Wilson
For The Society
May 18/99

John Mather
EVP Chief Information Officer
May 19, 1999

Gary Knowles
Society Unit Director (CIO)
May 18/99
LETTER OF UNDERSTANDING
# 91 Re: Policy #04-03-04 - "Rehabilitation and Reemployment"

1. Employees in receipt of LTD benefits, who are determined to be medically able to return to work, shall be provided with appropriate rehabilitation services. Such services shall be set out in a rehabilitation plan developed in accordance with the LTD and Rehabilitation and Re-employment policy. It is understood that a six-month period of rehabilitation employment may be insufficient for an LTD benefit recipient returning to work and that, therefore, the rehabilitation plan may provide for a period of rehabilitation employment that is reasonable in the circumstances. The ultimate goal of the rehabilitation plan is continuing employment in a full-time position. However, it is recognized that some employees have medical disabilities that may not be supportive of working full time.

2. Where the rehabilitation process identified reduced hours (minimum of 14 hours, maximum of 28 hours) as a permanent medical restriction (as supported by medical evidence), the employee will be re-employed, and accommodated, in an available and suitable on-going position while retaining his/her LTD status. This re-employment will be in accordance with the terms set out in Article 45 of the Collective Agreement.

3. Employees under this arrangement (as set out above) shall:
   (a) In accordance with their LTD status, continue to receive full (ie full-time) service credit during this period and have full coverage (ie in accordance with the Pension Plan; with no pro-rating) maintained in, but will not be required to contribute to, the Ontario Power Generation Pension Plan and the Ontario Power Generation Group Life Insurance Plan;
   (b) Receive the greater of; the appropriate salary level for hours worked; or LTD benefit entitlement; and,
   (c) Be eligible for Incremental Pay Step increases and the performance appraisal process, where medical restrictions do not preclude its application, shall take into account medical restrictions with respect to establishing goals and measuring achievements. For clarity, Article 43.4.1 of the Collective Agreement continues to apply to employees covered by this consent award.


Tim English   Jim Blair   Lanny Totton
For Ontario Power Generation   For The Society   For The Society

Revised 2011-2012 Collective Agreement
LETTER OF UNDERSTANDING
# 122  Re: The implementation of the PSA agreements:

A review has been completed of the level of augmented staff, managed task PSAs and the current regular staff levels in OPG. In the event of a significant change in the level of augmented or managed task, the parties will meet to update the dues level.

The following is an amount that represents a dues replacement formula:

1. The Society will receive $750,000 per year in lieu of dues for all augmented staff contingent upon reaching agreement for the respective business planning year. The amount for 2003 will be paid out in March 2003. Subsequent payments will be paid in each September following the completion of the Business Planning review. For clarity the 2004 payment would be due following the completion of the business planning process in September 2003.

2. Failure to reach an initial agreement or expiration of any of the three LOUs will lead to a proportional adjustment (the proportions to be determined prior to signing the final agreement) of the amount in #1 above.

3. This agreement will automatically expire when all of the three (OPG-N; OPG-EP; OPG Corporate Groups) LOUs expire.

John Murphy Rodney Sheppard, Lanny Totton
Ontario Power Generation The Society

February 12, 2003
LETTER OF UNDERSTANDING

# 124  Re: Article 67 Purchased Services Agreement (PSA) Nuclear (including Nuclear Waste and Nuclear Regulatory Affairs)

1. For the term of this Letter of Understanding the PSA is suspended.

2. The parties agree to meet during the annual business planning process to review the business plan and the work that is to be contracted out for the years 2003 and 2004.

3. During this process Management will consult with the Society regarding the regular and temporary staff levels for Society - represented staff. Management will also identify the level of proposed contracting out. The parties will attempt to reach agreement on the appropriate level of regular and temporary staff and the work to be contracted out for the business planning years. The 2004 levels shall be agreed to, based upon the business plan forecast for 2004 with an agreed upon monetary total for contracted work for 2004. There will be a +7.5% contingency for contract work for the 2003 business planning year and a +12.5% contingency for the 2004 business planning year.

4. Management agrees to provide the Society with reasonable access to available information (with appropriate consideration for confidentiality) on a regular basis in order to monitor the agreed level of contracted work in paragraphs #3 and #6.

5. Failure to reach an agreement on the levels as outlined in paragraph #3 above shall not be subject to arbitration as such failure shall result in the LOU being null and void and the parties reverting back to Article 67.

6. In the event of major projects, new and emergent work that may alter the agreed to level of contracted work, including the contingency, the parties will attempt to reach agreement on the impact of this change, including the exclusion of some or all of this work from the agreed to levels. The parties may also agree as to the amount, if any, of this work that should not be contracted out. If the parties fail to reach an agreement on the major projects, new and emergent work, the default shall be the Article 67 process, including arbitration, for the resolution of any disputes related to this unplanned for work.

7. The parties will meet on a regular basis to review the regular and temporary staff levels and the levels of contracted work. At the end of the business planning year there will be a final review of the outcome compared to the initial agreement.
8. In the event that the level of contracting out (including the contingency amount) at the end of the business planning year exceeds the agreed level, the parties will discuss and attempt to reach agreement on the impact of this change and any remedy if appropriate. If the parties fail to reach an agreement, the portion of contracted work that exceeds the agreed level may be referred to arbitration. The arbitrator may fashion any remedy he/she may deem appropriate, including an order to hire Society-represented staff. It is understood that the work which is contracted to spin off companies (where the work is being performed by Society-represented employees) is excluded from this arbitration process.

9. The Society may also arbitrate failure to meet under paragraph #2. The arbitrator may fashion any remedy he/she deems appropriate.

10. The final agreement of this LOU is contingent upon the parties reviewing the business plans and reaching agreement on the level of work to be contracted out during 2003 and 2004. This will be completed by February 21, 2003 or as soon as possible thereafter. Final agreement of the LOU resolves all outstanding PSA grievances under the collective agreement.

11. This LOU shall expire on December 31, 2010 unless there is agreement to renew this LOU for the business planning year 2011 by September 30, 2010. In the event that there is no agreement to renew, Article 67 will apply for work to be contracted out in 2011.

12. All discussions and/or attempts to reach agreement as defined above shall be without prejudice and without precedent to any position either party may take before an arbitrator under the Article 67 process, should no final agreement be arrived under this LOU.

Julie Mitchell                                     Rodney Sheppard
Ontario Power Generation                         The Society

February 12, 2003

Revised in 2006-2010 Collective Agreement
1. For the term of this Letter of Understanding the PSA is suspended.

2. The parties agree to meet during the annual business planning process to review the business plan and the work that is to be contracted out for the years 2003 and 2004.

3. During this process Management will consult with the Society in each Plant Group regarding the regular and temporary staff levels for Society - represented staff. Management will also identify the level of proposed contracting out. The parties will attempt to reach agreement on the appropriate level of regular and temporary staff and the work to be contracted out for the business planning years. The 2004 levels shall be agreed to, based upon the business plan forecast for 2004 with an agreed upon monetary total for contracted work for 2004. There will be a +7.5% contingency for contract work for the 2003 business planning year and a +12.5% contingency across Electricity Production for the 2004 business planning year.

4. Management agrees to provide the Society with reasonable access to available information (with appropriate consideration for confidentiality) on a regular basis in order to monitor the agreed level of contracted work in paragraphs #3 and #6.

5. Failure to reach an agreement on the levels as outlined in paragraph #3 above shall not be subject to arbitration as such failure shall result in the LOU being null and void and the parties reverting back to Article 67.

6. In the event of major projects, new and emergent work that may alter the agreed to level of contracted work, including the contingency, the parties will attempt to reach agreement on the impact of this change, including the exclusion of some or all of this work from the agreed to levels. The parties may also agree as to the amount, if any, of this work that should not be contracted out. If the parties fail to reach an agreement on the major projects, new and emergent work, the default shall be the Article 67 process, including arbitration, for the resolution of any disputes related to this unplanned for work.

7. The parties will meet in each plant group on a regular basis to review the regular and temporary staff levels and the levels of contracted work. At the end of the business planning year there will be a final review of the outcome compared to the initial agreement.
8. In the event that the level of contracting out (including the contingency amount) at the end of the business planning year exceeds the agreed level, the parties will discuss and attempt to reach agreement on the impact of this change and any remedy if appropriate. If the parties fail to reach an agreement, the portion of contracted work that exceeds the agreed level may be referred to arbitration. The arbitrator may fashion any remedy he/she may deem appropriate, including an order to hire Society-represented staff. It is understood that the work which is contracted to spin off companies (where the work is being performed by Society-represented employees) is excluded from this arbitration process.

9. The Society may also arbitrate failure to meet under paragraph #2. The arbitrator may fashion any remedy he/she deems appropriate.

10. The final agreement of this LOU is contingent upon the parties reviewing the business plans and reaching agreement on the level of work to be contracted out during 2003 and 2004. This will be completed by February 21, 2003 or as soon as possible thereafter. Final agreement of the LOU resolves all outstanding PSA grievances under the collective agreement.

11. This LOU shall expire on December 31, 2010 unless there is agreement to renew this LOU for the business planning year 2011 by September 30, 2010. In the event that there is no agreement to renew, Article 67 will apply for work to be contracted out in 2011.

12. All discussions and/or attempts to reach agreement as defined above shall be without prejudice and without precedent to any position either party may take before an arbitrator under the Article 67 process, should no final agreement be arrived under this LOU.

Julie Mitchell                             Lanny Totton
Ontario Power Generation                   The Society

February 12, 2003

Revised in 2006-2010 Collective Agreement
1. For the term of this Letter of Understanding the PSA is suspended.

2. The parties agree to meet in each of the Business Units listed above during the annual business planning process to review the business plan and the work that is to be contracted out for the years 2003 and 2004.

3. During this process Management in each of the Business Units will consult with the Society regarding the regular and temporary staff levels for Society - represented staff. Management will also identify the level of proposed contracting out. The parties will attempt to reach agreement on the appropriate level of regular and temporary staff and the work to be contracted out for the business planning years. The 2004 levels shall be agreed to, based upon the business plan forecast for 2004 with an agreed upon monetary total for contracted work for 2004. There will be a +7.5% contingency for contract work for the 2003 business planning year and a +12.5% contingency for the 2004 business planning year.

4. Management agrees to provide the Society with reasonable access to available information (with appropriate consideration for confidentiality) on a regular basis in order to monitor the agreed level of contracted work in paragraphs #3 and #6.

5. Failure to reach an agreement on the levels as outlined in paragraph #3 above shall not be subject to arbitration as such failure shall result in the LOU being null and void and the parties reverting back to Article 67.

6. In the event of major projects, new and emergent work that may alter the agreed to level of contracted work, including the contingency, the parties will attempt to reach agreement on the impact of this change, including the exclusion of some or all of this work from the agreed to levels. The parties may also agree as to the amount, if any, of this work that should not be contracted out. If the parties fail to reach an agreement on the major projects, new and emergent work, the default shall be the Article 67 process, including arbitration, for the resolution of any disputes related to this unplanned for work.

7. The parties will meet, in each of the business units, on a regular basis to review the regular and temporary staff levels and the levels of contracted work. At the
end of the business planning year there will be a final review of the outcome compared to the initial agreement.

8. In the event that the level of contracting out (including the contingency amount) at the end of the business planning year exceeds the agreed level, the parties will discuss and attempt to reach agreement on the impact of this change and any remedy if appropriate. If the parties fail to reach an agreement, the portion of contracted work that exceeds the agreed level may be referred to arbitration. The arbitrator may fashion any remedy he/she may deem appropriate, including an order to hire Society-represented staff. It is understood that the work which is contracted to spin off companies (where the work is being performed by Society-represented employees) is excluded from this arbitration process.

9. The Society may also arbitrate failure to meet under paragraph #2. The arbitrator may fashion any remedy he/she deems appropriate.

10. The final agreement of this LOU is contingent upon the parties reviewing the business plans and reaching agreement on the level of work to be contracted out in each of the business units above during 2003 and 2004. This will be completed by February 21, 2003 or as soon as possible thereafter. Final agreement of the LOU resolves all outstanding PSA grievances under the collective agreement.

11. This LOU shall expire on December 31, 2010 unless there is agreement to renew this LOU for the business planning year 2011 by September 30, 2010. In the event that there is no agreement to renew, Article 67 will apply for work to be contracted out in 2011.

12. All discussions and/or attempts to reach agreement as defined above shall be without prejudice and without precedent to any position either party may take before an arbitrator under the Article 67 process, should no final agreement be arrived under this LOU.

Julie Mitchell
Ontario Power Generation

Lanny Totton
The Society

February 12, 2003

Revised in 2006-2010 Collective Agreement
LETTER OF UNDERSTANDING
#166 Re: Coal Plant Closure

The purpose of this LOU is to provide fair and reasonable treatment of Electricity Production employees at the coal fired generating stations identified for future closure per the government’s plan and to facilitate the continued safe operation of these stations until their closure.

The intent of this document is to minimize the impact on affected staff at these sites by affording employees an opportunity for placement in Electricity Production or an avenue to voluntarily depart with the associated separation entitlements.

PROCESS:

For clarity, the term “closure” applies to both full and partial station closures (e.g. unit closure or fuel conversion) as announced by the Government.

Effective on the date the Company officially informs the Society that a station is to be closed (hereinafter called “the affected station”), it is agreed that the following shall apply:

Based on requirements at the station, management will determine the release date for employees. Local management and the Vice President of the OPGI Society local, or a delegate as appointed by the VP, will meet regularly to discuss issues associated with release dates.

Local management may hire Society represented temporary employees to occupy positions as a result of the departure or proposed departure of regular employees. Society represented temporary employees may be hired at other locations in the company to hold a position or to facilitate longer release dates for employees who were successful candidates for positions outside the station.

Notwithstanding Article 67, if qualified temporary employees are not available, local management will meet with the Vice President of the OPGI or OPG-N Society local as appropriate, or a delegate as appointed by the VP in order to facilitate the use of contract employees required as a result of circumstances outlined in point #2 above. A business case will not be required in this circumstance, however, the agreement of the appropriate Local Vice-President shall be required and such approval shall not be unreasonably withheld.

Local Management will keep the Vice President of the OPGI Society local, local Unit Director, and the local Delegate informed on a bi-monthly basis of staffing changes as a result of employees departing from the station.

Notwithstanding the provisions of Article 3.3.1, temporary employees will retain their temporary status until the position they were hired to cover is no longer required. Severance of two weeks per year of service (prorated for the partial year) shall be paid upon termination of employment for other than cause.
Approximately one year prior to the specific closure:

In the case of a partial closure, management will identify employees whose experience skills and qualifications are necessary for the on-going operation of the station based on Unit viability and employee choice (senior choice/junior force). Management will discuss the foregoing with the Society Vice-President of the OPGI Society local. All other employees not identified, with the exception of those who have accepted a vacancy outside of the station, will elect either A, B or C below.

In the case of a full closure, all employees within the affected station, with the exception of those who have accepted a vacancy outside the station, will elect either A, B or C below.

Option A: Voluntary surplus in accordance with the collective agreement. The termination date will be determined by management, however, such termination date cannot be extended beyond 21 months from the date that the employee’s application is confirmed and finalized, unless the employee agrees otherwise.

Employees will be allowed to delay their termination dates for a period not to exceed twenty one (21) months in order to achieve the earliest of the following pension milestones:

- Twenty-Five (25) years service
- Rule of 82
- Or age 65

Employees who avail themselves of this option will have their severance reduced by the amount of time elapsed between the date the employee's application is approved and finalized and their actual termination date.

Consideration of voluntary surplus will be based on seniority. Voluntary surplus may be denied in order to maintain the skills and qualifications required to operate the affected plant.

Option B: Employees will rank all of the available EP locations, in order of preference. Placements will be made on a seniority and qualification basis.

Where Option B is elected, the employee must return their rankings within 14 days or they will be deemed to have elected Option A.

Option C: Employees who cannot elect either Option A or Option B because of compelling personal circumstances will identify themselves to management.
(i) If management agrees that the employee has a compelling personal circumstance the employee will be declared surplus and may use his/her full search notice period as a surplus employee, as of the date of closure, to search for another acceptable position:

If located at Atikokan or Thunder Bay, within NW Fossil or NW Plant Group;
If at another affected station, within the local community of the affected station.

If management does not agree that the employee has a compelling personal circumstance, management will meet with the Local Society Vice-President and attempt to resolve the issue. If the issue cannot be resolved the parties agree to expedited arbitration in accordance with paragraph (7) below.

If the arbitrator agrees that he/she has compelling personal circumstances, then he/she will be declared surplus in accordance with Option C (i) above.

If the arbitrator does not agree that he/she has compelling personal circumstances, then he/she shall have the option of accepting the position under Option B above within two (2) working days or terminating with 75% of lump sum payments as per Article 64.9.2(a).

All arbitration decisions will be non-precedent setting.

7. Elections and placements will be confirmed and finalized approximately 3 months prior to the closure, and discussed with the Local Society Vice President prior to finalization.

8. Management agrees this LOU will be used to deal with the reduction of staff at an affected station. There will be no involuntary surplus of staff at other affected stations to accommodate the placements under Option (B) above.

All disputes regarding an election under Option (A) or Option (B) will be filed within 20 working days following the confirmation in paragraph (7) above. All disputes will be heard within 30 working days following the 20 working day filing period. All such disputes shall be governed by the provisions of Article 16 of the Collective Agreement.

If, during the life of this agreement there is a significant change to the timeframe for the coal station closure, management may terminate any process initiated in paragraphs (1) through (7) above.

The Society reserves the right to grieve any unreasonable or arbitrary exercise of management rights and violations in the execution of this LOU.

This agreement will expire upon completion of the closure of the Fossil Stations or 2015 whichever comes first.

____________________________________
Date
LETTER OF UNDERSTANDING
#171 Re: Dental Codes

This will confirm that the attached* are the dental codes agreed to by the Society of Energy Professionals and Ontario Power Generation as referenced in the “Health and Dental Benefits – Understanding Your Plan” brochure dated January 1, 2006 and residing on the OPG Internal Web.

Any changes to this list will be agreed to by the parties.

__________________________ __________________
Ontario Power Generation Inc. The Society

__________________________________
Date

(signed by Chris Davy, Ontario Power Generation and Joe Fierro for the Society - 04/02/2007)

*Clarity Note: Please note that the full list of dental codes has not been included in the Collective Agreement, but the full list can be accessed through the OPG Intranet.
LETTER OF UNDERSTANDING
#173 Re: Trainee Expenses - Modification to LOU #167

Amend Section 25.8 of Appendix “A” of LOU #167 to read as follows:

“Articles contained in Part XI (Relocation Assistance) will not apply to Management and Professional Trainees in the Nuclear business organization, except as noted below:

i) Management and Professional Trainees in the Nuclear business organization will be paid for any additional travel costs when assigned to a temporary work headquarters for short duration assignments (ie. meetings, conferences, seminars, or similar type of functions ) as long as these are job assignments requested by Management. Additional travel costs are defined as the mileage to the new work location minus the mileage to the normal work location.

ii) Articles contained in Part XI (Relocation Assistance) will apply to Management and Professional Trainees when they are appointed to an M&P or FM&P job, or are progressed to Step 3 on either the MP 2, MP 3 or MP 4 band.

iii) Any other reimbursement for expenses for Management and Professional Trainees will be at management’s discretion.

Chris Davy                     Lanny Totton
________________________________________  ______________________________________
Ontario Power Generation Inc.            The Society

January 7, 2008

____________________
Date
LETTER OF UNDERSTANDING
#174 Re: Band N

*This LOU includes and replaces the former LOUs #84, #99, #119, #142, #149, #160 and #174 Re: Band N, this new LOU is to update collective agreement references

The undersigned parties agree to the following:

This Letter of Understanding (LOU) supersedes LOU # 84, 99, 119, 142, 149, and 160 and Article 63 of the Collective Agreement. It outlines compensation and working conditions as they relate to the SSIT training program and the compensation and working conditions for CRSS, CRSOS, ATS, and U0TS positions. This LOU supersedes all other articles in the Collective Agreement that relate to base pay, performance/incentive pay, or bonuses.

Recognizing both the need for flexibility and appropriate compensation for the CRSS, CRSOS, ATS, and U0TS, and SSIT, the parties agree that the following is retroactive to January 1, 2007 unless otherwise specified. This agreement is subject to ratification by both parties.

A. Non-Monetary

1.0 SSIT

1.1 Upon CNSC certification Society-represented SSITs will be placed in a CRSS or CRSOS position without the requirement to post the vacancy.

SSIT Training Program

1.2 OPG and The Society are committed to an SSIT training program that will produce a high calibre of licensed staff. To accomplish such, the parties agree to the following principles:

a. Training and experiential activities to become licensed staff are the priority of all parties while on the SSIT program

b. Management shall consider the relevance of experiential assignments to the various phases of the program and the ultimate goal of certification.

c. SSITs shall have effective management mentoring during the program

d. SSITs shall be pro-active to bring concerns and issues to the Mentoring Shift Manager/Operations Manager's attention on any aspect of their training or assignments that they believe would jeopardize the ultimate goal of certification.
1.3 The SSIT with the assistance of the Operations Training Liaison and Authorization Training Section Manager will prepare a schedule that provides adequate time to complete all the activities for the success of the SSITs. This schedule will be approved by their mentoring Shift Manager.

Management will assign work as set out in each SSIT’s Individual Development and Training Plan and the Development and Training Program. There may be times when station work priorities will take precedence and assignments will not have direct relevance to their individual development within the certification program. In the event of such circumstances, the work assignment shall not significantly impact the SSIT’s Individual Development and Training Plan or their progression through the Development and Training Program or have a significant negative financial impact upon the SSIT.

**Issue Resolution**

1.4 Issues related to 1.2 and 1.3 may be referred to the Operations Manager. If any issue remains unresolved, the Director of Operations and Maintenance Training, The Society and the Director of Operations and Maintenance will be involved to resolve the issues taking into consideration the candidates concerns and the best long term interest of the Business. Failing resolution with respect to 1.3, either party may advance the issue through the Article 16, Complaint and Grievance/Arbitration Procedure of the Collective Agreement for resolution.

**2.0 CRSS/CRSOS, U0TS and ATS**

2.1 a. Effective January 1, 2008, CRSS, CRSOS, U0TS and ATS classifications will be eligible for payments under Article 66.4 if the employee exceeds 900 cumulative hours in a higher rated position for the duration of this LOU. The parties agree that a TEMPUS work event will be generated for such occurrences.

b. CRSSs and CRSOSs may be rotated into training positions. Management will first seek volunteers to fill these rotations. In addition, Shift Managers may be rotated into the ATS position in order to provide a mentoring, testing and evaluation role for Shift Managers.

c. The Employer agrees that there should be no more than twenty five percent (25%) of the ATS/U0TS staff positions filled on a rotational/contractor basis. The Employer agrees that effective July 31, 2009 at least 75% of the ATS/U0TS positions will be filled by regular Society represented employees on an average overall annual basis. It is recognized, however, that this percentage may drop below 75% due to retirements, promotions, etc. and temporary staffing measures may
be utilized as long as proactive measures are being taken to achieve the 75% level. An annual audit report demonstrating the above shall be provided to the Society in July of each year.

2.2 Article 67 – Purchased Service Agreement is suspended with respect to work performed by the CRSS, CRSOS, U0TS, and ATS classifications.

2.3 The requirement to obtain agreement for rotations by ANOs within the Society’s jurisdiction for CRSS, CRSOS, U0TS, and ATS classifications (see Business Unit Mid-term #14) is suspended.

2.4 In the event that overtime beyond 48 hours cannot be filled on a voluntary basis, OPG will require individual CRSS, CRSOS, U0TS, or ATS employees to work overtime up to 60 hours per week. The Society agrees on behalf of CRSSs, CRSOSs, U0TSs, or ATSs that notwithstanding an employee’s regular hours of work, they may be required to work up to 60 hours per week in accordance with the Employment Standards Act, subject to the following:

Such forced overtime:

- Is limited to refilling scheduled or prearranged control room CRSS/CRSOS positions;
- Is limited to simulator based training or simulator based exam development ATS or U0TS positions;
- Is limited to 3 non-consecutive weeks per employee per calendar year; and
- Forced overtime will be equitably rotated.

2.5 The U0TS and ATS positions will be classified as a "shift position" for the purpose of conducting simulator based training courses or the use of the simulator for exam/training material development only.

- OPGI-Nuclear will propose shift arrangements for employees and seek The Society’s input on proposed shift arrangements.
- Such shift arrangements will normally be on a voluntary basis. However, in the absence of any qualified volunteers, OPGI-Nuclear reserves the right to appoint specific individuals to perform the work.
- An employee who has volunteered to work a scheduled series of shifts may request a change in work assignment. Management will consider such a request.
- Except in an emergency situation, at least seven days’ notice will be given with respect to shift change notices.
m. There are no posting or voting requirement with respect to shifts scheduled.

2.6 Shifts for ATS and U0TS shall be as follows:

a. Normal Days
   • Monday to Friday: 08:00 to 16:00

b. 10 Hour Shifts-Days
   • Monday to Thursday: 08:00 to 18:00
   • Tuesday to Friday: 08:00 to 18:00

c. 10 Hour Shifts-Afternoons
   • Monday to Thursday: between 12:00 to 24:00
   • Tuesday to Friday: between 12:00 to 24:00

d. 8 Hour Shifts-Afternoons
   • Monday to Friday: between 12:00 to 24:00

2.7 Night Shift Conditions for ATS Conducting Simulator Based Training Courses shall be as follows:

a. 10 Hour Shifts-Nights
   • Monday to Thursday: between 20:00 to 08:00
   • Tuesday to Friday: between 20:00 to 08:00

b. Night shift provisions are effective from January 1, 2008 to December 31, 2010 at Pickering B and Darlington;

c. The total of night shifts worked will not exceed the number of hours required to execute two initial authorization programs, to a maximum of twenty (20) weeks per program;

d. Night shifts beyond (c) above require joint agreement;

e. Management will seek volunteers first but failing that, may assign qualified employees in accordance with 2.5 above;
f. ATS conducting simulator based training courses, on night shift will receive a non-pensionable shift premium of 50% of the employee's base rate for all normally scheduled hours on a night shift.

2.8 There will be no shifts other than those set out above without the prior agreement of the Society.

3.0 Compensation Treatment and Security

3.1 Compensation Security will be effective January 1, 2008. Compensation security for CRSS/CRSOS, ATS and U0TS and the compensation treatment for SSITs reflects the following principle:

No provision in this section other than those expressly provided for shall apply to circumstances where an employee elects to leave their position voluntarily or where an employee is moved from role due to performance issues.

3.2 Compensation Treatment for SSITs:

a. The security treatment for an SSIT who has left the program prior to completing their Station Specifics will result in the employee being returned to their former classification or, if unavailable, a lateral classification. The employee will revert to their previous wage rate, including any automatic progressions that they would have been entitled to had they not entered the SSIT program and they will immediately begin the hours of work schedule for that position.

b. The security treatment for an SSIT who has left the program and has completed their Station Specifics will be as follows:

i. for an SSIT who has left the program due to removal by management for cause will be returned to their former classification, or, if unavailable, a lateral classification. If the new position is a 40-hour position, the employee’s present base rate will be “red-circled”. If the position is a 35-hour position, the wage rate will be “red-circled” and treated in accordance with Article 64.26.2.

ii. for an SSIT who has left the program with mutual agreement or due to disability caused by accident or illness, or due to exculpatory performance issues and that personal career decisions are not involved, will be to return to their former classification, or, if unavailable, a lateral classification and the employee’s present base rate will be “green-circled”. If their position is a 35-hour position, the wage rate will be “red-circled” and treated in accordance with Article 64.26.2.
3.3 Compensation Security for CRSS/SOS, ATS or U0TSs

The compensation security for a CRSS/SOS, ATS or U0TS who has left the program upon mutual agreement or failure to satisfy the requirements of the Certified Continuing Training and Re-qualification Testing, or due to disability caused by accident or illness, or due to exculpatory performance issues and not for personal career decisions (except with respect to positions listed 3.4 below) will be as follows:

a. If the employee has less than 10 years in a certified and/or Band N position, they will receive no authorization bonus. If their new position is a 40-hour position, the employee's present base wage rate will be “green-circled”. If the position is a 35-hour position, the wage rate will be “red-circled” and treated in accordance with Article 64.26.2.

b. If the employee has been certified and/or in a Band N position for greater than or equal to ten years but less than fifteen, they will continue to receive 50% of the earned authorization bonus. If the new position is a 40-hour position, the employee's present base rate will be “green-circled”. If their position is a 35-hour position, the wage rate will be “red-circled” and treated in accordance with Article 64.26.2.

c. If the employee has been certified and/or in a Band N position for greater than or equal to fifteen years or is within 3 years of undiscounted pension, they will continue to receive their earned authorization bonus to a maximum of 20%. If the new position is a 40-hour position, the employee’s present base rate will be “green-circled”. If their position is a 35-hour position, the wage rate will be “red-circled” and treated in accordance with Article 64.26.2.

3.4 The Company further agrees to provide compensation security to employees in the CRSS, CRSOS, ATS and U0Ts classifications who are successful to the following positions provided these positions remain within the Society’s jurisdiction:

- Operations FIN – Shift Manager
- Work Control / IPG Single Point of Contact
- Days Operations – Shift Manager
- Section Manager Outages
- Section Manager Examinations

4.0 Rotational Positions

4.1 The length of rotations in CRSS/SOS, ATS and U0TS positions will be in accordance with Article 65. All ATS and U0TS rotations greater than 6
months in duration will be posted. Selection for posted rotations shall be as per Article 65.6.3 from among regular Society-represented applications first, followed by all others.

5.0 CRSS/SOS, ATS, UOTS and SSIT Issues Committee

5.1 The parties agree to create a CRSS/SOS, ATS, UOTS and SSIT Issues Committee (subsequently referred to as the Issues Committee), which will include a maximum of 5 Society members drawn from SSIT, CRSS, CRSOS, ATS, UOTS, or Society Staff Representative positions and 5 members from Management. Additional resources may attend the committee meetings with the agreement of the parties.

5.2 This Committee shall meet quarterly unless otherwise agreed to by the parties. Either party may request a meeting of the Issues Committee with three weeks notice.

5.3 In order to make the most efficient use of the time in committee, agenda items and details of issues to be discussed will be provided to all committee members two weeks in advance of any committee meeting.

5.4 The initial meeting of the Issues Committee will be no later than March 10, 2008.

5.5 The Issues Committee will continue to operate as a standing committee and will make regular reports to the Nuclear JSMC.

5.6 The Issues Committee will discuss and attempt to resolve, through consensus, identified issues. Any resolutions reached by this committee are subject to approval by both parties’ internal processes.

5.7 The Terms of Reference for the Issues Committee shall be as follows:

The Issues Committee will be structured to address and have meaningful consultation on the following Non Monetary issues, including but not limited to:

1. SSIT/CRSS/CRSOS/ATS/UOTS Testing and Training:
   - Provide input and make recommendation regarding the design and implementation of the existing and future initial and continuing training and testing programs.

2. Emerging Issues:
   - Provide a forum for input and recommendations on emerging issues related to CRSSs, CRSOSs, ATSS, UOTS and SSITs.
3. Rotational Positions:
   • Provide a forum for input and recommendations on issues regarding rotational positions as follows:
     - Position identification,
     - Duties,
     - Selection criteria

4. Complement/Staffing Issues:
   • Provide input and make recommendations for the determination of the staffing plan.
   • Provide input where these resources are deployed and determine the priority of deployment. This will be a dynamic process that is reviewed annually at a minimum and more often as needed.

5.8 Nothing in this Letter of Understanding shall limit either parties rights to access the dispute resolution processes with respect to Articles contained in the Collective Agreement.

B. Monetary

6.0 SSITs

6.1 Shift Supervisors in Training (SSITs) will move through the training program and receive compensation on the following basis:

   i. SSITs presently in the training program will be placed on Band N (Table 1). The salary range for SSITs will be from $111,500 to $129,685 in 2007. These SSITs will be placed in the range taking into account their present program completion status. SSITs whose base rate is within the range but above their present program completion status wage rate, will have their base rate green circled until such a time as their program completion status wage rate equals or is greater than their base rate. SSITs whose base rate prior to placement is at or above the top of the range will continue to receive their base rate and will be "green-circled".

   ii. SSITs entering the program after the signing of this agreement will be placed on Band N. SSITs whose base rate prior to placement is lower than the minimum of the salary range will receive the minimum of the range. SSITs whose base rate is within the range will continue to receive their base rate and are entitled to the increases in (iii) to (vii) below up to the top of the range. SSITs whose base rate prior to placement is at or above the top of the range (i.e. $129,685 in 2007) will continue to receive their base rate and be "green-circled".

   iii. Upon successful completion of the Generals and Science Fundamentals, SSITs within the salary range will receive 4% base rate increase.
iv. Upon successful completion of Station Specifics, SSITs within the salary range will receive a 4% base rate increase.

v. Upon successful completion of SS Supplementals, SSITs within the salary range will receive a 4% base rate increase.

vi. Upon successful completion of Simulator Training, SSITs within the salary range will receive a 3% base rate increase.

vii. When certified by the CNSC, SSITs within the salary range will receive an increase in base salary to the top of the SSIT salary range.

viii. All SSITs will receive a $7000 non-pensionable bonus upon certification by the CNSC.

ix. In no case will the increases in (iii) to (vii) above result in a base rate increase beyond the top of the salary range (i.e. the top of the range is a cap). SSITs who are at the top or above the salary range will continue to receive annual negotiated economic increases. If the annual economic increase is such that an employee who was at the top or above the salary range is now within the salary range, then they will be eligible for the increases in (iii) to (vii) up to the cap.

7.0 Compensation

7.1 The CRSS, CRSOS, ATS, U0TS classifications are eligible to receive an annual non-pensionable results based payment not to exceed 8.0%. Details of the payment are as follows:

i. The payment will be a lump sum payment based on meeting and/or exceeding targets and is not guaranteed;

ii. The payment will be paid as soon as practicable each year by the end of 1st quarter;

iii. The maximum payment will be calculated using the percentage of the appropriate year (base weekly salary times 52.1786 weeks per calendar year). The bonus will be prorated for any period less than a full calendar year based on full months completed;

iv. The targets will be measured from January 1st through to December 31st of each performance year;

v. Targets, measures, and assignment of values to each performance area will be discussed and agreed to by local joint teams (members appointed by Society and Management) for each of the classifications. In the event that a joint team is unable to agree the
matter will be referred to the appropriate Director of the applicable work group and the appropriate Society Unit Director who will endeavor to resolve the matter. Failing a joint resolution the matter will be referred to the appropriate OPG Senior Vice-President for a final decision;

vi. The results based payment is not subject to the grievance procedure;

7.2 Effective January 1, 2008 CRSS, CRSOS, ATS, U0TS employees shall receive a 1% annual base salary increase unless the employer demonstrates a performance problem.

In addition, there shall be annual performance pay of 1% of base payroll for CRSS, CRSOS, ATS and U0TS who are below the top of Band N. The base rate of employees who are at or above the top of Band N will not be used in the determination of base payroll. The annual performance adjustment is based on individual performance. In the absence of any mutually agreed to alternative, the practice for administering the annual performance adjustment will be as outlined in Articles 20, 21 and LOU 77 of the 2005 Society/OPG Collective Agreement. These adjustments shall be made in the first payroll period in the year following the performance year. In no case will these increases result in a base rate increase beyond the top of the salary range (i.e. the top of the range is a cap).

7.3 For the purposes of calculating the number of years for the pensionable bonus and for the purposes of Compensation Security as found in this Letter of Understanding, the parties agree to recognize years in a CRSS, CRSOS, ATS or U0TS position and all years since initially certified in a CNSC and/or formerly AECB position. The calculation of years shall be from January 1 in the first year that they became certified.

7.4 Effective January 1, 2006, CRSS and CRSOS employees who are certified for less than or equal to 10 years will have a monthly pensionable bonus equal to 15% of base annual pay (based on 52.1786 weeks per calendar year). CRSS and CRSOS employees who are certified for more than 10 years will have an additional 0.75% for each year certified to a maximum of 28%.

7.5 Effective January 1, 2006 for CRSS and CRSOS employees who are within three years of an undiscounted pension, and instead to the 0.75% increase in 7.4 above, they will receive a bonus increase of 2% for the entire third year prior to an undiscounted pension and 3% for all years thereafter, to a maximum of 28%.

7.6 The increase to the CRSS and CRSOS bonus in 7.4 and 7.5 above, will also result in a retroactive increase to the ATS and UOTS bonus for the time period of January 1, 2006 to December 31, 2007 and in the same
proportion as the bonus payments under LOU #119 (i.e. 50% for ATS and 25% for UOTS).

Effective January 1, 2008, ATS and formerly authorized staff selected into an ATS position will receive an annual pensionable Past Authorization Bonus (PAB) equal to 75% of all amounts in Sections 7.4 and 7.5 above, calculated in the same manner.

Effective January 1, 2008, UOTS who were formerly certified as Unit 0 CRO’s will receive an annual pensionable bonus equal to 67.5% of all amounts in Section 7.4 and 7.5 above, calculated in the same manner.

7.7 Employees selected to the ATS and UOTS position during a calendar year will have their bonus pro-rated to the nearest full week worked. This bonus will be paid on the first pay period in December of each year.

7.8 Employees selected to the CRSS and CRSOS positions during a calendar year will receive the monthly bonus in the month they commence work in these classifications, pro-rated to the nearest full week worked.

7.9 CRSS, CRSOS, ATS, UOTS employees covered by this agreement shall only be entitled to one of the bonuses detailed in Sections 7.4, 7.5 or 7.6 above.

7.10 The bonuses detailed above will be used for pension, insurance, and the “Long Term Disability” program.

7.11 Band “N” is a salary schedule exclusively for SSIT, CRSS, CRSOS, UOTS and ATS classifications. The band ranges from $111,500 to $145,000 in 2007. The starting rate for CRSS, CRSOS, ATS and UOTS will be the top of the salary range of SSITs (i.e. $129,685 in 2007), or their current base rate whichever is higher. The Band N salary range, see Table 1, will be increased by the annual negotiated economic increases. Any performance pay increase received will be compounded upon the base rate increases.

7.12 Employees as of the effective date of this LOU who exceed the top of CRSS, CRSOS, ATS and UOTS salary range on Band N will be green circled i.e. they will continue to be eligible for all monetary provisions of this LOU, except for Section 7.2, in the same manner as other employees.

8.0 Other Provisions

8.1 Where Management intends to revoke an employee’s certified license, the employee will be given written notice (with a copy to the Society), on the reasons for removal. The employee may be removed from the certified position pending the outcome of the process below.
The employee has the right to grieve the intention to remove their certified license within thirty (30) working days of receiving written notice through the normal grievance/arbitration procedure as outlined in the collective agreement.

The employee’s authorization bonus will continue throughout the grievance/arbitration procedure and shall cease if removal of the license is upheld at arbitration.

8.2 Except as expressly modified herein, all relevant provisions of the collective agreement shall continue to apply. For greater clarity, employees on Band N shall be treated as M&P employees where such a distinction is drawn in the Collective Agreement.

8.3 The Society hereby withdraws the grievances/complaints on Table 2, attached, which encompass SSIT, CRSS, CRSOS, ATS and Shift Manager positions subject to a review of all outstanding grievances.

8.4 The parties agree that this LOU will be effective upon the date of signing except where noted otherwise. This agreement will operate until December 31, 2012 and shall continue thereafter subject to ninety (90) days cancellation by either party.
<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>January 1 - 2012</th>
<th>April 1 - 2012</th>
</tr>
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<tbody>
<tr>
<td><strong>SSIT</strong></td>
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<td></td>
<td></td>
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<tr>
<td>Minimum</td>
<td>125,494</td>
<td>128,004</td>
<td>129,284</td>
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<tr>
<td>Maximum</td>
<td>145,961</td>
<td>148,880</td>
<td>150,369</td>
</tr>
<tr>
<td><strong>CRSS/CRSOS</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>ATS/U0TS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>145,961</td>
<td>148,880</td>
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<tr>
<td>Maximum</td>
<td>163,198</td>
<td>166,462</td>
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### Table 2

**Society Grievance to be Withdrawn**

<table>
<thead>
<tr>
<th>Grievance Number</th>
<th>Society Policy</th>
<th>Issue</th>
</tr>
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<tbody>
<tr>
<td>OPGN-2007-5289</td>
<td>Society Policy</td>
<td>Management performing Society Work</td>
</tr>
<tr>
<td>OPGN-2007-5236</td>
<td>Society Policy</td>
<td>ATS’s being assigned work outside their job Doc.</td>
</tr>
<tr>
<td>OPGN-2007-5237</td>
<td>Society Policy</td>
<td>ANO on Rotation as an ATS without posting under 65.5.2</td>
</tr>
<tr>
<td>OPGN-2007-5248</td>
<td>Society Policy</td>
<td>Excessive OT LOU 119</td>
</tr>
<tr>
<td>OPGN-2007-5272</td>
<td>Society Policy</td>
<td>Bonus Structure ANO stepped up in ATS</td>
</tr>
<tr>
<td>OPGN-2007-5293</td>
<td>Society Policy</td>
<td>Art 65 Extending Rotation without Society agreement</td>
</tr>
<tr>
<td>OPGN-2007-5308</td>
<td>Society Policy</td>
<td>Violation of Article 65 by failing to advertise and filling regular ATS positions with rotation vacancies</td>
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<tr>
<td>OPGN-2006-2489</td>
<td>Society Policy</td>
<td>Not paid Step up of 3%</td>
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<tr>
<td>OPGN-2006-5081</td>
<td>Society Policy</td>
<td>New Incentive plans not applicable to Band N</td>
</tr>
<tr>
<td>OPGN-2006-5082</td>
<td>Society Policy</td>
<td>Band N being denied $2K non pensionable bonus</td>
</tr>
</tbody>
</table>

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**Pierre Charlebois**  
**Ontario Power Generation Inc.**

**Olaf Heilandt**  
**The Society**

**December 5, 2007**  
**Date**
Letter of Understanding
#175 Re: Purchased Services Agreement (PSA) Nuclear (including Nuclear
Waste and Nuclear Regulatory Affairs)

*This LOU replaces the former LOU #153 Re: Purchased Service for OPG and Society Involvement in the OPG Business Planning Process*

1. For the term of this Letter of Understanding the PSA (Article 67) is suspended.

2. Without prejudice or precedent, for the purpose of this agreement only, “base work” shall be defined as OM&A work of an on going nature typically executed by Society-represented staff. This work would include, but not be limited to, items such as stress analysis, preparing bills of materials, equipment performance monitoring, addressing outage and non outage AAA holds or elimination of backlogs. It does not include OM&A or capital modification projects.

3. For the purposes of this agreement, “Augmented Staff” shall be defined as staff hired either directly by OPG, or through a managed task contract, that perform work regularly performed by Society-represented employees and are taking work direction from OPG.

4. The parties agree to meet during the annual business planning process to review the business plan and the work that is to be contracted out for the years 2006 to 2010.

5. The fixed dollar envelope for Nuclear, including Nuclear Waste and Nuclear Regulatory Affairs, will be the dollar amounts agreed to for 2006. The proportion of this fixed dollar envelope that represents base work will not exceed 10%. The fixed dollar envelopes will each have a 5% contingency for each year.

For further clarity, parties agree to the following amounts for contracting out of Society work, including all AECL work not specifically excluded by Appendix IV:

**Total Contracting out Envelope by Year**

<table>
<thead>
<tr>
<th>Year</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
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<tr>
<td>Total</td>
<td>$125M</td>
<td>$125M</td>
<td>$125M</td>
<td>$125M</td>
<td>$125M</td>
</tr>
</tbody>
</table>
6. Amounts from each year cannot be carried forward from one year to the next.

7. The contingency amounts can be used for base work but cannot be used to increase the “base work maximum” beyond the $12.5M maximum for each year. The term “base work” is defined in paragraph 2 above.

8. In accordance with the side letter attached to LOU 153, all BOM work will cease to be contracted out upon signing of this agreement. If base P.E. staff from elsewhere in Nuclear are assigned to perform work that would have been considered to be BOM work, then OPG may backfill those base P.E. staff with augmented staff or managed task.

9. In the event of major projects, new and emergent work that may alter the agreed to level of contracted work, including the contingency, the parties will attempt to reach agreement on the impact of this change, including the exclusion of some or all of this work from the agreed to levels. The parties may also agree as to the amount, if any, of this work that should not be contracted out.

If the parties fail to reach agreement on the major projects, new and emergent work, the default shall be the Article 67 process, excluding arbitration, for the resolution of any disputes related to this unplanned for work.

10. Arbitrations for disputes over amounts above the envelope will be expedited, i.e.
   - Business case briefs no longer than 10 pages;
   - No witnesses;
   - No lawyers (save and except LR and Society staff);
   - Multiple cases per day if possible;
   - Expanded list of arbitrators;

Agreed to arbitrator(s)** will be used who will hear cases on short notice and will give a verbal ruling on the day of the hearing or as soon as possible thereafter.

11. The company will report on an annual basis on the status of expenditures on the envelopes above. Further, management will also report on an annual basis the dollar expenditures of work performed by NSS, Kinectrics, AECL and other Society represented companies. For further clarity the dollar expenditures of work includes all work done (e.g. MG, PWU and Society work) and not solely Society work.
12. This LOU shall expire on December 31, 2010 unless there is agreement to renew this LOU for the business planning year 2011 by September 30, 2010. In the event that there is no agreement to renew, Article 67 will apply for work to be contracted out in 2011.
Lethe of Understanding
#176 Re: ESA Hours of Work Permit

Whereas the parties wish employees covered by the parties’ collective agreement to work extra hours as contemplated in the collective agreement and which are allowed by the Employment Standards Act 2000 (ESA) through agreements by the parties;

And whereas the parties understand that the Director of Employment Standards is required to approve agreements between employers and bargaining agents to permit employees to work more than 48 hours in a week;

Therefore in accordance with the ESA the parties hereby agree to the following with respect to the hours of work of employees covered by the parties’ collective agreement:

1. In accordance with the ESA the Society consents to employees working extra hours beyond their daily normal hours of work, to a maximum of 13 hours.

2. Also in accordance with the ESA the Society consents to employees working extra hours beyond 48 hours in a work week, to a maximum of 60 hours.

3. Nothing in this agreement shall be construed to interfere with the Corporation’s right to rely on the exceptions in the ESA in appropriate circumstances.

4. This letter of understanding will come into effect the date it is signed by both parties and shall form part of the collective agreement between the parties.

Dated this 13th day of May, 2008

Lanny Totton          Scott Martin
For the Society       For OPG
Letter of Understanding
#177: Treatment of Schedule 04 Management and Professional Trainees

*This LOU replaces the former LOUs #167, 172 & 173 Re: Treatment of Schedule 04 Management and Professional Trainees to update collective agreement references*

The parties agree to amend the Memorandum of Settlement dated October 27, 2005 and the Collective Agreement with respect to the treatment of Schedule 04 Management Trainees, and without prejudice or precedence with regards to the parties’ future discussion on Article 25.1, on the following basis:

1. Management and Professional Trainees who are at Step 6 of Schedule 04 as of the date of signing of this letter or who are scheduled to progress to Step 6 of Schedule 04 on or before June 30, 2006 will be placed at 80% of MP2 on Salary Schedule 01 effective January 5, 2006.

Management and Professional Trainees on Schedule 04 as of the date of signing of this letter, other than those identified in Item (1) above will be treated as follows:

2. Society- represented Management and Professional Trainees who were appointed to Salary Schedule 04 before 2006 and are still on Schedule 04 as of the date of signing of this Letter of Understanding will not remain on Schedule 04 during 2006. Instead, they will be placed on the new salary structure at either Step 1 or Step 2 of the MP2, MP 3 or MP 4 bands effective January 5, 2006 with full retroactivity. Their placement and initial progression on the bands will be as per paragraphs 3 and 4 below.

3. Management and Professional Trainees appointed to Salary Schedule 04 prior to January 5, 2005 will be placed on Step 2 of the appropriate MP band. They will progress to Step 3 after upon reaching their 1 year anniversary date from the most recent date of step progression date which occurred prior to January 5, 2006 unless Management demonstrates a performance problem.

The following is for illustrative purposes only: For example an employee progressed to Step 04 on July 8, 2005, he/she then progressed to Step 05 on January 8, 2006. He/she will be placed on Step 2 of the appropriate band effective January 5, 2006 and then will progress to Step 3 July 8, 2006. Thereafter annual progressions will occur on July 8 of subsequent years.

4. Management and Professional Trainees appointed to Salary Schedule 04 on or after January 5, 2005 will be placed on Step 1 of the appropriate MP band. They will progress to Step 2 one year following their date of appointment to Salary Schedule 04 after unless Management demonstrates a performance problem.

5. This Letter of Understanding together with Appendix “A” supersedes all provisions of Article 25.
6. For further clarification, the implementation of this letter of understanding will be as per Appendix B. (Note Appendix B not published for privacy reasons)

APPENDIX “A”

25 Pay and Benefits Treatment of DEVELOPMENTAL STAFF PAID ON STEPS 1 or 2 of the MP2, MP3 OR MP4 Bands.

25.1 Move to future discussions.

25.2 Individuals with advanced degrees or some applicable experience may be given an appropriate time credit when they are placed on either step 1 or 2 of the MP 2, MP 3 or MP 4 bands.

25.3 Management may appoint individuals to a regular position upon successful completion of Step 2. Such individuals will be given a letter (copy to the Society) six (6) months prior to the completion of the training program indicating the location of their final appointment.

25.4 Employees who have reached Step 3 and have not yet been appointed to an M&P or FM&P job will be treated as special cases to be dealt with on an individual basis by line management.

25.5 Progression from step 1 to step 3 of MP2, MP3 or MP4 will be dependent upon satisfactory performance. A progression step may be withheld where OPG can demonstrate unsatisfactory performance. In such cases the employee's performance will be reviewed in six months and, if performance has been satisfactory, the employee will progress to the next step. If progression must be withheld due to unsatisfactory performance for a twelve month period, there may be cause for termination. If the employee's performance is satisfactory for one year following the withholding of a progression step the employee will be awarded any withheld step increase, thus restoring his/her original progression pattern.

25.6 An absence greater than one month due to illness, pregnancy, parental leave, etc., may result in an extension of a step in the progression process. The original progression dates may be reinstated if satisfactory progress can be shown to have been made during an extension period.

25.7 Vacation provisions that apply to M & P staff will also apply to employees on steps 1 or 2 of either the MP 2, MP 3 or MP 4 Bands.

25.8 Articles contained in Part XI (Relocation Assistance) will not apply to Management and Professional Trainees in the Nuclear business organization, except as noted below:

i) Management and Professional Trainees in the Nuclear business organization will be paid for any additional travel
costs when assigned to a temporary work headquarters for short duration assignments (ie. meetings, conferences, seminars, or similar type of functions) as long as these are job assignments requested by Management. Additional travel costs are defined as the mileage to the new work location minus the mileage to the normal work location.

ii) Articles contained in Part XI (Relocation Assistance) will apply to Management and Professional Trainees when they are appointed to an M&P or FM&P job, or are progressed to Step 3 on either the MP 2, MP 3 or MP 4 band.

iii) Any other reimbursement for expenses for Management and Professional Trainees will be at management’s discretion.

25.9 Eligibility for other benefits and allowances which apply to regular staff will be granted to employees on steps one or two when they are granted regular employee status.

25.10 Shift compensation rates for developmental staff are as follows:

For work on Saturdays and Sundays:
- In 2006: $17.92/hour worked
- In 2007: $18.45
- In 2008: $19.00
- In 2009: $19.57
- In 2010: $20.16

For work on statutory holidays:
- In 2006: $35.83/hour worked
- In 2007: $36.90
- In 2008: $38.00
- In 2009: $39.14
- In 2010: $40.31

Beyond December 31, 2010 the shift premiums are subject to the same general base wage increases that are applied to wage schedules.

25.11 Student employees will be paid at either Step 1 or 2 of the MP 2 Band.
OPGN is displacing the Durham Regional Police (DRPS) who currently constitute a Nuclear Response Force in favour of creating its own Nuclear Response Force (NRF). To ensure an effective transition of the work from the DRPS to the NRF, the parties have agreed as follows:

1. The current security FLM classification will be comprised of both FLMs who supervise NSOs and FLMs who supervise NRF qualified NSOs.

2. Security FLMs (NSO who express interest to become NRF qualified will be selected on the basis of seniority, for BTOC training prior to the posting of a vacancy. Similarly, where interest is expressed and an FLM (NSO) vacancy exists, an NRF qualified security FLM will be selected to fill the vacancy.

3. The requirements to get into BTOC will include the following:
   - Medical;
   - Psychological;
   - Physical;
   - Aptitude;
   - Security Clearance;
   - Driver’s License;
   - Possession Acquisition License (PAL);
   - CPR and First Aid

4. A retention bonus will be applied for maintaining the NRF status. This bonus will be structured annually from January to December. An employee who is granted NRF status between January and December and successfully completes any required re-qualification prior to the end of the year will receive a pro-rated bonus. For example, if an employee commences role in February, that employee would receive 11/12ths of the first year bonus.

   The annual amount for the bonus will be $3,000 per year, adjusted upwards annually at the same rate as the negotiated general wage increase.

5. All NRF qualified security FLMs are required to report to work 15 minutes prior to the commencement of their shift with payment at the appropriate overtime rate.
Dated at Ajax this 3 day of July, 2008.

J. Fitzsimmons  L. Totton
For OPG       For the Union

Ontario Power Generation  The Society
Letter of Understanding  
#179 Re: Expediting Society/OPG Jurisdictional Arbitrations

*This LOU replaces the former LOU #73 Re: Expediting Society/OPG Jurisdictional Arbitrations.

Without prejudice and without creating a precedent in respect of any other matter, the undersigned Parties agree to the following:

1. This Agreement applies to jurisdictional grievances advanced by the Society pursuant to Articles 2 and 16.3 and other relevant provisions of the Collective Agreement which do not involve the interests of any intervening trade union.

2. The referral to arbitration shall be made by the Society delivering a brief to OPG setting out the facts and evidence on which it relies. OPG shall deliver a responding brief within 20 business days thereafter, and the Society may file a reply brief within a further 10 business days after receipt of the responding brief.

3. If a party does not deliver a brief within the above time lines it may only file a brief and lead evidence at arbitration with leave of the arbitrator, on such terms as the arbitrator may impose.

4. Arbitrations will be held in an expedited med./arb. format. The arbitrators will be selected from the following group:
   a. Jules Bloch
   b. William Kaplan
   c. George Surdykowski

   This roster of arbitrators will be reviewed by the parties every year that this agreement continues. Prehearing issues may be referred to Jules Bloch or his designate for resolution

5. **Prior settlements made without prejudice and without precedent shall not be determinative of any grievance.**

6. In addition to jurisdiction under the collective agreement under which the dispute was filed, the arbitrator shall have the jurisdiction set out in s. 99 of the Ontario Labour Relations Act, 1995, except that the arbitrator shall not have power to alter a Society bargaining unit as determined in a certificate and/or defined in the Voluntary Recognition Agreement or an applicable collective agreement.

7. Arbitration awards will be precedent setting.

8. The parties agree that arbitrator George Adams shall decide the issues raised in the "Referral to Arbitration - Policy Grievance re Excluded ‘Individual Contributor’ Positions" (December 10, 1997) at a hearing scheduled [SUBJECT TO CONFIRMATION - February 29, 2000] or his first available date thereafter, and shall issue a pattern-setting award on the following terms:
a. On or before November 15, 1999 the Society will identify up to four reference positions to provide a factual foundation and by November 26, 1999 OPG will provide all current and predecessor job documentation (including TIRRs and TARRs where applicable), current organization charts, and any other current documentation of the nature and function of the work organization relevant to these positions;

b. The Society will file its Primary Brief by the later of December 10, 1999 or within 15 business days of receiving the complete reference material; OPG will file a Responding Brief by the later of January 28 or within 30 business days of receiving the Society's Primary Brief, and the Society will file its Reply Brief by the later of February 15 or within 10 business days of receipt of the Responding Brief;

c. Arbitrator Adams will have jurisdiction as set out in other provisions of this Agreement except that either party, on request, shall have the right to oral evidence including proof of documents and cross-examination;

d. If either party intends to call oral evidence it will provide the other party with a will-say statement of all such evidence not less than ten days prior to the hearing;

e. Any individual contributor grievances which are not expressly decided by arbitrator Adams award may be referred by the Society to another arbitrator under the provisions of this Agreement.

9. Except as expressly modified herein, all relevant provisions of the Society's Collective Agreement shall continue to apply.

10. Either party may withdraw from this agreement on six months written notice to the other party.

John Wilson  
On behalf of the Society

Brian Story  
On behalf of OPGI

Nov. 9/99  
Date
LETTER OF UNDERSTANDING
#181 Re: PND Local Agreement for #1 Shift Coverage by Society-Represented Employees Assigned to Days

In 1987, a memo was issued to adopt the M&P 12-Hour Shift Task Group recommendations. One recommendation dealt with the pay treatment when Society-represented employees assigned to days are required to work 12-hour #1 shifts (20:00 to 08:00). Recently, we have encountered situations where different interpretations of these guidelines have resulted in inconsistent compensation.

In order to ensure a uniform approach and remain consistent with The Society Collective Agreement, the following guidelines will be adopted if a Society-represented employee assigned to days is required to provide coverage for one to three consecutive #1 shifts. For coverage of greater than three consecutive shifts, the employee will be assigned to the appropriate crew as per The Society Collective Agreement Section 59.2.

Our intent is to clarify timekeeping practices and ensure a consistent approach to compensation – these rules are not retroactive for shifts worked prior to the date of this memorandum.

1. (a) If the day prior to the first #1 shift is a normal scheduled day of work, the employee will be granted that day off, consistent with Section 2.1 of the attached memo and Section 59.2(c) of The Society Collective Agreement.

   For example, if the first shift to be covered is a Tuesday #1 shift, the employee will be granted Monday off, reporting to work Monday at 20:00.

   Hours worked on the granted day, including the first four hours of the #1 shift, will be paid or banked for future time off at the appropriate premium rate, consistent with Sections 57.1, 57.2, 57.4, and 57.5 of The Society Collective Agreement.

   In the above example, the hours worked Monday from 20:00 to 24:00 will be paid or banked at the appropriate premium rate. If the employee is required to work part of the granted day shift (e.g., required to work Monday morning in the example above), those hours worked will be paid or banked at premium rate.

(b) If the day prior to the first #1 shift is a Saturday, Sunday, or statutory holiday, the first four hours of the 12-hour shift will be paid or banked for future time off at premium rates, consistent with Sections 57.2, 57.4, and 57.5 of The Society Collective Agreement.
For example, if the first shift to be covered is a Monday #1 shift, the four hours worked Sunday 20:00 to 24:00 will be paid or banked at double-time.

2. If the #1 shift occurs on a Saturday, Sunday, or statutory holiday, the hours worked from 00:00 to 08:00 will be paid or banked for future time off at premium rates, consistent with Sections 57.2, 57.4, and 57.5 of The Society Collective Agreement.

For example, if the employee works a Saturday #1 shift, the eight hours Saturday from 00:00 to 08:00 will be paid or banked at the appropriate premium rate.

3. When two or more consecutive #1 shifts are worked, hours in the calendar day in excess of the normal number of hours worked per day shall be paid or banked for future time off at premium rates.

If Tuesday #1 shift and Wednesday #1 shift are worked, for example, an additional four hours of overtime will be paid or banked at the appropriate premium rate for the hours worked Tuesday 20:00 to 24:00.

4. The night shift premium will be paid on all hours which are not compensated at premium rates, consistent with Section 2.3 of the attached memo. In example 1(a) above, the night shift premium would be paid for the eight hours worked from Tuesday 00:00 to 08:00.

5. The next shift to be worked following the last covered shift will be the next regularly scheduled day shift, consistent with Section 59.2(d) of The Society Collective Agreement.

In example 1(a) above, the next shift to be worked following the Tuesday #1 shift will be the regularly scheduled Wednesday day shift.

Several examples of #1 shift pay treatment for 40 hour/week and 35 hour per week employees are provided on the following pages.

As per The Society Collective Agreement Section 61.9.8, all hours worked during the #1 shift will be recorded and treated as if they occurred during the calendar day in which the shift ends. The time code “N” should be entered on the timesheet if the #1 shift is worked on a normal scheduled day of work; otherwise (i.e., for Saturdays, Sundays, or statutory holidays) the time code “R” should be used.

(prepared by Randy Leavitt, approved by Frank Vanderbruggen for The Society, John Walker for The Society, and Mike Williams for Management)
**Tuesday #1 Shift Worked by 40 Hour/Week Employee Assigned to Days**

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Timesheet coding: D  D  R  R  R  N  D

Total hours worked: 36

Compensation: 40 hours at normal rate + 4 hours at time-and-one-half + 8 hours of night shift differential

**Monday #1 Shift Worked by 40 Hour/Week Employee Assigned to Days**

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Timesheet coding: D  D  R  R  R  N  D

Total hours worked: 44

Compensation: 40 hours at normal rate + 4 hours at double-time + 8 hours of night shift differential
### Saturday #1 Shift Worked by 40 Hour/Week Employee Assigned to Days

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Total hours worked: 44

Compensation: 40 hours at normal rate + 12 hours at time-and-one-half

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### Tuesday and Wednesday #1 Shifts Worked by 40 Hour/Week Employee Assigned to Days

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Total hours worked: 40

Compensation: 40 hours at normal rate + 8 hours at time-and-one-half + 16 hours of night shift differential
# Schedule 1 Staff-144

## Monday and Tuesday #1 Shifts Worked by 40 Hour/Week Employee Assigned to Days

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Timesheet coding: D D R R N N D

Total hours worked: 48

Compensation: 40 hours at normal rate + 4 hours at double-time + 4 hours at time-and-one-half + 16 hours of night shift differential

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## Saturday and Sunday #1 Shifts Worked by 40 Hour/Week Employee Assigned to Days

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Timesheet coding: D R R R D D D

Total hours worked: 56

Compensation: 40 hours at normal rate + 16 hours at time-and-one-half + 8 hours at double-time
Tuesday #1 Shift Worked by 35 Hour/Week Employee Assigned to Days

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Timesheet coding: D  D  R  R  R  N  D

Total hours worked: 33
Compensation: 35 hours at normal rate + 5 hours at time-and-one-half + 7 hours of night shift differential

Monday #1 Shift Worked by 35 Hour/Week Employee Assigned to Days

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Total hours worked: 40
Compensation: 35 hours at normal rate + 4 hours at double-time + 7 hours of night shift differential
### Saturday #1 Shift Worked by 35 Hour/Week Employee Assigned to Days

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Total hours worked: 40

Compensation: 35 hours at normal rate + 12 hours at time-and-one-half

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### Tuesday and Wednesday #1 Shifts Worked by 35 Hour/Week Employee Assigned to Days

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Total hours worked: 38

Compensation: 35 hours at normal rate + 10 hours at time-and-one-half + 14 hours of night shift differential

Revised in 2006-2010 Collective Agreement
LETTER OF UNDERSTANDING

#182  Re: Compensation & Working Conditions - 12-Hour Shift Schedule

1. The following will be applicable to Hydroelectric employees in the Commercial Resource Management Centre when working a 12-hour schedule.

2. General Provisions

2.1. The 12-hour shift schedule will average the regular scheduled hours per week for employees and will indicate the days and hours of work (shift) for each employee. Payment will be determined in accordance with this Letter of Understanding and as outlined in Article 59 of the Collective Agreement ("Shift Work (M&P, TMS/TS))."

2.2. The implementation of 12-hour shift work will be on the understanding that its application will not result in any appreciable increase in cost to Hydroelectric.

2.3. Hydroelectric or The Society Local Vice-President shall have the right to terminate 12-hour shift work. Written notice must be provided by the Department Manager to The Society Local Vice-President or vice versa.

   a) If the notice is two months prior to the end of the current schedule, 2-hour shift work will terminate at the end of the current schedule. Reason(s) for termination will be provided by the respective party.

   b) The 12-hour shift schedule may be canceled immediately by Hydroelectric should any of the following be adversely affected: safe operation of plant; health of shift workers; public safety.

   c) When employees at any Department have exercised the right to opt out of time-balanced 12-hour shift work, no new 12-hour shift work may be introduced for those employees without the mutual agreement of local management and the local Society Unit Director.

2.4. All policies and Agreements which normally apply to employees will continue to apply unless specifically stated otherwise in this LOU.

3. Shift Differential

A shift differential of $1.10 per hour worked will be paid to 12-hour shift employees for each night shift hour worked, in accordance with Article 59.3
4. Shift Premium

Hourly shift allowances shall be paid to M&P shift workers in accordance with Article 59 ("Shift Work (M&P, TMS/TS)").

5. Overtime

5.1. Authorized overtime beyond 12 hours of work on scheduled workdays Monday to Saturday inclusive and all hours worked on scheduled days off Monday to Saturday inclusive shall be compensated in accordance with the overtime provisions of this Agreement.

5.2. Authorized overtime beyond 12 hours of work on scheduled workdays which are Sundays or statutory holidays and all hours worked on scheduled days off which are Sundays or statutory holidays shall be compensated in accordance with the overtime provisions of the Collective Agreement.

6. On-Call

6.1. On-call service payments will not be applied to those employees on the Minimum Availability Requirement (MAR) list (see Section 9).

7. Special Conditions

7.1. The following items will be credited for pay purposes on an hour-for-hour basis:

a) Vacation
b) Floating Holidays
c) Sick Leave
d) Time Off Without Pay
e) Travel Time
f) Medical and Dental Consultations - Periods of less than four hours shall not be deducted from sick leave credits.

7.2 In the application of the above-noted items (a), (b) and (c), a reference under the current provisions of this LOU to a "day's" entitlement will mean eight hours. Therefore a 12-hour shift will constitute one and one-half days deducted from credits.

7.3 When an employee is scheduled to work a 12-hour shift and one of the under-noted conditions occurs, a "day" will be considered to be 12 hours.
7.4. Jury duty and attendance at court.

7.5. Funerals.


7.7. Time Charges for Attendance at Delegates' Council and meetings of The Society's Board of Directors.

8. The basic statutory holiday and special time off provisions remain unchanged in that time off and pay entitlements will continue to be calculated on an eight-hour basis.

9. Minimum Availability Requirement (MAR) List

9.1. In order that a sufficient number of shift employees are on duty to maintain and ensure a continuous operation at any Department utilizing 12-hour shifts, a MAR List will be prepared.

9.2. A sufficient number of employees, by job classification and qualifications, will be determined by Hydroelectric. Employees will volunteer their willingness to be called in to work in this situation, by placing their name on the MAR List under the day(s) they wish to be called. If there are no volunteers, Hydroelectric reserves the right to assign employees to the MAR List. Employees will not be placed on the MAR List who are scheduled to work on an adjoining shift.

9.3. An employee on the MAR List agrees to be available during the Required Availability Period (RAP), to report to work to cover short-term absence. The RAP is the period of time commencing two hours prior to each shift change and ending one hour after each shift change.

9.4. If an employee whose name is on the MAR List cannot be available for the specified day(s), the employee must arrange for a substitute acceptable to Hydroelectric, whose name then would be added to the MAR List.

9.5. Volunteering or being assigned to the MAR List for RAP periods does not entitle the person to any compensation, i.e., on-call pay, etc., nor does it guarantee that overtime will result.

9.6. In the event that an employee is called to work from the MAR List, he/she will be entitled to overtime premium rates (outlined in Section 61.4) for all hours worked.

10. Time-balanced 12-hour shift work will be introduced in the CRMC
Department when the following conditions are met:

10.1. More than fifty percent (50%) of employees who vote in that Department must vote in favour of 12-hour shift work.

10.2. More than fifty percent (50%) of all eligible shift workers who vote in that Department must vote in favour of the 12-hour shift work.

10.3. The process for taking the Vote and counting it will be agreed upon by The Society Unit Director and the Department Managers.

10.4. Employees eligible to vote are those employees in the CRMC normally assigned to shift.

10.5. Although the content, preparation, costing and administration of shift schedules is the sole responsibility of Hydroelectric, the preference of the majority of shift workers in a department for a particular basic type of schedule will be considered. Such preferences must be made known to Hydroelectric 4 months in advance of the starting date of the new schedule.

10.6. Supernumerary Shifts while working on the 12-hour shift schedule, will be 08:00 – 16:00.

10.7. Three supernumeraries can be exchanged for working two 12-hour regular days off.

10.8. When a regular shift commences before midnight and continues after midnight, all hours during the continuous shift shall, for pay and time balance purposes, be recorded and treated as if they occurred during the calendar day in which the shift ends.

10.9. Exception: The statutory holiday shift premium shall be paid on an actual hourly-as-worked basis.

10.10 Shift workers with a plus or minus four hours time balance assigned to day work or shift for an indeterminate period of time may be required to take off or work a four-hour period respectively, but no payments, premium or otherwise, will apply to such time worked as an extension of a normal eight-hour day to resolve a minus time balance.

10.11 For the day on which an election occurs and up to three days before and after, all employees on a 12-hour schedule will be changed to an eight-hour schedule unless joint agreement is reached to do otherwise.

10.12 A minimum of 48 hours off per pay period except for MAR list needs.
11. An excessive number of 12-hour shifts cannot be worked in sequence. Three would be the maximum for nights and four would be the maximum for days.

(signed by M.K. Robinson on April 25, 1996 for Ontario Hydro, and G. Murphy on May 2, 1996 for The Society) Revised in the 2006-2010 Collective Agreement
LETTER OF UNDERSTANDING

#183  Re: Society Represented Employees in IMS - Periodic Assignment to Shift Work (Final)

This Agreement, pursuant to Article 72 of the CA, establishes conditions if Society represented staff in Nuclear Inspection Maintenance Services Division of Ontario Power Generation are assigned to work shift or provide 24 hour coverage.

1. Principle:

   Society Represented staff (staff) in IMS may be assigned to shift work or 24 hour continuous coverage work schedules from time-to-time as required. Management will endeavour to equitably distribute assignments taking into consideration business and employee needs.

2. Assignment:

   Society represented staff, who are assigned to shift work, may be assigned for up to six (6) months in total per year per employee provided that no single period of shift work exceeds three (3) consecutive months. Society represented staff assigned to perform SLAR work may be placed on shift for up to eight (8) months in the year.

   When assigned to shift, articles 59, 60, 61, 62 and 70 of the Collective Agreement do not apply except 59.3, 60.3, 60.4, 60.7, 61.3, 61.6 (reference 1995-96 Agreement or subsequent applicable revisions).

3. Fiscal Year:

   For purposes of this Agreement, a "year" will be a year commencing April 1. The defined fiscal year will not be changed in future periods.

4. Shift/Work Schedule Design:

   The design of the shiftwork schedule(i.e., length and pattern):

   a) may result in scheduled work for an employee on average exceeding normal base hours.

   b) will not result in an employee being scheduled to work less than 35 hours on average over pay periods, inclusive of any normal scheduled work on days.

   c) will be the same shift length and pattern as the associated PWU crews on shift or 24 hour coverage work schedule when:

      i) The PWU Crew is from IMS;

      ii) Society Staff must work alongside the PWU Crew to provide supervision or direct support to the work being conducted by the PWU Crew;
unless otherwise agreed.

5. Notice:

A minimum seven (7) days notice will be provided when an employee's shift schedule is changed or when putting an employee on shift with the following exceptions:

a) Three (3) days notice if a forced unit outage occurs. The applicability of the three (3) day notice period is dependent upon a shift change notice being issued to the affected employees within 48 hours of the occurrence of the forced unit outage.

b) In cases of illness, four (4) days notice will be given.

Failure to provide the above notice will require payment at the appropriate overtime rates for work performed outside of normal hours during the notice period.

6. Overtime:

Work performed outside of scheduled hours is overtime and will be compensated at the appropriate overtime rates.

7. Compensation while on shift:

7.1 During each pay period in which scheduled shift hours are worked;

a) All scheduled hours worked, either OR days or on shift, will be credited to the time bank at straight time.

b) The employee will be paid their base pay, and the equivalent number of base hours at straight time will be deducted from the time bank.

c) The employee will be paid the premium and differential portion for scheduled hours worked on weekends, and night shifts during each pay period.

7.2 At the end of the fiscal year, the remaining cumulative hours in the time bank will be paid out, or, time may be taken off at times throughout the fiscal year which are mutually agreeable to management and the employee, as follows:

a) The cumulative total will be divided into groups of 7 hours (or fraction if there is a residual amount).

b) For each group, the first four hours will be at time-and-one-half and the second three hours will be paid at double-time.

c) Negative time balances existing at the fiscal year end will be written off.

d) For purposes of calculating time bank compensation
provisions under this Agreement, the number of base work hours in a pay period will be equivalent to the number of current standard hours.

7.3 Periods of time required at the start and end of a shift, to effectively carry out any turnover to the incoming or outgoing crew will not be compensated, if the total time required is less than 30 minutes. Turnovers requiring more time, if authorized by the Superintendent or that person designated by the Superintendent, will be compensated according to the overtime provisions of the Agreement.

8.0 Relativity-

8.1 In the event that Society staff are required to work alongside an associated PWU crew as determined under 4(c)(i) and 4(c)(ii) above, who are on a work schedule that provides 24 hour coverage but are not on an assigned shift schedule under a PWU Agreement, equivalent premiums will be paid in lieu of any premium (weekends, shift differentials, time bank) payments as determined under this Agreement.

8.2 When working alongside an associated PWU crew, as described in 8.1, and a minimum payment is provided to the PWU crew for the purposes of maintaining normal base hours, the equivalent treatment will be afforded to The Society staff.

9.0 The implementation plan requirement of Letter of Understanding Re. Peak Work Hours Arrangements (LOU-6), is as follows:

a) This LOU may be jointly re-negotiated in April of 1998 if requested by either party in advance, and during the month of April of each second year subsequently. Unresolved disputes during this re-negotiation may be referred to the dispute resolution process as defined in Article 72 of the 1995/96 Collective Agreement.

b) The effective start date will be April 1, 1997, which will be declared the start of the fiscal year for purposes of this Agreement.

(signed by B.J. Murdoch on behalf of NTSD and J. Gierlach on behalf of The Society) Revised in the 2011-2012 Collective Agreement
LETTER OF UNDERSTANDING
#184  Re: Society Representation of Authorized Nuclear Operators in Rotations

To implement the OPG Procedure Authorized Nuclear Operator Staffing of Days Based on Rotational Positions within OPG Divisions and the tripartite Memorandum of Understanding addressing matters of union representation dated January 11, 1996 (attached), the undersigned Parties agree:

Ontario Power Generation will remit to The Society on a quarterly basis, a dollar amount equal to the weekly dues requirement in effect for Society represented staff.

The funds will be remitted for each week an Authorized Nuclear Operator is on rotational assignment to a position within The Society’s jurisdiction, ending at the conclusion of the rotational assignment.

In addition to its jurisdiction over the position, The Society’s representational rights and its Collective Agreement shall apply to any employee grievance for which the PWU does not have representational rights under the Memorandum of Understanding.

MEMORANDUM OF UNDERSTANDING

The Authorized Nuclear Operator Career Path Team produced an Ontario Hydro Nuclear (OHN) Procedure titled, "Authorized Nuclear Operator Staffing of Days Based Rotational Positions within OHN Divisions". Contained in this procedure was a process for determining applicants to be selected for a rotational assignment to a position within The Society's jurisdiction. This Memorandum will address the matters of union representation and compensation to the unions.

1.0 CONDITIONS OF THE AGREEMENT

a) Except as expressly modified in representation (Item 3), below, the Collective Agreement signed between Ontario Hydro and the Power Workers Union and Ontario Hydro and The Society apply.

b) This Memorandum of Understanding is without prejudice to any Party's position in any other matter between the Parties and does not constitute a precedent.

c) This Memorandum of Understanding is revocable upon one (1) year's written notice by any Party.

2.0 GENERAL PRINCIPLES

a) Agreement must be reached with the responsible Society Unit Director to fill a position within the Jurisdiction of The Society on a rotational basis.

b) Power Workers Union represents the individual Authorized Nuclear Operator as well as the position of Authorized Nuclear Operator.

c) OHN regularly requires an Authorized Nuclear Operator on a rotational assignment within The Society's jurisdiction to perform Power Workers Union jurisdiction work.

3.0 REPRESENTATION

When an Authorized Nuclear Operator is selected to fill a rotational assignment within the jurisdiction of The Society the following will apply:

a) The Society represents the position.

b) The employee is represented by the Power Workers' Union except for representation with respect to established working conditions for the position as set out in LOU 27 ("Re: Article 5 "Established Working Conditions’ for Employees Temporarily Included in The Society's Jurisdiction") of The Society Collective Agreement.

(signed by T. Pigeau for the Power Workers' Union, J. Wilson for The Society, and D. Ivany for Ontario Hydro, dated January 11, 1996.)
LETTER OF UNDERSTANDING

#185  Re: Purchased Services Agreement (PSA) Nuclear (including Nuclear Waste and Nuclear Regulatory Affairs)

Re: Reduction of Nuclear PSA Envelope as a Result of Establishment of Nuclear Waste Management Organization (NWMO)

Whereas The Society and OPGI have previously agreed to a Purchased Services Agreement (PSA) for Nuclear (LOU #175); and

Whereas OPGI and the Nuclear Waste Management Organization (NWMO) are negotiating an asset transfer agreement under which certain assets and liabilities of OPGI will be transferred to the NWMO to be effective on or about January 1, 2009; and

Whereas a portion of Society work that was previously contracted out by OPGI Nuclear will now be contracted out by the NWMO;

1. The Society and OPGI hereby agree to amend paragraph 5 of LOU #175 to reflect that the project portion of the “Total Contracting Out Envelope by Year” shall be reduced by $13 million for each of 2009 and 2010, resulting in a revised projects envelope of $99.5 million and base envelope of $12.5 million, for a total envelope of $112 million for each of 2009 and 2010.

OPGI agrees to make a one-time, lump sum payment in lieu of dues in the amount of $25,000 to The Society before the end of 2008.
LETTER OF UNDERSTANDING
#187 RE: IM&CS Termination of Services with Bruce Power

It is jointly agreed that the following Letter of Understanding (LOU) shall form part of
the Collective Agreement between the parties. This LOU is limited to the IM&CS
Termination of Services with Bruce Power and supersedes any provision of the
Collective Agreement dealing with employee transfers. The intent of this LOU is to
afford options for IM&CS employees located at the Bruce site who are affected by the
termination of services with Bruce Power and to ensure the Company can fulfill its
contractual obligations to Bruce Power during the transition.

The parties enter into this LOU without prejudice to either parties’ position in future
matters involving identical and/or similar circumstances.

Except as expressly modified by this LOU, all other provisions of the Collective
Agreement apply.

1. This Agreement is contingent on an agreement between OPG and Bruce Power
on the transition of IM&CS services, and on the understanding that Bruce Power
will offer positions to OPG employees who on acceptance will terminate
employment from OPG and begin employment with Bruce Power under the
terms of the collective agreement between Bruce Power LP and The Society at
a date established between the employers, and on the understanding that Bruce
Power and The Society will reach an agreement in respect of employees
accepting employment with Bruce Power, for the recognition of service under the
Collective Agreement between Bruce Power and the Society. It is also
understood and agreed that an employee accepting an offer of employment
with Bruce Power under the terms of this agreement must transfer all of their OPG
pension from the OPG pension plan to the Bruce Power pension plan.

2. This agreement is limited to regular IM&CS employees permanently located at
the Bruce site. Beyond the application of this agreement, in the event the
ceasing of IM&CS services provided by OPG to Bruce Power results in an
adverse impact on employment continuity for Society IM&CS employees working
in Durham Region, Article 64 will apply to those affected employees.

3. The following options will be made available to IM&CS employees who are
permanently located at the Bruce site on the date of this agreement and
remain at the Bruce site on the date that the options are presented:

   a) Offer of employment with Bruce Power at the Bruce Site under
the terms of paragraph 1; or

b) A lump sum retirement allowance equal to one year's base salary. Eligibility for a retirement allowance is contingent on qualifying for an undiscounted pension as of June 5, 2011. The retirement allowance will be paid effective the date of retirement as determined by OPG. Where contractual obligations to Bruce Power, or continued operations are impacted an employee's retirement may be delayed no later than June 5, 2011; or

c) Placement of affected staff in available vacancies for transfer, at the Bruce site, IM&CS business unit, or Nuclear Business Unit.

4. Redeployment Process

A joint team of Society and Management representatives will be formed to oversee an expeditious staff redeployment process. The joint team will be comprised of 2 members from The Society and 2 members from Management plus any required support staff.

The joint team will operate under the principles of fairness, reasonableness and equality to ensure employee seniority, preference and qualifications are considered as outlined below in the allocation of staff while also ensuring the needs of the business are satisfied. Where agreement cannot be reached Management will determine the placements. The Society reserves the right to grieve any placements not jointly agreed to.

a) Management will prepare a list of available vacancies for transfer
b) Employees will be required to rank a location preference

c) Employees will be matched to vacancies for transfer in the following order:
   • ¹Same job document ~ location preference on the basis of seniority and qualification
   • Lateral placement - location preference on the basis of seniority and qualification.

¹ Same job document defined - an employee performing their current role in a different location.
5. OPG will execute a pension transfer agreement, where permitted by law, that will allow IM&CS employees located at the Bruce Site to transfer their pensions to Bruce Power.

6. All elections are irrevocable except where the employee has subsequently experienced a "significant life altering event" that requires consideration by OPG.

7. The Society consent to the use of Purchase Services, which for clarity will not be accounted for under any PSA envelope, for the preservation of vacancies for the future transfer of IM&CS employees. Once the employees are matched through the redeployment process outlined in paragraph #4 only those positions being held for matched employee transfers will continue to be exempt from any PSA envelopes, The Society further consent that all contractors hired in IM&CS at the Bruce site or not at the Bruce site but providing services to Bruce Power will also not be counted against the current PSA envelopes.

This agreement is subject to OPG providing The Society an electronic monthly summary regarding the use of purchased services, which will contain, date and expected end of the contract, purpose of hiring and the roles and responsibilities,

8. The Society also agree to waive any rights to jurisdictional claims where the number of reports is reduced as a result of preserving vacancies for the future transfer of IM&CS employees, or deferred release dates of employees. This condition does not apply where the positions held (if filled), would not allow the supervisor to meet the exclusion criteria as set out in the collective agreement. This condition is removed once all employee transfers are completed.

9. Any offer made after the completion of the redeployment process outlined in paragraph #4 to an employee over age 55 at the time of reporting will outline the extent and terms of relocation assistance that will be provided pursuant to Article 52,5,2 of the 2005 collective agreement.

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2 Significant life altering event defined – exceptional circumstances that management would consider material in informing an employee choice and which can be alleviated by providing reconsideration where the option still exists.
10. This agreement will expire upon completion of the transfer of services to Bruce Power or June 5, 2011 whichever comes first. This does not alter the eligibility date associated with the retirement allowance.

11. The Society reserves the right to grieve any unreasonable exercise of management in the application, and interpretation of this LOU.
For the term of this Letter of Understanding the PSA (Article 67) AND LOU’S 122, 124, 125, 126 and 175 are suspended, subject to the exceptions set out in this LOU.

SECTION A

1. Without prejudice or precedent, for the purpose of this agreement only, “Nuclear base work” shall be defined as OM&A work of an on going nature typically executed by Society-represented staff. This work would include, but not be limited to, items such as stress analysis, preparing bills of materials, equipment performance monitoring, addressing outage and non outage AAA holds or elimination of backlogs. It does not include OM&A or capital modification projects.

2. For the purposes of this agreement, “Augmented Staff” shall be defined as staff hired either directly by OPG, or through a managed task contract, that perform work regularly performed by Society-represented employees and are taking work direction from OPG.

3. The Parties agree that there shall be three PSA Envelopes for OPG as a Company in the total amount of 165 Million dollars for each year of this Agreement.
   - A maximum 17 Million dollar envelope can be used for base work in Nuclear.
   - A maximum 4 Million dollar envelope can be used for base work in Corporate.
   - The remaining 144 Million dollar envelope is for OM&A projects, non-standard projects, capital projects, provisional projects and non-nuclear base work (excluding Corporate base work).

4. Any amounts in excess of the 144 Million dollar envelope up to 164 Million dollars shall attract a 0.5% payment to The Society. Any amounts above 164 Million dollars shall attract a payment of 1% to the Society.

5. Any amounts in excess of the 17 Million dollar base work envelope for Nuclear or in excess of the 4 Million dollar base work envelope for Corporate shall attract a 1% payment to the Society.

6. The parties agree that any amounts in a PSA envelope in any given year cannot be reallocated to any other year or any other envelope.

7. The parties shall form an OPG PSA Review Committee that will be a subcommittee of the Joint Society Management Committee (JSMC). The main discussions regarding PSA will take place at the OPG PSA Review Committee. Ad hoc local discussions may take place for clarification.
purposes. The Committee will be comprised of one OPG Management and one Society representative from each of the following business units: Thermal, Hydro, Corporate, and Nuclear. Additional resources can be added as required by the Committee.

8. The OPG PSA Review Committee will meet during the term of this agreement on a quarterly basis where Management will present the following:
   - Society actual and planned staffing levels; including Regular, Temporary and Augmented Staff
   - A report on the status of the Envelopes in sufficient detail to identify the information currently included in the 2009 Report which is provided by Nuclear (to be provided 10 working days in advance of the quarterly meeting)
   - The approved business plans for each year of this agreement (to occur in Q1)
   - The PSA plan for the current year (to occur in Q1)
   - Any payment amounts required for envelope exceedance will be finalized at the Q2 meeting of the following year, for each year of this agreement

9. Society designated representatives shall be granted system access using customized PSA reports to view purchase orders that are included and excluded on the report and will be provided appropriate training.

10. The Parties agree that in the event work performed by Society-represented employees is removed from the existing service provider, as provided for in the 2009 Information Technology Service Agreement (ITSA), and transferred to another service provider, base work as currently performed (not project work) shall not be dealt with under the envelopes available under Part A of this LOU. OPG shall process any PSA relating to such work pursuant to Article 67. The Information Technology organization at OPG has full access to Parts B and C of this LOU.

11. OPG agrees to pay the Society the sum of $1.25M per year of this agreement. In lieu of this payment, OPG agrees to provide the benefit improvements detailed in Section “E” of this agreement.

SECTION B

PSA’s representing major, multi year projects such as, but not limited to, New Business Development, New Build, Biomass/Gas Conversion, Niagara Tunnel, Lower Mattagami Project, Darlington Refurbishment, etc. shall be dealt with in the following manner:

i. The existing PSA Agreements for the Niagara Tunnel Project and the Lower Mattagami Projects are not part of this PSA Agreement and their existing PSA agreements will continue to be in effect until they expire or the projects are completed.
ii. The Parties will meet to determine the amount and type of work involved in the Project that would normally be performed by Society represented employees.

iii. OPG shall meet with The Society to discuss the hiring of additional “regular” or temporary staff and/or deployment of existing staff to assist on the project, respecting all of the requirements of the applicable provisions of the Collective Agreement.

iv. Discussions with respect to (ii) and (iii) above will be concluded within 30 days of notice from the Company to the Society, unless there is mutual agreement to extend the discussions. The Company shall provide The Society with at least 10 working days notice of such a meeting and such notice shall include reasonably adequate and relevant information for the Society to prepare for the meeting.

v. If the parties reach an agreement on the requirements of (ii) and (iii) above, the Society will be paid an amount of money which is equal to 0.5% of the total amount of work normally performed by Society represented staff based upon the initial contract estimate. This payment will be divided annually over the life of the contract commencing in the year the contract begins.

vi. If there is no agreement under (ii) and (iii) above then the matter will be processed pursuant to Article 67 which will then be active for that particular project/contract.

vii. For those projects contracted out under this process (Section B of this LOU), OPG agrees to meet with the Society on a regular basis to keep them apprised of the status of the Projects. Material changes with respect to contracted out work normally performed by Society represented employees will require recalculation of the payment amount and payment schedule.

SECTION C

Exclusions from the PSA Envelope

The following work is excluded from the envelope in Section A and in the calculation of Society represented work in Section B, above:

1. Work performed under a manufacturer’s warranty
2. Any arms length or proprietary work required to be performed
3. Where a service is obtained for OPG from a business which has Society represented employees who are providing the service.

- For the purposes of this LOU, “Arms Length” shall be defined as work that must be performed by a 3rd party as a condition of ISO certification, regulatory or statutory compliance. It is understood that there are circumstances that could arise wherein OPG may seek Society concurrence for additional exclusions for work performed by a third party. These issues will be advanced to the OPG PSA Review Committee for discussion.
For the purposes of this LOU, “Proprietary” shall be defined as work that only a vendor or their licensee can perform on a system since no one else is allowed to work on it as the vendor either built it or retains sole rights to do repairs or work on it after it is purchased.

All items meeting these exclusions will be included on the report with an explanation of the exclusion.

SECTION D

Staffing

1. During the term of this Agreement there shall be no involuntary layoff of any Society represented employees as a result of contracting out.
2. Over the term of this Agreement, OPG agrees to hire a total of 120 regular Society represented employees, of which 70 will be graduate trainees and 50 will be hires from outside of the Society bargaining unit. OPG shall inform the Society of its progress in meeting these commitments, on an annual basis.

SECTION E

Benefit Improvements

1. Benefit improvements will be made and shall continue for the term of this Agreement in the following areas:
   a) OPG will find an Insurance Carrier to provide Group Out of Country coverage. The Company will pay up to $35 per year for the cost of Family Coverage for Regular employees and $35 per year towards coverage for retirees who choose to participate. This benefit improvement will exist for a period of five years, from the date that the plan is initiated.
   b) Dispensing Fees coverage shall be increased from $5.00 to $11.00.

It is understood that these benefits shall cease at the end of this Agreement unless the parties expressly negotiate their continuation. It is also understood that in the event this Agreement ceases to exist, the Dispensing Fee shall revert back to $5.00 as it existed prior to the signing of this LOU.

The parties agree that any disputes arising from the implementation, administration or interpretation of this agreement are subject to the grievance process, with the exception of specifically negotiated provisions contained within this agreement that default to the Article 67 dispute resolution process.

This agreement shall expire on December 31, 2015 unless there is an agreement by the Parties to renew this agreement for the business planning year 2016 by
September 30, 2015. In the event that there is no agreement to renew, Article 67 shall apply to any work to be contracted out in 2016.
LETTER OF UNDERSTANDING
#189 Re: ESA Averaging Hours of Work Approval

1. In accordance with the ESA the Society consents to employees working schedules that average hours over a period of greater than two weeks. Specifically, the Society agrees to average employees' hours over a period of five weeks for A-E crews and over a period of 52 weeks for project crews.

2. This letter of understanding will come into effect April 1, 2011 and shall form part of the collective agreement between the parties and shall continue in effect until March 31, 2016.
354

LETTER OF UNDERSTANDING

#191 Re: Reorganization of Ontario Power Generation Adoption of Centre Led Organizational Design

"WITHOUT PREJUDICE"

Without prejudice and without establishing a precedent in respect of this or any other matter, the undersigned parties agree as follows:

1. In 2013 Ontario Power Generation (OPG) will move to finalize the implementation of Centre Led Organization design resulting in further change to organizational structure and the implementation of new or revised jobs. This restructure will have an impact on existing roles, reporting relationships and locations requiring the matching of employees from the existing to the new organizational structure. This Letter of Understanding (LOU) has been arrived at to facilitate the matching of existing employees against the new organization and will enable both OPG and the Society to work cooperatively to accomplish this goal. This LOU supersedes both Article 64 A and Article 64 B, unless a specific reference to those articles is referenced herein. Nothing in this agreement affects the existing Society rights to challenge new or revised jobs at the completion of the JRPT process under this agreement.

This LOU will expire on November 30, 2014 unless expressly renewed or extended by the parties.

2. General Principles of Operation
   - There shall be no involuntary layoff of any regular bargaining unit employee while this LOU is in effect.
   - The Redeployment Procedure will not operate within Units of Application but will operate as a single OPG wide exercise.
   - Management in its discretion may offer a voluntary termination package to a work group. For the purposes of this provision, unless otherwise agreed to by the parties, a work group will be no smaller than employees reporting to a Band G Manager within a location as defined by this LOU. In such cases, employees who terminate their employment will be entitled to a voluntary termination amount calculated as per the provisions of Article 64.6.4 as applied to 64.27.
   - Unplaced employees will be provided meaningful work to bridge to future opportunities at their current work location or at other locations providing the benefit of the assignment outweighs the cost.
   - The Joint Redeployment Planning Team (JRPT) will match unplaced employees to lateral positions or demotions on the basis of seniority and qualifications as the positions arise.
   - Any employee placed into a lateral or demotion position under the redeployment procedure in this LOU will not have their progression date reset.

1 All references to Articles contained within this LOU are from the 2006-2010 Collective Agreement
A JRPT will be established to oversee Joint Implementation Teams (JIT’s) who are tasked with the placement of employees in accordance with this agreement. Any unresolved issues at the JIT level will be escalated to the JRPT.

- Any matching criteria will be consistent with job documents and will not alter the job evaluation process.
- Demoted employees will receive income protection in accordance with this LOU.
- All positions not filled after matching at each salary level will be posted in an expedited manner and filled on a best qualified basis prior to moving to the next step/level in the matching process.
- Graduate trainees will not be considered as part of this JRPT process. Trainees will continue to progress through the band under the conditions of Article 25, however placement of a trainee into a permanent position will be delayed to a date no sooner than the completion of the redeployment procedure as outlined in Item #3. It will be the responsibility of their home base to find them a permanent position once they complete their training.
- Employees on leave (excluding LTD) will be treated as though they were at work for the purposes of this process. Communications will be mailed to the employees’ address on record.

3. Redeployment Procedure
   a. The JRPT and JIT’s are established
   b. The JRPT and JIT’s are provided with joint training
   c. Management will provide details on the new organizational structure at a detail level that will indicate the classification, location, number of positions in the new organization.
   d. All employees will be required to submit a Fact Sheet and rank a list of irrevocable locations and job categories.
   e. The JRPT and JIT’s will operate the Redeployment Process Steps as outlined below.
   f. The JRPT will facilitate the operation of the Employee Alternatives as outlined below.
   g. The JRPT will provide a report for approval to the EVP, Business Transformation Project summarizing the outcome of the Redeployment Process.

4. Redeployment Process Steps

Steps 4.1 through 4.9 below will be carried out one band at a time, starting with MP-6 and continuing in descending order to MP-2. Appendix C illustrates the application of the steps for each band.

4.1 Determine Same Work Location Incumbents
   Management to prepare list of employees, list of positions, designate incumbents and review with Site JIT. The JIT will confirm incumbency. The JIT’s will consist of equal numbers of Society and Management
representatives and shall make decisions on consensus basis. The incumbency rules will be as follows:
- Equal Salary Band
- Similar Job Duties (Majority of duties and responsibilities that you were doing in your base position)
- Hours of Work (same)
- Work Location Unchanged

4.2 The JRPT will consolidate the lists from all JIT’s, resulting in an overall list of positions unfilled and employees who still require a placement.

4.3 Determine Volunteer Incumbents

Management will designate volunteer incumbents based upon location preference in their Fact Sheets and review with the appropriate Site JIT. The JIT will confirm volunteer incumbency. The volunteer incumbency rules will be as follows:
- Equal Salary Band
- Similar Job Duties (Majority of duties and responsibilities that you were doing in your base position)
- Hours of Work (same)
- Work Location indicated as preferred on their Fact Sheet.

4.4 Notify Incumbents/Non Incumbents (Appeal Process to JRPT after review by JIT)

The JRPT will confirm all incumbency decisions made by the JIT. The JRPT will review all issues brought to it by the JIT’s and make decisions with regard to who is an incumbent.

The incumbents and non-incumbents will be notified of their status. They must appeal within two business days. Appeals are based upon ensuring the job meets the definition of incumbency rules and to ensure suitability of the person for the duties and responsibilities.

An employee may appeal their status as a non-incumbent if they were subject to a management-initiated change in duties and responsibilities, including a transfer under the new staffing resourcing process. The resourcing process\(^2\) is the subject of a grievance which is currently at arbitration in the last 24 months and, as a result, their duties and responsibilities in their prior assignment were not considered. Any individual complaints/grievances on qualifications or reasonable offer challenges under item #7 will consider an employee’s duties and responsibilities over the past 24 months, unless those duties and responsibilities were changed in accordance with processes set out in Article 64 or 65, in which case only the employee’s base position will be considered.

\(^2\) The resourcing process is the subject of a grievance which is currently at arbitration
4.5 Matching non-incumbents to lateral Vacancy (Senior Qualified)
First Pass – Same Location
Matching rules:
- Work Location (same)
- Hours of work (same, then different)
- Qualified

Second Pass – Preferred Location
Matching rules:
- Work Location (Identified as preferred on their Fact Sheet)
- Hours of work (same, then different)
- Qualified

Work Unit Viability Check – All Locations

4.6 Matching non-incumbents to Demotion Vacancy (Senior Qualified)
Not applicable for placements to MP-6 positions
First Pass – Same Location
Matching rules:
- Work Location (same)
- Hours of work (same or more)
- Qualified

Second Pass – Preferred Location
Matching rules:
- Work Location (Identified as preferred on their Fact Sheet)
- Hours of work (same or more)
- Qualified

4.7 Force Lateral Vacancy Match (Senior Qualified)
Matching rules:
- Any Work Location
- Hours of work (same, then different)
- Qualified

4.8 Force Demotion Vacancy Match (Senior Qualified)
Matching rules:
- Any Work Location
- Hours of work (same or more)
- Qualified

Work Unit Viability Check – All Locations

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3 Not applicable for placements to MP-6 positions
4.9 Any remaining unfilled positions will be posted and filled on an expedited basis and will be available to unplaced Society Represented staff on a best qualified basis prior to filling from outside of the bargaining unit. Management reserves their right to not fill a position if there are no qualified Society represented applicants.

Repeat steps 4.1 through 4.9 for each band until all bands are complete.

4.10 Final Viability Check and Balance
The JRPT will agree on how to meet viability requirements and will act to do so. If a viability concern continues to exist after the Mix and Match process is complete, the JRPT will then attempt to address the concern using one or more of the following options prior to forced matches: call for specific volunteers; Corporate-wide vacancies; hiring externally; forced rotations and/or relief assignments in order to bridge for training; external contractors.

4.11 Issue Letters to Staff Identifying Placement
After the process is complete staff will be issued letters confirming their placement or alternatively their initial work assignment in the case of unplaced staff.

5. Employee Alternatives to Accepting a Placement
5.1 An employee who is matched or bridged to future workload and is placed at a new work location which qualifies them for relocation assistance under Article 52.2, and who Elects not to take the placement, may terminate with severance of 2 weeks per year of service to a maximum of 26 weeks. For clarity, to qualify for this provision the employee cannot have elected the location as preferred on their Fact Sheet.

5.2 Employees who qualify for relocation assistance under Article 52.2, may, within 12 weeks of reporting to the new work location, make an irrevocable election to forgo their entitlements under Part XI – Relocation Assistance and receive a travel reimbursement up to $350 per month commencing at the end of the 12 week period. The 12 week period will be paid in accordance with Article 52.3.3. Payment of the travel allowance will cease the earlier of two years from the date of first payment or upon the employee ceasing to be employed at the location. Employees exercising this option will submit travel expense claims and be reimbursed for mileage/out of pocket costs during this period up to the established limit of $350 per month for travel to their new work location. When an employee travels to a temporary work headquarters, the provisions of Article 55 “Compensation When Assigned to Temporary Work headquarters” apply.

5.3 Employees faced with circumstances preventing them from accepting a placement as confirmed by the JRPT may appeal the decision to the JRPT on the basis that the placement is unreasonable or there are compelling
personal circumstances. Where so agreed by the JRPT the following options are available:

5.3.1 Terminate with severance of 2 weeks per year of service to a maximum of 26 weeks
5.3.2 Substituted with a reasonable placement. For further clarity, such substitution may result in a placement being undone.
5.3.3 Unplaced employees will be provided meaningful work to bridge to future opportunities.

6. Income Protection
Where an employee is demoted, and their current rate is greater than or equal to the top step of the band they are demoted to, economic increases will continue to apply; in other words the employee will be green circled. Where an employee is demoted and their current rate is lower than the top step of the band they are demoted to, their step progression date will not be reset. No employee will be forced into a demotion greater than two salary bands below their current band.

An employee who has been matched through the operation of this LOU and whose position is subsequently downgraded within 18 months shall be subject to redeployment in any future JRPT at the previously pre matched level.

In the event that the employee is placed in a position with less hours of work Article 64.26 Reduction in Hours of Work will apply. There will be no demotions into positions that result in reduced hours of work.

7. Dispute Resolution
Where the JRPT reaches an impasse in the execution of this LOU the following shall apply:

7.1 The Vice-President of the Society Bargaining Unit and the Vice-President Employee and Labour Relations shall attempt to resolve the impasse;
7.2 Failing resolution per (7.1) above, and after giving 48 hours written notice of any issues it considers in dispute, either Party may refer these issues for final and binding resolution under Article 16.11.2 to Laura Trachuk, who shall rule within 24 hours of hearing, with written reasons to follow. The process will not continue until Arbitrator Trachuk rules;
7.3 The arbitrator shall have the powers of an arbitrator under the Labour Relations Act, with jurisdiction to determine procedure and make such orders as required to resolve disputed issues consistent with this LOU and the Collective Agreement.
7.4 Where there is an individual complaint/grievance on qualifications or reasonable offer challenges, they will be dealt with under Article 16.11.2. Arbitrator Laura Trachuk will hear all matters that proceed to arbitration under this provision. An individual complaint/grievance on qualifications or reasonable offer challenges under Article 16.11.2 will not prevent continuation of the placements under Item #4 even where there is a disagreement of the JRPT or JIT. However, if the Arbitrator rules in favour of the employee, the employee will be afforded the rights that he/she would have had under the process at the time the dispute arose.
8. Interaction with Coal Closure (LOU #166)
   a. LOU 166 is to be amended to:
      i. include any employee physically located at the station, regardless of reporting relationship during the application of the LOU;
      ii. include Lennox;
      iii. include Corporate vacancies for Corporate staff located at Thermal locations;
      iv. expire on completion of the closure of coal stations or March 31, 2015 whichever comes first.
   b. Any employee attached to Thunder Bay GS, Lennox GS, Nanticoke and Lambton who is placed in accordance with this LOU removing them from the application of LOU 166, will have the option of electing for a voluntary severance under LOU 166 rather than taking the placement.
   c. In the event Coal Closure LOU #166 is triggered while the steps as identified under Item #4 are not completed, the parties will agree on how to reconcile the processes.

9. Amended Units of Application
   At the expiry of this LOU, Article 64 shall be amended to reflect the Units of Application found at Appendix A (inclusive of the notes). Article 64.9.9 will be amended to include the language of Article 106.3 as found in the 2006-2010 Collective Agreement.

      Notwithstanding the above, all employees will be mapped by the JRPT into a revised Unit of Application found in Appendix A, based on their reporting relationship which will be identified on their placement letter.

      Employees who are unplaced will be mapped by the JRPT to a Unit of Application found at Appendix A. For clarity, the mapping will identify their Divisional Unit of Application as identified in the 64A column of Appendix A.

10. Employee data verification
    As soon as practical following signing of this letter of understanding, OPG will provide to the Society Local VP an electronic copy of the data described in this paragraph. The Society will have ten (10) business days to review and identify any errors or omissions on this list. OPG will make appropriate corrections to the list and then send an email to all Society-represented employees with a link to the seniority list which will be electronically posted on the Intranet. The posting will include employee number, name, base building code, base location, occupation code, job title, band and service recognition date (SRD). A form will be provided where employees may challenge the accuracy of their data within 2 weeks of posting. Management and the Society will triage and disposition challenges. The Dispute Resolution process per item 7 of this LOU may be invoked if required.
11. Kipling Move
Effective date of signing of this LOU any Society represented employees who were force relocated after June 1, 2012 to Kipling from 700 University will have Kipling treated as a temporary location until their placement is confirmed by the JRPT or June 1, 2013, whichever comes first.

12. Jurisdiction
OPG will pay the Society $25,000 and in exchange the Society agrees that all outstanding Management jurisdictional grievances/challenges that have been filed as of the date of signing this LOU are resolved. The Society agrees not to file any new Management jurisdictional grievances/challenges until the JRPT concludes. Upon the completion of the JRPT, the Society is free to file any jurisdictional grievances/challenges. Nothing in this paragraph prevents the Society from challenging the jurisdiction of any positions that were challenged prior to JRPT and where a basis for challenge remains after the JRPT concluded.

For positions excluded on numbers supervised and which do not have the required reports at the start of the JRPT, and are not expected to have the required reports at the end of the JRPT, those individuals/positions will be converted at the start of the JRPT to MP6 positions and OPG will pay dues for the period which they were improperly excluded from the Society’s jurisdiction.

13. Any Society represented positions not filled during the JRPT will be posted and filled after the JRPT as per Article 65.6.3 of the Collective Agreement.

14. Notwithstanding the expiry of this agreement a Standing JRPT will remain in place as long as there are staff resulting from this agreement who are still unplaced.

OPG wide vacancies for positions represented by the Society will be provided to the Standing JRPT prior to any posting. The Standing JRPT will determine if any unplaced staff are qualified for any vacant positions that become available and shall place them in the vacancies to which they are qualified. Promotions will not be considered for placement opportunities and will be posted and filled on a best qualified basis. Laterals or demotions placements will be on a qualified basis. Placements will be same location prior to different location and lateral prior to demotion.

Prior to invoking an Article 64A, any unplaced employees in that unit of application will be placed in an on-going position for which they are qualified, at their original band, hours of work, and work location.

Employee alternatives as outlined in item #5 will be available to unplaced staff who receive a placement under this item.

15. Schedule
The following schedule consists of milestones for the completion of the redeployment process. The parties will agree on target completion dates for each of the milestones below. It is recognized that any variables may affect the completion
dates and the team will amend the target dates where it considers it necessary. Failure to meet these target dates are not to be construed as justification for invoking the defaults under Part A of Article 64.

The parties will appoint members to the teams identified in Appendix B of this LOU, no later than 30 days following signing of the document. Either party reserves the right to amend the team members as required. The team members are to be appointed on the understanding that joint meetings varying from one to three days per week will be required. Meetings will commence as soon as practicable following the appointment of the team members. Team members are responsible for sending a delegate to meetings if they cannot attend. Delegates will have the same decision making authority as the Team Member.

The first team meeting will include all JRPT and JIT members. This session will be jointly conducted and will be used to ensure that all team members have a common understanding of the intent, language, and process of this LOU.

OPG will ensure that all Society team members will be released from their normal duties to carry out this role.

For illustrative purposes:

<table>
<thead>
<tr>
<th>ID</th>
<th>Task Name</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Activation of JRPT</td>
<td>1d</td>
</tr>
<tr>
<td>2</td>
<td>Information Review, Communication plan, logistics planning</td>
<td>15d</td>
</tr>
<tr>
<td>3</td>
<td>Employee Preferences Obtained</td>
<td>15d</td>
</tr>
<tr>
<td>4</td>
<td>MP-6 through MP-2 Process (As per item 4)</td>
<td>90d</td>
</tr>
<tr>
<td>5</td>
<td>Employee Alternatives (As per item 5)</td>
<td>15d</td>
</tr>
<tr>
<td>6</td>
<td>Final Report</td>
<td>5d</td>
</tr>
</tbody>
</table>

16. Accountabilities
Management will be responsible for:
- Developing job documents for the purposes of assessing qualifications.
- Assessing qualifications for given positions and determining who is qualified for a given position under consideration by the JRPT.
- Providing details on the new organizational structure at a detail level that will indicate the classification, location, number of positions in the new organization.
- Providing a listing of existing staff by category and location.
Providing an up-to-date employee database of staff represented by the Society.
Providing the qualifications and selection criteria for positions without incumbents.
Ensure all job documents for Society represented positions are accessible.

The Joint Redeployment Planning Team will:
- Manage the process.
- Ensure conformance with the process and deal with exceptional matters as they arise.
- Confirm the matching of employees to available positions.
- Communicate relevant information at appropriate milestones;
- Prepare a report describing the outcome of the mix and match process (Final Report).
- Prepare a list of the names of all employees and their respective placements.
- Resolve all reasonable offer disputes.

Joint Implementation Team (JIT)
- Apply the Redeployment Process Steps as outlined above and as directed by the JRPT.
- Each JIT has accountability for provision of information with respect to employees and positions at a designated site or sites if required by the JRPT.

Employees
- Are responsible for completing the required forms and submitting forms to the JRPT.

17. Definitions:

**Base Building Code:** the Ontario Power Generation Building code where the employee’s home base position is located.

**Base Location:** shall mean the work location as set out below, within which the Base Building Code is found.

**Work Unit Viability:** shall mean if the ability of the organizational unit to adequately perform its functions is placed in jeopardy by the application of seniority.

**Qualified:** shall mean having the qualifications and experience required to perform the job within a reasonable period of time, normally not to exceed six months.

**Work Locations for the purpose of incumbency determination are as follows:**
- Pickering as per Article 105.1
- Darlington as per Article 105.2
- Whitby as per Article 105.3
- Wesleyville as per Article 105.4
- Bruce Site
GTA (excluding 700 University)
Nanticoke
Lambton
Lennox
Head Office – 700 University
Thunder Bay
Atikokan
Niagara Plant Group
Northwest Plant Group
Northeast Plant Group
Central Plant Group
Saunders GS
Ottawa ST. Lawrence Plant Group (less Saunders)

At the expiry of this LOU, Article 64B shall be amended to reflect the above locations applied consistently across OPG.

**Preferred Location** is a location to which the employee has identified a willingness to move on their employee Fact Sheet.

**Joint Redeployment Team (JRPT)** The Joint Redeployment Team will be comprised of three members from each of Management and the Society.

**Joint Implementation Team (JIT)** The JIT’s will consist of equal numbers of Society and management representatives and shall make decisions on a consensus basis.

**Unreasonable Placement** The JRPT will consider compelling personal circumstances in determining whether the offer was reasonable or not. In the event that the JRPT cannot agree, the issue will be referred to the Arbitrator.

**Fact Sheet**: All employees will be required to submit a Fact Sheet and a list of irrevocable location and job preferences. The employee’s base location will always be considered a preferred location. Employees may identify and rank multiple locations as preferred. Employees will identify a preference for laterals to a different site or demotion at the same site. Employees may assign equal preference to multiple locations. Where a form is not received, the default will be that the employee has only one preferred location, their base location.

(Signed by Scott Martin, Vice President Employee and Labour Relations, on behalf of OPG, and Joe Fierro, Society Local Vice President, on behalf of the Society of Energy Professionals, dated December 8, 2012.)
## APPENDIX A: UNITS OF APPLICATION

<table>
<thead>
<tr>
<th>Surplus (Article 64A)</th>
<th>Non-Surplus (Article 64 B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Division</td>
<td>Business Unit</td>
</tr>
<tr>
<td>Finance ***</td>
<td>Finance</td>
</tr>
<tr>
<td>Business and Admin Services ***</td>
<td>Business and Admin Services</td>
</tr>
<tr>
<td>People and Culture ***</td>
<td>People and Culture</td>
</tr>
<tr>
<td>Balance of Corporate Functions*, ***</td>
<td>Balance of Corporate Functions</td>
</tr>
<tr>
<td>Pickering (per current includes Ajax and Toronto)</td>
<td></td>
</tr>
<tr>
<td>Darlington (per current includes Whitby, Oshawa and Wesleyville)</td>
<td>Nuclear*</td>
</tr>
<tr>
<td>Bruce Site</td>
<td></td>
</tr>
<tr>
<td>Hydro/Thermal</td>
<td>Hydro/Thermal</td>
</tr>
</tbody>
</table>

*Includes Commercial Operations and Environment, Corporate Business Development and CRO, Corporate Executive Operations, Strategic Initiatives, Corporate Stakeholder Relations, and Law Division

**Includes Commercial Operations and Environment, Corporate Business Development and CRO, Corporate Executive Operations, Strategic Initiatives, Corporate Stakeholder Relations, Law Division, People and Culture, Finance and BAS

*Includes Nuclear Projects and DNNP

***Any individual who was in the Pickering or Darlington Units of Application as of the date of signing this agreement and is assigned to one of the four Corporate units of application through the application of this LOU and is subsequently declared surplus in accordance with Article 64A shall be granted “Significant Inequity Rights” that apply beyond the “Business Unit” in accordance with Article 64.17.2.
APPENDIX B

JRPT  3 Members for each the Society and Management

JIT's  2 Members for each the Society and Management on each team

<table>
<thead>
<tr>
<th>JIT</th>
<th>Applicable Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Toronto (All Staff at 700 University and Kipling)</td>
</tr>
<tr>
<td>2</td>
<td>Pickering Headquarters and Whitby Headquarters</td>
</tr>
<tr>
<td>3</td>
<td>Darlington Headquarters, Wesleyville Headquarters and Bruce site</td>
</tr>
<tr>
<td>4</td>
<td>All Hydroelectric and Thermal Sites</td>
</tr>
</tbody>
</table>
# Appendix C – Redeployment Process Steps

<table>
<thead>
<tr>
<th>Positions in Play</th>
<th>Employees in Play</th>
<th>Step</th>
</tr>
</thead>
<tbody>
<tr>
<td>All MP-6</td>
<td>All MP-6</td>
<td>6.1) Incumbent Placement of employees at the same site (current incumbent rules)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.2) Consolidate the lists from all JIT’s, resulting in an overall list of positions unfilled and employees who still require a placement</td>
</tr>
<tr>
<td>Unfilled MP-6</td>
<td>Unplaced MP-6</td>
<td>6.3) Volunteer incumbency (current incumbent rules) only change is location and the employee had indicated a willingness to move to the new location</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.4) Expedited Incumbency challenges, and based on the outcome of the challenges finalize a consolidated listing of all placements, and a resulting list of unplaced staff and open positions</td>
</tr>
<tr>
<td>Unfilled MP-6</td>
<td>Unplaced MP-6</td>
<td>6.5) Lateral vacancy matches (senior qualified) to preferred locations</td>
</tr>
<tr>
<td>This step does not apply for placements to MP-6 positions</td>
<td></td>
<td>6.6) Demotion vacancy (senior qualified) matches to preferred location</td>
</tr>
<tr>
<td>Unfilled MP-6</td>
<td>Unplaced MP-6</td>
<td>6.7) Force lateral match (senior qualified) to non-preferred location</td>
</tr>
<tr>
<td>This step does not apply for placements to MP-6 positions</td>
<td></td>
<td>6.8) Force Demotion vacancy (senior qualified)</td>
</tr>
<tr>
<td>Unfilled MP-6</td>
<td>Unplaced MP-6 and all MP-5 through MP-2</td>
<td>6.9) Expedited Posting (best qualified) any Unfilled MP-6 Positions</td>
</tr>
<tr>
<td>All MP-5</td>
<td>All MP-5</td>
<td>5.1) Incumbent Placement of employees at the same site (current incumbent rules)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.2) Consolidate the lists from all JIT’s, resulting in an overall list of positions unfilled and employees who still require a placement</td>
</tr>
<tr>
<td>Unfilled MP-5</td>
<td>Unplaced MP-5</td>
<td>5.3) Volunteer incumbency (current incumbent rules) only change is location and the employee had indicated a willingness to move to the new location</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.4) Expedited Incumbency challenges, and based on the outcome of the challenges finalize a consolidated listing of all placements, and a resulting list of unplaced staff and open positions</td>
</tr>
<tr>
<td>Unfilled MP-5</td>
<td>Unplaced MP-5</td>
<td>5.5) Lateral vacancy matches (senior qualified) to preferred locations</td>
</tr>
<tr>
<td>Unfilled MP-5</td>
<td>Unplaced MP-6</td>
<td>5.6) Demotion vacancy (senior qualified) matches to preferred location</td>
</tr>
<tr>
<td>Unfilled MP-5</td>
<td>Unplaced MP-5</td>
<td>5.7) Force lateral match (senior qualified) to non-preferred location</td>
</tr>
<tr>
<td>Unfilled MP-5</td>
<td>Unplaced MP-6</td>
<td>5.8) Force Demotion vacancy (senior qualified)</td>
</tr>
<tr>
<td>Unfilled MP-5</td>
<td>Unplaced MP-6 and MP-5, and all MP-4 through MP-2</td>
<td>5.9) Expedited Posting (best qualified) any Unfilled MP-5 Positions</td>
</tr>
</tbody>
</table>

| All MP-4 | All MP-4 | 4.1) Incumbent Placement of employees at the same site (current incumbent rules) |
| Unfilled MP-4 | Unplaced MP-4 | 4.2) Consolidate the lists from all JIT’s, resulting in an overall list of positions unfilled and employees who still require a placement |
| Unfilled MP-4 | Unplaced MP-4 | 4.3) Volunteer incumbency (current incumbent rules) only change is location and the employee had indicated a willingness to move to the new location |
| Unfilled MP-4 | Unplaced MP-4 | 4.4) Expedited Incumbency challenges, and based on the outcome of the challenges finalize a consolidated listing of all placements, and a resulting list of unplaced staff and open positions |
| Unfilled MP-4 | Unplaced MP-4 | 4.5) Lateral vacancy matches (senior qualified) to preferred locations |
| Unfilled MP-4 | Unplaced MP-6 and Unplaced MP-5 | 4.6) Demotion vacancy (senior qualified) matches to preferred location |
| Unfilled MP-4 | Unplaced MP-4 | 4.7) Force lateral match (senior qualified) to non-preferred location |
| Unfilled MP-4 | Unplaced MP-6 and Unplaced MP-5 | 4.8) Force Demotion vacancy (senior qualified) |
| Unfilled MP-4 | Unplaced MP-6, MP-5 and MP-4, and all MP-3, MP-2 | 4.9) Expedited Posting (best qualified) any Unfilled MP-4 Positions |

| All MP-3 | All MP-3 | 3.1) Incumbent Placement of employees at the same site (current incumbent rules) |
| Unfilled MP-3 | Unplaced MP-3 | 3.2) Consolidate the lists from all JIT’s, resulting in an overall list of positions unfilled and employees who still require a placement |
| Unfilled MP-3 | Unplaced MP-3 | 3.3) Volunteer incumbency (current incumbent rules) only change is location and the employee had indicated a willingness to move to the new location |
| Unfilled MP-3 | Unplaced MP-3 | 3.4) Expedited Incumbency challenges, and based on the outcome of the challenges finalize a consolidated
| Unfilled MP-3 | Unplaced MP-3 | 3.5) Lateral vacancy matches (senior qualified) to preferred locations |
| Unfilled MP-3 | Unplaced MP-5 and MP-4 | 3.6) Demotion vacancy (senior qualified) matches to preferred location |
| Unfilled MP-3 | Unplaced MP-3 | 3.7) Force lateral match (senior qualified) to non-preferred location |
| Unfilled MP-3 | Unplaced MP-5 and MP-4 | 3.8) Force Demotion vacancy (senior qualified) |
| Unfilled MP-3 | Unplaced MP-6, MP-5, MP-4 and MP-3 | 3.9) Expedited Posting (best qualified) any Unfilled MP-3 Positions |
| And all MP-2 | | |

| All MP-2 | All MP-2 | 2.1) Incumbent Placement of employees at the same site (current incumbent rules) |
| | | 2.2) Consolidate the lists from all JIT’s, resulting in an overall list of positions unfilled and employees who still require a placement |
| Unfilled MP-2 | Unplaced MP-2 | 2.3) Volunteer incumbency (current incumbent rules) only change is location and the employee had indicated a willingness to move to the new location |
| | | 2.4) Expedited Incumbency challenges, and based on the outcome of the challenges finalize a consolidated listing of all placements, and a resulting list of unplaced staff and open positions |
| Unfilled MP-2 | Unplaced MP-2 | 2.5) Lateral vacancy matches (senior qualified) to preferred locations |
| Unfilled MP-2 | All Unplaced MP-4 and MP-3 | 2.6) Demotion vacancy (senior qualified) matches to preferred location |
| Unfilled MP-2 | Unplaced MP-2 | 2.7) Force lateral match (senior qualified) to non-preferred location |
| Unfilled MP-2 | All Unplaced MP-4 and MP-3 | 2.8) Force Demotion vacancy (senior qualified) |
| Unfilled MP-2 | All Unplaced | 2.9) Expedited Posting (best qualified) any Unfilled MP-2 Positions |
Memorandum of Agreement

Between

Ontario Power Generation Inc.

-and-

The Society of Energy Professionals

OPGI and the Society agree to the following Memorandum of Agreement subject to ratification by their respective principals.

Unless otherwise noted, all amendments are in effect on January 1, 2016.

For the Company

Dave Milton
Vice President, Health, Safety, Employee & Labour Relations, OPG

For the Society

Joe Fierro
Society Vice President – OPG Local

Date

Oct 16/15

It is jointly agreed that the Collective Agreement covering the period of January 1, 2013 – December 31, 2015 will be amended as follows. All changes will be effective January 1, 2016 unless otherwise dated. The parties herein agree that the terms of the Collective Agreement shall be from January 1, 2016 to December 31, 2018.
1. Term of Agreement

3 year agreement: January 1, 2016 – December 31, 2018

The IPO Share Performance Bonus Plan agreement will form a Letter of Understanding (LOU) between OPG and the Society that will take effect immediately upon ratification by both parties on any tentative agreement that arises from early bargaining.

2. Compensation

Effective January 1, 2016 – 1.0% general wage increase to all Society employees

Effective January 1, 2017 – 1.0% general wage increase to all Society employees

Effective January 1, 2018 – 1.0% general wage increase to all Society employees

Suspend the escalator clause (Article 24) for the term of the Collective Agreement (January 1, 2016 – December 31, 2018)

3. Pension and Benefit Changes

a. OPG – All Plan Members

Effective March 31, 2025 for future service benefit accruals for current employees and new hires:

1. Adjust the number of years for final average earnings to highest 5 years from 3 years

2. Early retirement rule of 85 (from rule of 82)

The above change will be incorporated into the 2016-2018 Collective Agreement, pension brochure and will require a pension amendment

Explanatory Note on Pension Changes – OPG All Plan Members

Rule of 85

- The 85-point rule would become effective for future service beginning March 31, 2025
- Members with 82 or more points on March 31, 2025 would retain eligibility for an unreduced pension for all service
- For all other members with service prior to March 31, 2025, pension benefits earned for service prior to March 31, 2025 would remain subject to the 82-point rule for an unreduced pension
• For members in this category retiring on or after their 82-point date but before their 85-point date, pension benefits for service from March 31, 2025 will be subject to the plan’s early retirement reductions which would be extended below age 55 for this purpose.

• For members with 20 or more years of pre-March 31, 2025 service, the early retirement reduction would be 3% per year from the 85-point date.

• For members with less than 20 years of pre-March 31, 2025 service, the regular early retirement reductions would apply, including extending those reductions below age 55 for this purpose.

Final Average Earnings

• Pension benefits earned for future service beginning March 31, 2025 would be based on a high five-year average instead of a high three-year average; the high three-year average would continue to apply to pension benefits earned for service prior to March 31, 2025.

4. Contribution Increases

Employee pension contributions, effective January 1, 2016 – increase by 1.0%

Employee pension contributions, effective January 1, 2017 – increase by 1.0%

For clarity, the ultimate contribution rate will be 9.0% of salary.

Employer current service contributions will not be less than employee contributions for the period up to March 31, 2025.

5. Employee Lump Sum Payments and Shares

OPG – All Plan Members

Lump Sum Payments

Society-represented employees contributing to the Pension Plan as of January 1, 2016 will receive the following:

--Lump sum payment of 1.0% of salary as of January 1, 2016 provided the individual is still an employee of OPG as of January 1, 2016 and contributing to the Pension Plan

--Lump sum payment of 2.0% of salary as of January 1, 2017 provided the individual is still an employee of OPG as of January 1, 2017 and contributing to the Pension Plan
Share Performance Bonus Plan

Society-represented employees contributing to the Pension Plan as of January 1, 2016 will participate in a Share Performance Plan related to the Hydro One IPO, as follows:

--Share awards will be made on January 1st of each year starting January 1, 2018 and continuing up to and including January 1, 2032 (i.e., maximum of 15 share awards) provided the individual is still an active employee of OPG as of the award date and has less than 35 years of pensionable service, with the number of shares awarded to each individual each year calculated as 2.0% of Salary as of Jan 1, 2016/Initial Share..

-- Value of share award at each award date will equal number of shares awarded x Hydro One share price at date of award

-- Share award will be made in Hydro One shares with employee having option to take 50% of award in cash to pay the taxes since the value of the share award is a taxable event. As per current tax rules, the employee may direct the payment of shares into an RRSP, providing the employee has room within their contribution limits.

Example – if an employee has a salary on January 1, 2016 of $100,000, and the initial share price is $20.00, the employee will get a share award of 100 shares each year (2.0% x $100,000/$20.00). If the share price is $30.00 at the time of the award, the share award value will be 100 shares x $30.00 per share or $3,000.00.

6. Default

In the event that the Hydro One IPO does not occur by March 31, 2016, the following shall apply:

• 1 year term – January 1, 2016 to December 31, 2016
• 1.0% economic increase on January 1, 2016
• Pension Contributions to increase by 1.0% effective January 1, 2016
• Cash lump sum of 1.0% to be paid January 2016
• All other terms in the MOA continue as agreed, except for the below which will be struck from the one (1) year default agreement:
  • The year 2 and 3 economic increases
  • The year 2 employee pension contribution changes
  • The year 2 lump sum payment
  • The year 3 to 18 (max 15) share grants
  • The pension Benefit changes planned to take effect March 31, 2025 (Rule of 85 & High 5)
7. Article 16 – Complaint and Grievance/Arbitration Procedure

Amend language as follows:

16.6 Step 2: Meetings of the Joint Grievance Resolution Committee

a) The Society may file an employee grievance at Step 2, within ten (10) working days of the Step 1 meeting. A Policy grievance shall be initiated at Step 2. A grievance must be filed by letter from a Vice-President of The Society, or designate, to a management designate. This letter will outline the grievance and proposed resolution. Management will keep The Society apprised at all times as to the management designates for the purposes of receiving Step 2 letters.

b) Prior to 2nd Step the Parties will use their best efforts to identify the issue(s), the basis of the grievance and areas of agreement and disagreement. Three weeks prior to each Step 2 meeting, the Society shall provide OPG with a list of grievances to be heard. Two weeks prior to each Step 2 meeting, the Society shall provide OPG with a copy of their brief outlining the issues, providing the facts and information relevant to the grievance, and containing proposals for settlement of the grievances scheduled for the meeting. One week prior to the Step 2 meeting, OPG shall provide a response brief to the Society.

c) The parties will form a standing Joint Grievance Resolution Committee (JGRC) that will meet on a pre-booked, bi-monthly basis.

d) The JGRC process will be as follows:

i. The JGRC shall be comprised of the appropriate level of affected Line Management, Labour Relations, Human Resources, the filing Society Unit Director and a Society Staff Officer.

ii. The parties may agree to additional attendees but will try to minimize the number of people in attendance in order to encourage focused settlement discussions.

iii. The Line Management and Society Unit Director will have the appropriate authority to settle the case.

iv. The Society and Management will each present their case and discuss questions, options and possible resolutions.
v. This process should have the flexibility to respond to the advantages gained through a problem-solving approach to dispute resolution.

vi. The Grievance may be settled, withdrawn, referred to mediation and/or arbitration hearing. The Parties may agree to any other resolution.

e) A Step 2 grievance may be resolved by written agreement of the JGRC. Such resolution shall be final and binding on the Parties. Nevertheless, if resolution is not achieved before the date of the next Step 3A meeting, the grievance will be automatically referred to arbitration.

Amend language as follows:

16.10 Mediators/Arbitrators

The following are agreed to arbitrators under Article 16. With mutual agreement the parties may use other arbitrators who are not found on these lists:

<table>
<thead>
<tr>
<th>Expedited Arbitration</th>
<th>Regular Arbitration</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Jules Bloch</td>
<td>- Ken Swan</td>
</tr>
<tr>
<td>William Kaplan</td>
<td>Louisa Davie</td>
</tr>
<tr>
<td>- Laura Trachuk</td>
<td>- Jane Devlin</td>
</tr>
<tr>
<td>- Kevin Burkett</td>
<td>- Laura Trachuk</td>
</tr>
<tr>
<td>- Larry Steinberg</td>
<td>- Kevin Burkett</td>
</tr>
<tr>
<td>- Susan Stewart</td>
<td>- George Surdykowski</td>
</tr>
<tr>
<td></td>
<td>- Rob Herman</td>
</tr>
<tr>
<td></td>
<td>- Larry Steinberg</td>
</tr>
<tr>
<td></td>
<td>- Susan Stewart</td>
</tr>
</tbody>
</table>

8. Article 37 – Release of Society Representatives

Amend the language as follows:

37.2.2 In the expectation that the joint problem solving approach based on the JSMC principles outlined in Article 1.2 will be mutually beneficial to the relationship between OPG and The Society, Management agrees to continue its practice of maintaining base salaries for Society representatives involved in all joint processes including arbitration.
9. Article 38 – Vacations

Add the following language to article 38.16:

38.16.4 An employee who becomes ill while on vacation shall not be placed on sick leave until after termination of the vacation. Under exceptional circumstances in case of very serious illness, sick leave may be granted at the discretion of the Chief Physician/Manager Health Services. The employee would then be entitled to the unused portion of his/her vacation after recovery from the illness.

Minor illnesses and injuries may cause some degree of discomfort or disability to an employee while on vacation. Yet for the most part, these do not necessitate complete removal from the vacation setting or loss of the beneficial effects of the holiday. However, when an employee on vacation becomes seriously ill or injured and as a result must be removed from vacation setting entirely, he or she should be entitled to sick leave.

The decision as to when an illness or non-occupational injury is sufficiently severe to justify transfer from vacation to sick leave should be made on medical grounds and rests with the Health and Safety Division. Normally hospitalization or complete confinement to bed in the home under regular physician's care have been the criteria used to judge severity, often after consultation with the attending doctor. "Exceptional circumstances" may include a number of things such as hospitalization, the need to be flown home from a trip abroad, becoming seriously ill on the first day of vacation, etc.

The decision to transfer from vacation to sick leave must be based on reliable medical evidence and made by a physician in the Health and Safety Division. All cases of requests for such consideration should be referred to the Health and Safety Division without exception.

10. Article 42 – Sick Leave Plan for Employees Hired Prior to January 1, 2001 or Covered by the Transition Provisions in Article 9.3 of the 2006-2010 Collective Agreement

The parties agree that the settlement “Re: Resolution of OPGI-2014-2839 (OPG #2026)” has been fully resolved with the following language change. The parties also agree to settle grievance #OPGN-2013-6106 (OPG #1854) on a with prejudice basis based on the following language change.

Amend language as follows:

42.1 The Sick Leave Plan provides for maintenance of an employee's income when he/she is absent from work due to illness or non-occupational injury.
42.2 Employees are granted 23 days of sick leave a year - eight (8) days at full pay and 15 days at three-quarter pay. These grants accumulate continuously each year if not used, up to a maximum of 200 days at three-quarter pay and no limit to the number of days at full pay.

42.3 In the year in which an employee completes six years of service, all sick leave used in the first year of service will be restored. In the 7th year of service, all sick leave used in the 2nd year of service will be restored. This will continue until the employee has completed 14 years of service. In the 15 year of service, all sick leave used in the 10th through to the 13th years of service will be restored. In every year after 15 years of service, sick leave credits will be restored in the year following the year in which they were used. There will be no payout of unused sick leave credits when an employee leaves the service of OPG.

For ease of reference, the schedule for restoration of sick leave is set out in the below table:

At 6 years, restore sick credits taken in year 1
At 7 years, restore sick credits taken in year 2
At 8 years, restore sick credits taken in year 3
At 9 years, restore sick credits taken in year 4
......
At 15 years, restore sick credits taken in year 10-13
At 16 years, restore sick credits taken in year 14
At 17 years, restore sick credits taken in year 15
At 18 years, restore sick credits used in year 16

Employees who have been approved for LTD (Article 43) shall be entitled to receive one re-accumulation prior to receiving LTD benefits. When an employee returns from any approved LTD they shall re-accumulate their sick leave in the normal fashion, including any restoration they did not receive while on LTD benefits.

....

42.6 The accumulation/restoration of sick leave will take place during the first payroll week of January for those employees with an ECD between January 1 and June 30, or, during the first week of July for those employees with an ECD between July 1 and December 31.
11. Article 42A – Sick Leave Plan (For Employees Hired on or After January 1, 2001)

Amend language as follows:

42A.1 The Company’s Sick Leave Plan will provide probationary and regular employees with substantial income protection regardless of their seniority. Probationary and Regular Employees will accumulate 8 sick leave credits (a credit equals 8 hours, 7.5 or 7 hours, whichever applies to the employee) per year of service at 100% of the employee’s base pay. **Accumulation of sick leave will take place during the first payroll week of January for those employees with an ECD between January 1 and June 30, or, during the first week of July for those employees with an ECD between July 1 and December 31.**

....

42A.5 Employees will be required to submit all Major Medical Absence forms required by management through their personal physician. The Company will compensate the employee for the cost associated with completion of these forms up to a maximum of $30.00. It is the responsibility of the employee to ensure that the employer receives these forms within a reasonable period of time. If there is an issue with the receipt of this form, the supervisor will contact the employee's Society delegate and the delegate will work with the employee to provide the documentation as soon as possible. If the Major Medical Absence form is still not forthcoming, then the supervisor may discontinue the sick leave entitlement until the form is received.

Employees will be reimbursed for any additional doctor's notes required by OPG.

12. Article 57 – Overtime

Amend language as follows:

The following provisions shall apply to employees when assigned to work overtime.

57.1 The method of compensation, for authorized overtime, may be money or time off at the appropriate premium rate. If the employee elects for time off, the time for such time off will be subject to their supervisor's approval, which will be granted unless OPG's operational needs are such as to make the time off unreasonably difficult. If approval is not granted, the method of compensation will be money.
### 57.2 Day Workers

<table>
<thead>
<tr>
<th>Overtime Worked</th>
<th>Overtime Hours</th>
<th>Rate of Payment</th>
</tr>
</thead>
</table>
| Monday to Friday   | Authorized overtime beyond normal scheduled hours worked in the day | a) Time and one half (T-1/2) for all overtime work performed during the first four clock hours after normal quitting time.  
b) Two times (2T) for all overtime work performed outside the first four clock hours. |
| Saturday           | Authorized overtime                                  | Two times (2T)                                                                  |
| Sunday             | Authorized overtime                                  | Two times (2T)                                                                  |
| Granted Days       | Authorized overtime                                  | Two times (2T)                                                                  |
| Statutory Holiday  | Authorized overtime                                  | Monday to Friday: Two times (2T) for all unscheduled hours plus a Statutory Holiday credit.  
Saturday: Two times (2T) for all unscheduled hours worked. |
### 57.3 Shift Workers

<table>
<thead>
<tr>
<th>Overtime Worked</th>
<th>Overtime Hours</th>
<th>Rate of Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheduled Work Days</td>
<td>Authorized overtime beyond normal scheduled hours worked in the day.</td>
<td>Monday to Friday:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a) Time and one half (T-1/2) for all overtime work performed during the first four clock hours after normal quitting time.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Two times (2T) for all overtime work performed outside the first four clock hours.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Saturdays, Sundays and Statutory Holidays:</strong> Two times (2T)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Granted Days: Two times (2T)</td>
</tr>
<tr>
<td>Scheduled Days Off</td>
<td>Authorized overtime on a normally scheduled day off.</td>
<td>Monday to <strong>Sunday:</strong> Two times (2T).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Statutory Holidays: Two times (2T) plus a Statutory Holiday credit for hours worked up to normal hours for the day.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Granted Days: Two times (2T)</td>
</tr>
</tbody>
</table>

Amend language as follows:

59.3 Shift Allowances (M&P, TMS/TS)

b) Shift Differentials

- For work on an 8-hour afternoon shift (1600 - 2400 hours) – $0.88 per hour worked
- For work on an 8-hour night shift (0000 - 0800 hours) - $1.21 per hour worked
- For work on a 12-hour night shift only $1.38 per hour worked.
- For work on a 10 hour night shift only - $0.88 per hour worked

59.5 Ten Hour Shifts

b) Shift Differential

- First shift – 06:00 – 18:00 hours - no shift differential
- Second shift – 14:00 – 02:00 hours – $0.88 differential per hour worked

61.2 Shift Differential

A shift differential of $1.38 per hour worked will be paid to 12-hour shift employees for each night shift hour worked, in accordance with Article 59.3 ("Shift Work (M&P, TMS/TS)").

LOU #182 Re: Compensation & Working Conditions - 12-Hour Shift Schedule

3. Shift Differential

A shift differential of $1.21 per hour worked will be paid to 12-hour shift employees for each night shift hour worked, in accordance with Article 59.3 ("Shift Work (M&P, TMS/TS)").
14. Article 55.5 – Compensation for Daily Commuting To, and From, Temporary Work Headquarters

Add the following language:

c) When an employee is commuting to a TWHQ without an overnight stay, which is greater than 50 kms one way (incremental), from their normal WHQ, they will be reimbursed for reasonable out of pocket meal expenses(s) per the meals section of the current OPG Business Travel & Expense Policy for each day they are required to travel.

15. LOU #174 (Band N)

Amend language as follows:

8.4 The parties agree that this LOU will be effective upon the date of signing except where noted otherwise. This agreement will operate until December 31, 2018 and shall continue thereafter subject to ninety (90) days cancellation by either party.

16. LOU #189 (ESA Averaging Hours of Work Approval)

Amend language as follows:

2. This letter of understanding will come into effect April 1, 2011 and shall form part of the collective agreement between the parties and shall continue in effect until March 31, 2019.
17. New LOU #193 – Re: Article 67 Purchased Services Agreement

Amend Article 67 as result of LOU# 193 to read:

Except as indicated by Letter of Understanding (LOU) 193, Article 67-is suspended for the term of LOU 193. Purchased Services for this term are governed by LOU 193.

New PSA LOU language:

LETTER OF UNDERSTANDING
Re: Article 67 Purchased Services Agreement

For the term of this Letter of Understanding the PSA (Article 67) is suspended, subject to the exceptions set out in this LOU.

SECTION A

1. Without prejudice or precedent, for the purpose of this agreement only, “Nuclear base work” shall be defined as OM&A work of an on going nature typically executed by Society-represented staff. This work would include, but not be limited to, items such as stress analysis, preparing bills of materials, equipment performance monitoring, addressing outage and non outage AAA holds or elimination of backlogs. It does not include OM&A or capital modification projects.

2. For the purposes of this agreement, “Augmented Staff” shall be defined as staff hired either directly by OPG, or through a managed task contract, that perform work regularly performed by Society-represented employees and are taking work direction from OPG.

3. The Parties agree that there shall be three PSA Envelopes for OPG as a Company in the total amount of 165 Million dollars for each year of this Agreement.
   • A maximum 17 Million dollar envelope can be used for base work in Nuclear.
   • A maximum 4 Million dollar envelope can be used for base work in Corporate.
   • The remaining 144 Million dollar envelope is for OM&A projects, non-standard projects, capital projects, provisional projects and non-nuclear base work (excluding Corporate base work).

4. For the purposes of calculating dollar amounts for work done within each envelope the parties will use the following percentages:
   • Any line item in the data extract that is for construction/trades work will automatically have the Society percent for that item set at 4%.
   • Any line item in the data extract that is for Engineering work will automatically have the Society percent for that item set at 73%.
   • Augmented staff will automatically have the Society percent for that item set at 100% unless it is agreed to by the parties to be considered 100% PWU or 100% management work. The 100% allocation does not apply to contractors hired through a managed task contract. Percentages for contractors hired through a managed task contract will be determined by the local PSA contacts.
   • All work that is not captured by the above will be dealt with and agreed to by the local PSA contacts.
5. Any amounts in excess of the 144 Million dollar envelope up to 164 Million dollars shall attract a 0.5% payment to The Society. Any amounts above 164 Million dollars shall attract a payment of 1% to the Society.

6. Any amounts in excess of the 17 Million dollar base work envelope for Nuclear or in excess of the 4 Million dollar base work envelope for Corporate shall attract a 1% payment to the Society.

7. The parties agree that any amounts in a PSA envelope in any given year cannot be reallocated to any other year or any other envelope.

8. The parties shall form an OPG PSA Review Committee that will be a subcommittee of the Joint Society Management Committee (JSMC). The main discussions regarding PSA will take place at the OPG PSA Review Committee. Ad hoc local discussions may take place for clarification purposes. The Committee will be comprised of one OPG Management and one Society representative from each of the following business units: Thermal, Hydro, Corporate, and Nuclear. Additional resources can be added as required by the Committee.

9. The OPG PSA Review Committee will meet during the term of this agreement on a quarterly basis where Management will present the following:
   • Society actual and planned staffing levels; including Regular, Temporary and Augmented Staff
   • A report on the status of the Envelopes in sufficient detail to identify the information currently included in the 2015 Report which is provided by Nuclear (to be provided 10 working days in advance of the quarterly meeting)
   • The approved business plans for each year of this agreement (to occur in Q1)
   • The PSA plan for the current year (to occur in Q2)
   • Any payment amounts required for envelope exceedance will be finalized at the Q2 meeting of the following year, for each year of this agreement

10. Society designated representatives shall be granted system access using customized PSA reports to view purchase orders that are included and excluded on the report and will be provided appropriate training.

11. The Parties agree that in the event work performed by Society-represented employees is removed from the existing service provider, as provided for in the 2015 Information Technology Service Agreement (ITSA), and transferred to another service provider, base work as currently performed (not project work) shall not be dealt with under the envelopes available under Part A of this LOU. OPG shall process any PSA relating to such work pursuant to Article 67. The Information Technology organization at OPG has full access to Parts B and C of this LOU.

12. Any disputes that cannot be resolved at the local level will be escalated to the OPG PSA Review Committee for resolution. Any items not resolved at the OPG PSA Review Committee will be resolved through arbitration by Jules Bloch. The process for arbitration will be as follows: items in dispute will be grouped in batches of up to 10. Each party will prepare a short brief for each of the ten items. Arbitrator Bloch will issue a ruling based on his review of the briefs and limited oral argument at a hearing.

13. OPG agrees to pay the Society the sum of $1.25M per year of this agreement. In lieu of this payment, OPG agrees to provide the benefit improvements detailed in Section “E” of this agreement.

SECTION B

PSA’s representing major, multi year projects such as, but not limited to, New Business Development, New Build, Biomass/Gas Conversion, Lower Mattagami Project, Darlington Refurbishment, etc. shall be dealt with in the following manner:
i. The existing PSA Agreements for the Darlington Refurbishment Project and the Lower Mattagami Projects are not part of this PSA Agreement and their existing PSA agreements will continue to be in effect until they expire or the projects are completed.

ii. The Parties will meet to determine the amount and type of work involved in the Project that would normally be performed by Society represented employees.

iii. OPG shall meet with The Society to discuss the hiring of additional "regular" or temporary staff and/or deployment of existing staff to assist on the project, respecting all of the requirements of the applicable provisions of the Collective Agreement.

iv. Discussions with respect to (ii) and (iii) above will be concluded within 30 days of notice from the Company to the Society, unless there is mutual agreement to extend the discussions. The Company shall provide The Society with at least 10 working days notice of such a meeting and such notice shall include reasonably adequate and relevant information for the Society to prepare for the meeting.

v. If the parties reach an agreement on the requirements of (ii) and (iii) above, the Society will be paid an amount of money which is equal to 0.5% of the total amount of work normally performed by Society represented staff based upon the initial contract estimate. This payment will be divided annually over the life of the contract commencing in the year the contract begins.

vi. If there is no agreement under (ii) and (iii) above then the matter will be processed pursuant to Article 67 which will then be active for that particular project/contract.

vii. For those projects contracted out under this process (Section B of this LOU), OPG agrees to meet with the Society on a regular basis to keep them apprised of the status of the Projects. Material changes with respect to contracted out work normally performed by Society represented employees will require recalculation of the payment amount and payment schedule.

SECTION C

Exclusions from the PSA Envelope

The following work is excluded from the envelope in Section A and in the calculation of Society represented work in Section B, above:

1. Work performed under a manufacturer's warranty
2. Any arms length or proprietary work required to be performed
3. Where a service is obtained for OPG from a business which has Society represented employees who are providing the service.

• For the purposes of this LOU, "Arms Length" shall be defined as work that must be performed by a 3rd party as a condition of ISO certification, regulatory or statutory compliance. It is understood that there are circumstances that could arise wherein OPG may seek Society concurrence for additional exclusions for work performed by a third party. These issues will be advanced to the OPG PSA Review Committee for discussion.

• For the purposes of this LOU, "Proprietary" shall be defined as work that only a vendor or their licensee can perform on a system since no one else is allowed to work on it as the vendor either built it or retains sole rights to do repairs or work on it after it is purchased.

All items meeting these exclusions will be included on the report with an explanation of the exclusion.
SECTION D

Staffing

1. During the term of this Agreement there shall be no involuntary layoff of any Society represented employees as a result of contracting out.

2. Over the term of this Agreement, OPG agrees to hire a total of 300 regular Society represented employees from outside of the Society bargaining unit. This will be tracked by providing the Society LVP a quarterly list of all new employee names hired for that quarter and life-to-date as part of the 300, including position number, that enter the Society bargaining unit. All new employee names after October 1, 2015 will count towards the 300 requirement. Any management employees who are converted to Society-represented employees as a result of any settlements or arbitrations will not count towards the 300 hiring requirement. For clarity, only OPG PWU and management regular employees who are selected and become Society-represented employees through a position which was posted internally and filled, or if a non-OPG employee applies and is selected and becomes a Society-represented employee through a position which was externally posted and filled, then the person shall be treated as a hire for the purpose of achieving the 300 requirement.

SECTION E

Benefit Improvements

1. Benefit improvements will be made and shall continue for the term of this Agreement in the following areas:
   
a). OPG will find an Insurance Carrier to provide Group Out of Country coverage. The Company will pay up to $76 per year for the cost of Family Coverage for Regular employees and $35 per year towards coverage for retirees who choose to participate. This benefit improvement will exist for a period of three years from the expiry date of the benefit provision at Section E.1 (a) of LOU# 188.

   b). Dispensing Fees coverage shall be increased from $5.00 to $12.00.

It is understood that these benefits shall cease at the end of this Agreement unless the parties expressly negotiate their continuation. It is also understood that in the event this Agreement ceases to exist, the Dispensing Fee shall revert back to $5.00 as it existed prior to the signing of this LOU.

The parties agree that any disputes arising from the implementation, administration or interpretation of this agreement are subject to the grievance process, with the exception of specifically negotiated provisions contained within this agreement that default to the Article 67 dispute resolution process.

This agreement shall expire on December 31, 2018 unless there is an agreement by the Parties to renew this agreement for the business planning year 2019 by September 30, 2018. In the event that there is no agreement to renew, Article 67 shall apply to any work to be contracted out in 2019. The parties agree to have an interest based mediation/arbitration with Arbitrator Stout on Feb 24 and 25, 2016 in order to determine whether or not Article 67 must apply to work that is being performed in 2019 or beyond, pursuant to a contract issued prior to January 1st 2019.

- Not to be reproduced in the Collective Agreement
- The parties agree to have meaningful discussions regarding the establishment of a Pickering End of Commercial Operations, establishment of a Society Career Hall, and Staff Planning


- Not to be reproduced in the Collective Agreement
- Notwithstanding the dates identified in the VRA and related provisions in the Collective Agreement and associated documents, the Parties agree to extend med/arb provision for 3 years (from Jan 1, 2017 to Jan 1, 2020) (i.e. no party can give notice prior to January 2, 2020)

20. Side Letter – Pension Benefit Change Explanation to Examples

- Not to be reproduced in the Collective Agreement
- Examples to be clarified by OPG actuary and agreed to by Society actuary. If unable to reach agreement, the matter will be referred to arbitration pursuant to Article 16 of the collective agreement.
- The examples are as follows:

1. A Society-represented employee who reaches the 82-point rule on March 17, 2025 can retire anytime after that date with unreduced pension benefits for all service.

2. An employee who is age 50 with 25 years of Credited Service on March 31, 2025 will have 75 points on that date. This member may retire on September 30, 2028 at age 53 years and six months and with 28 years and six months of Credited Service having attained 82 points on that date. The member’s pension with respect to his Credited Service accrued prior to March 31, 2025 (i.e. based on 25 years of Credited Service and high 3-year Average Earnings) will be unreduced and the Member’s pension with respect to his Credited Service accrued after March 31, 2025 (i.e. 3.5 years) will be determined using high 5-year Average Earnings and be reduced based on the 85 point rule. The reduction for retiring with only the 82 point rule being obtained after March 31, 2025 and not reaching the 85 point rule will result in a reduction of the member’s post March 31, 2025 pension of 4.5% (i.e. 3% per year prior to attaining rule of 85 times 1.5 years).

For clarity, assume the member had a monthly pension at September 30, 2028 (the member’s Rule of 82 date) of $4,900 per month, of which $4,300 is based on service up to March 31, 2025 and $600 per month is based on service on and after April 1, 2025, then the member’s pension would be reduced by $27.00 (4.5% times $600), to $4,873.00. Note that the pension earned for service up to March 31, 2025 would
be based on high 3-year Average Earnings, and the pension earned for service on
and after April 1, 2025 would be based on high 5-year Average Earnings.

If the member retires on March 31, 2030 or later (i.e. after having attained 85 points),
the member's total pension shall be unreduced.

3. A Society-represented employee who retires on March 31, 2025 will retire and
have their pension calculated using only the high 3-year Average Earnings.

4. For a Society-represented employee who has 25 years' service as of March 31,
2025 and elects to retire on March 31, 2030 with 30 years of service, the
administrator would calculate the high 3-year Average Earnings and the high 5-year
Average Earnings and then apply them to the appropriate service period
independently.

For example if the employee had a high 5-year Average Earnings of $100,000 at
March 31, 2030 and high 3-year Average Earnings of 102,500 as of March 31 2030,
then the calculation of the annual pension (before offset) would be ($102,500 x 25.0
x .02) + ($100,000 x 5.0 x .02) = $61,250. If the member has reached Rule of 85,
then the pension would be unreduced for early retirement. If the member does not
have Rule of 85 but has Rule of 82, then the pension earned for service after March
31, 2025 would also be subject to the reduction as described in Example 2.


- Not to be reproduced in the Collective Agreement
- For the term of the Collective Agreement, no involuntary layoff of any Society
  represented employees
- This agreement, which shall not be reproduced in the Collective Agreement, expires at
  the end of this Collective Agreement (December 31, 2018)

22. Side Letter – PSA LOU #193 Hiring Commitment

- Not to be reproduced in the Collective Agreement
- As per LOU #193 OPG commits to hiring 300 regular Society represented staff between
  October 1, 2015 and December 31, 2018. In the event that a grievance is filed alleging
  noncompliance with this clause and an Arbitrator determines that OPG failed to hire 300
  regular Society represented employees by December 31st 2018 and the Arbitrator
dismisses a force majeure argument from OPG, the arbitrator will order OPG to comply
  with this clause and may order any other remedies or penalties as he/she sees fit.
  Should an arbitrator accept that OPG is unable to comply with its obligation to hire 300
  regular Society-represented employees due to a "force majeure", the arbitrator may
  award an alternative remedy to the Society.

For the purposes of LOU #193 and this agreement, "force majeure" shall be considered
to include such things as the Pickering or Darlington permanent plant closure before
December 31, 2018 or the shutting down of multiple OPG nuclear units permanently
before December 31, 2018 or a catastrophic event significantly negatively impacting
OPG's future operation. It does not include such things as an OEB decision to deny (in
full or in part) an OPG's rate application or to reduce or freeze staffing levels, a
Shareholder directive to cease or restrict hiring or a decision by OPG that it no longer
requires the positions.

This agreement, which shall not be reproduced in the Collective Agreement, expires at
the end of this Collective Agreement (December 31, 2018)

23. General Administrative

1. In accordance with Article 99, review all Letters of Understanding and Mid-Terms for
either deletion or renewal within 90 days of signing the memorandum of agreement.

2. Discuss a process and timeline for completion of the final printed version of the collective
agreement
Board Staff Interrogatory #145

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:

Ref: Exh F4-3-1 pages 12-13
The evidence states that overtime expenses are expected to fall by approximately 50% from 2013 to 2021.

a) Given the relatively stable FTE numbers over this period, how will OPG manage to reduce overtime expenses by 50%?

b) Figure 9 shows that the projected overtime costs are essentially stable from 2014 through 2019, and then fall significantly in 2020 and 2021. Why is there a significant drop-off in 2020 and 2021?

Response

a) As noted in the evidence reference provided, OPG plans to continue its efforts to control overtime expenditures over the IR period by requiring pre-approvals of overtime use in non-emergency situations, regular monitoring of overtime by executives and finance staff and conducting periodic reviews to assess overtime usage. OPG also plans to manage overtime costs by increased reliance on external resources, where cost-effective and consistent with outage requirements and its collective agreements.

The number of nuclear FTEs does not drive changes in overtime over the period 2013 to 2021. Rather, changes in overtime are driven primarily by the mix of resources used to address OPG’s outage work programs, the number of outages, the duration of outages, the scope and complexity of outage activity. For example, overtime costs were relatively high in 2013 because Darlington executed two outages in that year based on its three-year outage cycle. However, Darlington is expected to have one large outage per year during the rate-setting period while one unit is in refurbishment, which results in reduced overtime costs during the rate-setting period.

b) The reasons for overtime costs being variable are outlined in part a). In addition, there is no scheduled planned outage in Darlington in 2021, as explained at Ex. F2-4-2, pp. 2-3.
Board Staff Interrogatory #146

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: Exh F4-3-1 page 12

In prior periods, OPG has complied with compensation restraints for management staff. To address issues related to salary compression and management retention, “OPG has re-instated its annual base pay increase program for Management staff below the Vice President level and obtained OPG Board approval of funding for 2016. Under this program, salary increases are performance based, linked to external labour markets in line with the benchmarking results discussed in section 5.0, and enable some compression issues to be addressed where appropriate. The cost of this program is being off-set through savings associated with Management headcount reductions and movement towards market compensation for some Management positions.

a) What is the cost of the program?

b) What were the savings associated with management headcount reductions?

Response

a) The cost of the base pay increase program for all of OPG was $2.3M.

b) Savings associated with management headcount reductions were $5.7M, based on headcount reductions made during 2014, and sustained into 2015, for Management group positions below the Vice President level. Positions at or above the Vice President level did not participate in this program in 2016.
Board Staff Interrogatory #147

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: Exh F4-3-1 pp. 15-16
The evidence discusses changes to pension and benefits.

a) Figure 10 shows the employee/employer contribution ratio. Does this figure relate to pensions only, or does it include OPEBs? If it does not, please provide a chart showing the employee/employer ratio including OPEB costs.

b) Do retirees receive the same benefits as current employees?

c) The evidence states that the mandate of the Advisory Council on Government Assets included “obtaining a multi-year agreement, wage increases that were neutral to Ontario taxpayers and electricity ratepayers, and longer term solutions to help address pension stability.” Did the agreements reached with the PWU and the Society result in wage increases that were neutral to electricity ratepayers? If yes, please provide the details.

d) The evidence describes three concessions that were negotiated with the unions respecting pensions: increased employee contributions, changes to the earnings basis for pensions, and changes to retirement eligibility for undiscounted pensions. Please provide the anticipated annual savings over the test period for each of these changes. Are these savings included in Figure 3 at F4-3-1 p. 6?

e) How does the “Rule of 85” compare with pension plans in the Ontario public service generally?

f) Approximately how much money is expected to be saved annually in the years after the test period on account of the concessions described in question (d)?

In return for the concessions described in question (d), PWU and Society employees received a “lump sum payment” and a number of Hydro One Limited shares (the Share Performance Plan). Please provide the annual costs for these measures. Are these costs included in Figure 3 at F4-3-1 p. 6?
h) Is OPG targeting a 1:1 contribution ratio for some point in the future? If so, when? What is the revenue requirement impact in the test period for contribution ratios higher than 1:1? Please provide the answer for each year, and on an accrual basis and a cash basis.

Response

a) The employee / employer contribution ratio shown in Ex. F4-3-1, Figure 10 relates only to OPG’s registered pension plan. OPEBs are not funded; as a result, OPG has not provided a chart showing the employee/employer ratio including OPEB costs as requested.

b) Retirees receive similar benefits to employees. Employees, retirees and their respective dependents are eligible for health and dental coverage. Retirees also receive basic life insurance coverage; however, the amount of the life insurance benefit is reduced compared to the coverage provided to employees. Only employees are eligible for short-term and long-term disability benefits.

c) Please see Attachment 1 for a copy of the letter from the Minister of Energy informing OPG of the Ministry’s revised bargaining mandate for negotiations with both PWU and Society.

Please see Attachment 2 for a copy of a letter from the Minister of Energy confirming the results from the collective agreement negotiations with PWU align with the bargaining mandate referred to in Attachment 1.

d) The total projected savings associated with increased employee contributions attributed to the nuclear facilities are $88M over the 2017-2021 period ($17M/yr for 2017-2018 and $18M/yr for 2019-2021). These savings are reflected in Figure 3 at Ex. F4-3-1, p. 6.
There are no savings during the 2017-2021 period associated with the changes to the earnings basis for pensions and changes to retirement eligibility for undiscounted pensions for unionized employees because, as noted at Ex. F4-3-1, p. 16, lines 12-14 and lines 20-21, these changes apply to future service accrued by employees after March 31, 2025.

e) Most major Ontario public sector pension plans currently utilize a Rule of 85 (with some of these requiring a minimum age of 55), with some also utilizing a Rule of 90.

f) OPG declines to provide the requested information on the basis of relevance. This interrogatory seeks information for periods beyond the IR Term that is not relevant to deciding any issue on the approved Issues List in this application and is not readily available.

g) The total projected costs associated with the “lump sum payments” made in the first two years of the respective collective agreements, and the Share Performance Plan for the remaining years of the respective collective agreements, attributed to the nuclear facilities are $92M over the 2017-2021 period ($26M in 2017, $24M in 2018, $15M in 2019, $14M in 2020, and $13M in 2021). These costs are reflected in Figure 3 at Ex. F4-3-1, p. 6.

OPG notes that, unlike employee contribution increases that apply to both existing and new employees, the Share Performance Plan applies only to employees contributing to the pension plan on April 1, 2015 (PWU) and January 1, 2016 (Society), and having less than 35 years of pensionable service as of those dates, as noted at Ex. F4-3-1, p. 17, lines 7-11. This means that while savings from higher employee contributions are expected to continue at similar levels beyond 2021, the cost of the Share Performance Plan will decline as the number of eligible employees declines.
FEB 05 2015

Mr. Tom Mitchell  
President and Chief Executive Officer  
Ontario Power Generation  
700 University Avenue  
Toronto ON  M5G 1X6  

Dear Mr. Mitchell:

I understand that Ontario Power Generation (OPG) will be engaging in collective bargaining discussions with the Power Workers’ Union (PWU) shortly, and with the Society of Energy Professionals (Society) later this year. In advance of these discussions, I am writing to confirm that OPG will engage in negotiations that reflect a revised bargaining mandate that includes specified cost-savings objectives.

You may recall that in recent budgets the Province has expressed its commitment to manage the costs of public sector compensation, and to review electricity sector pensions, in particular. The Province is now looking to ensure there are savings achieved in the short and long term by minimizing the impact of compensation and pension costs to ratepayers across Ontario.

As you prepare for upcoming bargaining negotiations with the PWU and the Society, the government expects that the following bargaining mandate will form the basis for those discussions. Prior to entering into negotiations, please ensure that the mandate and requirement for government approval is made clear to the PWU and the Society. OPG’s bargaining mandate comprises the following elements:

- Multiple year agreements (two to four years).
- Pension contributions from employees adjusted upwards gradually in order to achieve equal cost sharing between employers and employees.

.../cont’d
While protecting all employee pension benefits earned under the plans to date, modestly reduce future service benefit accruals for current employees and new hires through a number of mechanisms that may include:

- Adjustment of number of years upon which the calculation of final average earnings would be based;
- Revising the points formula for the threshold for reduced early retirement;
- Reducing bridge benefit before age 65; and/or
- Basing indexation on a modestly reduced percentage of CPI.

- Introduce a model of shared governance of risk through a combination of:
  - Funded conditional indexation; and
  - Limiting employer funding for deficits arising under a new funding policy to a defined corridor, after which the funding policy would define how to address deficits.

- Where relevant, enable restructuring activities recommended by the Premier's Advisory Council on Government Assets and approved by government.

- The cumulative effect of the resolution of compensation issues would reflect an overall net neutral costing result. Any changes to pension contributions and benefits would not count as offsets for the purposes of calculating this net zero result.

I would appreciate confirmation that OPG's final negotiating mandates reflect the elements described above, as the company commences engagement with PWU and with the Society. I expect that OPG will provide regular updates to the Ministry on the status of negotiations and return to government for approval prior to finalizing any and all collective agreements.

Sincerely,

Bob Chiarelli
Minister
MAY 28 2015

Mr. Bernard Lord
Chair
Ontario Power Generation
700 University Avenue
Toronto ON M5G 1X6

Dear Mr. Lord:

I write in regard to the recently ratified, collective agreement negotiated between Ontario Power Generation (OPG) and the Power Workers' Union (PWU). I commend you and the PWU in arriving at a measured agreement that will have a favourable impact on electricity rates for years to come.

Treasury Board and Cabinet have concluded that the terms of the agreement align with the government’s labour negotiating mandate, as outlined in my letter of February 5, 2015. The government is pleased that OPG and PWU found a path forward which protects the interests of electricity ratepayers while fundamentally transforming the nature of electricity sector compensation and addressing pensions.

Thank you again for your efforts culminating in this positive result.

Sincerely,

[Signature]

Bob Chiarelli
Minister

c: Hon. Charles Sousa, Minister of Finance
Hon. Deb Matthews, President of the Treasury Board
Board Staff Interrogatory #148

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: Exh F4-3-1 p. 18

The evidence states that “OPG’s Total Direct Compensation” is at market. Total Direct Compensation reflects cash compensation paid to employees, excluding overtime. It also does not include pensions and benefits.

a) Why is overtime excluded from Total Direct Compensation? Was the decision to exclude overtime made by Willis Towers Watson (Towers), or by OPG?

b) Did Towers conduct any analysis with respect to overtime costs or practices at OPG?

c) Does Total Direct Compensation include the lump sum payment and Share Performance Plan? If not, why not?

d) Has OPG assessed whether its total compensation (i.e. all salary, bonuses, overtime, pensions, benefits, OPEBs, etc.) is at market?

Response

a) The recommendation to exclude overtime from the compensation benchmarking study was made by Willis Towers Watson (Towers). This is a common industry practice. Overtime is highly variable by organization and linked to each company’s unique operating model. Towers does not gather overtime information in their annual survey database, and as such, overtime information was not available for use in this benchmarking study. This approach is consistent with the approach taken in the 2013 benchmarking study conducted by AON Hewitt (see EB-2013-0321, Ex. F5-4-1).

b) No, Towers did not conduct any analysis with respect to overtime costs or practices at OPG.

c) No, the Total Direct Compensation captured in the Towers’ benchmarking study does not include the lump sum payment or the Share Performance Plan. Program costs that are not available to new hires are not typically included in this type of compensation benchmarking study as these programs do not reflect the ongoing compensation costs.
offering. In addition, neither the lump sum payment nor share award had been made at the time of the Towers’ benchmarking study.

d) No, OPG has not assessed whether its total compensation, including salary, bonuses, overtime, pensions and benefits, is at market.

The Towers’ benchmarking study at Ex. 4-3-1, Attachment 2 assessed Total Direct Compensation (Base Salaries & Incentives) and provided an analysis of OPG’s pension and benefits plan provisions.

OPG has not assessed its overtime costs relative to market. Overtime costs have not been included in OPG’s compensation benchmarking in accordance with industry practice, as mentioned in part (a) above.
**Board Staff Interrogatory #149**

**Issue Number: 6.6**

**Issue:** Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

**Interrogatory**

**Reference:**
Ref: Exh 4-3-1 pp. 19-23

OPG retained Towers to conduct a compensation study. At figure 11 OPG presents a comparison between the results of the Towers study (2015) and the compensation study produced for OPG by AON Hewitt (“AON”) for 2013. The Towers study generally shows more favourable OPG results compared to the AON study.

a) Please provide the retainer letter or other instructions OPG provided to Towers when they were retained to do the compensation study.

b) Please discuss any methodological or other significant differences between the Towers study and the AON study. For example, were the same comparators used? Are the positions reviewed the same?

c) Some of the results are markedly different from 2013 to 2015. For example, the PWU “utility” figures went from 21% above market in 2013 to only 4% above market in 2015. The management nuclear figures went from 3% below market in 2013 to 27% below market in 2015. Please provide any details that can help explain such a large shift over a short period of time.

d) Why did OPG select Towers instead of AON to conduct the 2015 study?

e) On page 20, there are three references to OPG employee compensation being at or below market (at lines 4, 13, and 19). Please confirm that “compensation” here refers to Total Direct Compensation (i.e. cash compensation) and excludes overtime, pensions and benefits, etc.

f) On pages 20-21, OPG observes that its “general industry” comparisons would be closer to market if measured against similar positions at utility companies. Does OPG believe that the make-up of the comparators in the general industry segment is faultly? Does Towers believe that the make-up of the comparators in the general industry segment is faultly?

Witness Panel: Corporate Groups, Compensation
Response

a) Attachment 1 is a copy of the agreed to scope of work which outlines services to be provided in relation to the compensation study. Note, Attachment 1 is marked “confidential”, however OPG has determined this attachment to be non-confidential in its entirety.

b) There are many similarities between the compensation benchmarking studies prepared by AON Hewitt (“AON”) for 2013 and Willis Towers Watson (“Towers”) for 2015. Each provide directional insights into OPG’s total direct compensation relative to three distinct segments, including the Utility segment (AON Group 1), the Nuclear Authorized segment (AON Group 2) and the General Industry Segment (AON Group 3). Both studies utilized similar comparator organizations that reflect organizations with similar talent pools and complexities to OPG, with a focus on those organizations from which OPG would recruit or lose talent. A comparison of the specific organizations included in each study is captured in L-06.6-15 SEC-82, Attachment 1.

There are a few key differences between these studies, including:

i) Utilization of Benchmarking Databases vs Custom Survey: While both studies used compensation data gathered as part of their annual survey processes, when evaluating positions in the General Industry segment, AON undertook a custom survey of select organizations and select positions to evaluate positions relative to the Utility (Group 1) and Nuclear (Group 2) segments. Towers utilized benchmark data from its survey database for all three segments.

By utilizing a broader data set (i.e. Towers survey database), the number of OPG positions that could be included in the study results was increased, additional compensation components available in the market could be included (i.e. long term incentives), and OPG’s ability to repeat this study in the future with comparable and reliable results was improved. Benchmark studies that are based on custom surveys, such as the study conducted by AON, are difficult to repeat over time due to participants dropping out.

ii) Segmentation of Positions: As previously noted, both studies utilized similar but different comparator groups for each of the three segments assessed. The study prepared by Towers also utilized a segmented approach to selecting which OPG positions would be compared to each comparator group.

This resulted in OPG positions associated with the General Industry segment, only being compared against comparator organizations that represent a mix of 50% public and 50% private in the General Industry segment.

Similarly, OPG positions unique to energy production or related fields were only compared to organizations in the Utility or Nuclear Authorized segments.
In defining the Nuclear Authorized segment, focus was placed on those OPG positions that require individuals to hold or have held a federal license as per regulatory requirements.

Segmenting the positions on this basis is defined in Ex. F4-3-1, Attachment 2, p.5. Ex. F4-3-1, Attachment 2, pp. 7 and 34 provide additional information on the analysis done to ensure that segmenting the Nuclear Authorized segment in this manner was appropriate. Additional information on the associated premium that was applied to some positions in the Utility segment is provided in L-06.6-1 Staff-154.

iii) Target Market Positioning: The AON study utilized the 50th percentile for all segments, as well as the pension and benefits analysis. The Towers study uses the 50th percentile for the Utility and General Industry segments, as well as the pension and benefits analysis. The 75th percentile is used for the Nuclear Authorized segment below the Senior Executive level. Use of the 75th percentile is discussed further in L-06.6-1 Staff-153.

c) In comparing results, it is useful to refer to the results by job family shown in each of the exhibits, and consider the implications of the differences noted in part (b) above. This is explained further below, citing the examples referenced in this interrogatory.

PWU – Utility Segment: Referring to Ex. F4-3-1, Attachment 2, p. 14, this segment is dominated by positions in the Maintenance and Operations job family. Note that there are no positions captured under the Administration, Finance and Supply Chain job families. These job families are assessed as part of the General Industry segment. The table below summarizes these factors and shows that the results, while showing modest improvement, are not as divergent as they may have appeared upon initial review.
Management Group - Nuclear Authorized Segment: In the Towers study, this segment reflects a small group of authorized employees, primarily in the Operations job family. The AON study did not include any matches in the Operations job family, so for this particular group of employees, the overall total results are not directly comparable. Looking at the broader utility segment (Group 1) in EB-2013-0321, Ex. F5-4-1, p. 57 as a proxy, the Operations job family is 1% above the 75th percentile (OPG’s target market positioning for the Nuclear Authorized segment). While this is still higher than the 27% below target indicated in the Towers study, the inclusion of long term incentives in the Towers study, and impact of foreign exchange as described in L-06.6-1 Staff-153 contribute to this difference.

d) Confirmed.

e) Confirmed.
f) No, OPG and Towers do not believe the make-up of the comparators in the general industry segment is faulty. The make-up of the comparators is based on a 50/50 mix of public and private sectors, and is an appropriate comparison relative to the talent pools from which OPG attracts and loses talent to for these positions. The fact that utility organizations tend to pay positions in general industry (i.e. finance, clerical and human resources staff) more than what other organizations would tend to pay for this type of work is a factor that affects OPGs ability to differentiate its compensation for these roles through the bargaining process given OPG’s highly unionized environment.
January 18, 2016

Private and Confidential

Mr. Craig Halket
Vice President Total Rewards
Ontario Power Generation Inc.
700 University Avenue
Toronto, ON M5G 1Z5

Dear Craig:

SCOPE OF WORK – RATE CASE SUPPORT REFRESH

Willis Towers Watson will be engaged by Ontario Power Generation ("OPG") to provide evidence in respect of OPG’s 2016 rate application(s) before the Ontario Energy Board ("OEB").

SERVICES

OPG will engage Willis Towers Watson to provide expert evidence and analysis related to the market competitiveness of OPG’s compensation relative to appropriate comparators. The scope of work will include:

- Preparing a market analysis and report on findings to reflect an assessment of market compensation levels within the effective 2015 timeframe. Data provided will leverage selected comparator groups as available in the Willis Towers Watson Canadian compensation and pension/benefits databases respectively. The report should benchmark relative to the current OPG compensation philosophy, actual OPG 2015 compensation levels for both bargaining unit and non bargaining unit positions:
  - The use of the Willis Towers Watson database will enable comparison of the majority of positions to industry benchmarks to ensure a cross-functional sample. Data will be provided where sufficient data is available for the identified jobs under study;
  - The market comparisons will be made to comparator groups established for each OPG segment to best reflect the range of organizations in which comparable skill sets reside. (For example only benchmark positions requiring utilities specific skill sets will be aligned to energy/utilities comparators whereas a broader range of comparators will be used for job families found across all industries, such as finance, IT, HR, etc.);
  - The report will reflect all compensation data on a market relevant basis (i.e. Base Salary and Target Direct Compensation);
The report will reflect the current OPG job family structure; and,
- The report will summarize the employer-paid value of OPG’s pension and benefits package relative to comparators at aggregated levels.

In addition, the report will reflect the following:
- Relevant assumptions including those used to compare the value of OPG’s pension and benefits package relative to market comparators
- An analysis leveraging US data to determine the extent of market compensation differences between positions requiring skills specific to the generation of nuclear power (vs. other forms of power generation). This is in order to assess if any such differences should be taken into account when using Canadian market utilities peer group data for positions with a nuclear skills focus. Use of US data is needed due to the small number of employers in Canada generating nuclear power (i.e. insufficient market data)
- An analysis of cash compensation levels attributed to authorized nuclear licensed roles which are typically eligible for additional license allowances in the market

The report will be in a form suitable for filing with the Ontario Energy Board as appendix to OPG’s rate application.

DETAILED PROJECT PLAN AND TIMELINE

Willis Towers Watson will conduct the analysis and prepare the final report in order to meet the delivery deadlines requested by OPG. Subject to the provision of the requisite OPG incumbent data, the report is expected by March 1, 2016. Willis Towers Watson will undertake to provide regular updates to OPG on project progress. Key project milestones are summarized as follows:

<table>
<thead>
<tr>
<th>Project Milestone</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>In order to compare OPG salary and structure information to market findings, OPG will provide full incumbent file and relevant pay data, segmentation, job family and pay band data including confirmation of effective date of incumbent data</td>
<td>January 13th, 2016</td>
</tr>
<tr>
<td>Matching of OPG roles and levels to functional and level benchmark jobs within Willis Towers Watson compensation database</td>
<td>January 29th, 2016</td>
</tr>
<tr>
<td>Willis Towers Watson to generate market data for benchmark OPG roles based on survey database jobs available and comparator organizations selected for each segment</td>
<td>February 15th, 2016</td>
</tr>
<tr>
<td>Willis Towers Watson to conduct a nuclear segment market analysis for roles requiring specific nuclear industry skills and examine market compensation practices for nuclear licensed authorized roles</td>
<td>February 15th, 2016</td>
</tr>
<tr>
<td>Willis Towers Watson to conduct a pension and benefits analysis relative to agreed peer group</td>
<td>February 22nd, 2016</td>
</tr>
<tr>
<td>Issue final report</td>
<td>March 1st, 2016</td>
</tr>
</tbody>
</table>
INVOICING AND ESTIMATED FEES

Payment will be based on hourly rates outlined in the master compensation consulting agreement between OPG and Willis Towers Watson as amended and extended in 2014. Invoices will be provided monthly based on the accepted scope of work (as outlined above) upon submission of an invoice. Work in addition to the scope outlined above; including any follow up consultation following issuance of the final compensation benchmarking report will be subject to a subsequent statement of work.

Each invoice will include a short, detailed description of the associated work provided in accordance with the detailed project plan agreed by OPG. Estimated fees for the activities and milestones outlined above are estimated at $200,000. The 7% technical and administrative charges and applicable taxes are in addition.

Please indicate your acceptance of this Scope of Work by having an appropriate representative of Ontario Power Generation sign a copy of this letter in the space provided below and returning the signed document to us.

TOWERS WATSON CANADA INC.

By: _____________________________

Print Name: Sandra McLellan

Print Title: Director, Talent & Rewards

Date: January 18th, 2016

Accepted and agreed:

ONTARIO POWER GENERATION INC.

By: _____________________________

Print Name: Craig Halket

Print Title: Vice President, Total Rewards

Date: _____________________________
Board Staff Interrogatory #150

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:

a) Is receipt of salary above base salary schedule still occurring?

b) If yes, how many staff are affected?

c) If yes, was Towers’ analysis based on salary schedules or actual salaries?

Response

a) Yes, OPG continues to have individuals who are paid above current salary schedule maximums. These circumstances arose from the introduction of new salary structures dating back to 2002 for PWU represented employees and 2006 for Society represented employees.

b) Currently, there are just over 700 (8%) employees affected across OPG. The number of staff affected has been steadily declining since the new salary structures were put in place. This declining trend is expected to continue.

c) The Towers’ analysis was based on actual salaries and included individuals who were paid above current salary schedule maximums.
Board Staff Interrogatory #151

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: Exh F4-3-1 pp. 21-22, Exh. F4-3-1 Attachment 3

The evidence presents a direct comparison between wages at OPG and at Bruce Power.

a) Please confirm that the comparison includes wages only, and does not include pensions, benefits, OPEBs, overtime, lump sum payments, share performance plan, etc.

b) Towers prepared a total compensation benchmarking study. The study included analysis of OPG’s direct compensation as compared against a “nuclear authorized” group, which includes Bruce Power. Does Towers believe that the analysis comparing OPG only to Bruce Power is preferable to the analysis comparing OPG against the nuclear authorized group as a whole?

Response

a) Yes, the comparison includes wages only.

b) To fully understand OPG’s positioning relative to the broader labour market, including several key compensation elements and both unionized and non-unionized positions, the benchmarking study prepared by Willis Towers Watson would be preferable to the Bruce Power comparison. This opinion is shared by both OPG and Willis Towers Watson.

The Bruce Power salary schedule comparison provides a deeper dive on one of the closest comparators for OPG and focuses solely on unionized employees. This direct comparison to Bruce Power adds value in relation to understanding the labour relations environment in which OPG negotiates, as Bruce Power employees are represented by the same unions as OPG.
Board Staff Interrogatory #152

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:

Ref: Exh F4-3-1 Attachment 2
The Towers Total Compensation Benchmarking Study benchmarked 78% of OPG incumbents (corporate wide). However, only half of the Society nuclear authorized staff and Society represented general industry staff were benchmarked.

a) Please explain the low level of representation in the benchmarking.

b) Is there any correlation between these positions not benchmarked by Towers and the positions not benchmarked by Goodnight in the report at Exh F2-1-1 Attachment 2?

Response

a) The Nuclear Authorized segment is a relatively small population, with 111 Society incumbents in four different jobs. Two of these jobs were readily matched against roles included in Willis Towers Watson’s (Towers) 2015 Compensation database. These two jobs were the Control Room Shift Supervisor and the Authorized Training Supervisor. There were a total of 53 incumbents in these jobs, which represented 48% of the total, as depicted at Ex. F4-3-1, Attachment 2, p.3.

The remaining two jobs could not be matched and were excluded from the study. This included employees who are training to become Control Room Shift Supervisors (Shift Supervisors in Training) and Unit 0 Training Supervisors.

This level of representation, while below the 78% achieved corporate wide, was an increase over that captured in the previous benchmarking study performed by Aon Hewitt (Aon) which was submitted in EB-2013-0321, Ex. F5-4-1. In that study, there were no suitable matches for any Society represented positions in the Nuclear Authorized segment (refer to the Operations job family, EB-2013-0321, Ex. F5-4-1, p.24). Referring to page 29 of the Aon benchmarking study (see EB-2013-0321, Ex. F5-4-1, p.29), suitable matches were found for a total of 74 incumbents in General Industry positions represented by the Society. Most of these were in the Finance and Information Technology job families.

Witness Panel: Corporate Groups, Compensation
More matches for Society represented positions in the General Industry were available in the Towers benchmarking study, with 290 incumbents (51%) matched as shown, in the aggregate and by job family, at Ex. F4-3-1, Attachment 2, pp. 3 and 23, respectively.

There were 282 Society represented positions in the General Industry that could not be matched by Towers. As described at Ex. F4-3-1, Attachment 2, p. 7, both the function of a position and the associated accountabilities are considered in finding an appropriate match. If a suitable match cannot be found, the position is excluded from the study.

In addition, some positions in the security function were excluded from the Towers benchmarking study due to the sensitive and protected nature of this information.

b) Both the Willis Towers Watson compensation benchmarking study (Ex. F4-3-1, Attachment 2) and the Goodnight analysis (Ex. F2-1-1, Attachment 2) excluded the security function as noted in part (a) above. There was no other correlation between positions that were excluded from these studies.
Board Staff Interrogatory #153

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: Exh F4-3-1 Attachment 2

The Towers Total Compensation Benchmarking Study provides a compensation analysis and a pension and benefits analysis.

a) Nine of the ten comparators in the “nuclear authorized” group are based in the United States; accordingly Towers converted their compensation figures into CAD. Please confirm that the results of the nuclear authorized comparison can be heavily influenced by fluctuating exchange rates.

b) At page 11, the report states: “OPG’s compensation philosophy defines a target market position at the … 75th percentile for the Nuclear Authorized Segment (based on role complexity).” Does Towers agree that the 75th percentile is the most appropriate comparison point for the Nuclear Authorized Segment? Please elaborate.

Response

a) As referenced in Ex. F4-3-1, p.21, footnote 7, “the Nuclear Authorized segment results are being affected by volatile exchange rates.” It is also important to note that due to the small percentage of staff in this segment, the overall impact of exchange rates on OPG’s benchmarking results is not significant.

b) Willis Towers Watson (“Towers”) agrees that the 75th percentile is an appropriate comparison point for the Nuclear Authorized segment.

The purpose of benchmarking compensation at the job role level is to ensure a comparison to market for comparable skills and accountabilities. Management, Society and PWU roles in the Nuclear Authorized Segment at OPG are subject to greater complexity due to how the nuclear units are structured with responsibility for 4 units at OPG compared to 1-2 in the market. This makes the scope of the management, society and PWU roles broader and more complex. As such in reviewing the range of market data, the 75th percentile data was determined to be the best proxy to address this relative level of complexity. It should be noted that use of the 75th percentile data is not
used for top executive jobs where accountability for overall nuclear operations is consistent across roles in the comparator group.
Board Staff Interrogatory #154

Issue Number: 6.6
Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: Exh F4-3-1 Attachment 2
At page 26, the methodology for the pensions and benefits analysis is discussed.

a) Does the pensions and benefits analysis include OPEBs? If not, why not?

b) At page 26 the report states: “Benefits no longer available to new hires are not considered.” Why not? What benefits were excluded because of this decision?

c) Page 27 presents the value of OPG’s and comparator organizations’ pensions and benefits as a percentage of base salary. What is included in “base salary?”

d) OEB staff is having difficulty understanding the 10% adjustment that has been made for non-authorized roles in nuclear plants (described at pages 7 and 34 of the report). Which employees comprise the “Non-Authorized Nuclear segment”? The report states that for many roles the salaries are comparable, but nuclear operations management roles carry a premium. Was the 10% premium applied only to nuclear operations managers? Please list the positions to which the premium was applied. Please present the results of the report without applying the 10% adjustment.

e) In considering the relative value of OPG’s pensions and benefits (pages 28-29 of the report), what was included as being a pension or benefit? At Exh F4-3-2 page 1 OPG defines its pension and OPEB programs as consisting of the registered pension plan, a supplementary pension plan, other post-employment benefits such as group life insurance and health and dental care for pensioners and their dependants, as well as long-term disability benefits for current employees. Were all of these things included by Towers in its analysis of pensions and benefits?

Response

a) Yes, other post employment benefits including health and dental and life insurance are included in the Willis Towers Watson (Towers) analysis in Ex. F-4-3-1, Attachment 2.

Witness Panel: Corporate Groups, Compensation
b) The objective of benefits benchmarking is to understand market competitive practice with respect to the current benefit plan offerings of employers in the comparator group. As such, the Towers benefits benchmarking database gathers information specific to the current plan offering available to new hires. While some individual employees may be eligible for grandfathered arrangements, these programs are offered to a decreasing portion of the employee population (eligibility ends upon termination), may not be systematically documented and do not reflect the current benefit offering. Grandfathered arrangements are not gathered by Willis Towers Watson for inclusion in the benchmarking database for these reasons.

There is no element of OPG’s compensation program that was excluded as a result of this practice; however, the program design that was valued in the pension and benefits analysis reflected the program design associated with new hires. Assumptions included continuation of the current practice of new external hire Management group employees becoming eligible for an undiscounted pension using a Rule of 90 factor and participation in the health and dental plan that includes higher co-payments and different coverage as described in Ex. F4-3-1, pp.14 and 16. For unionized positions, a single set of assumptions were used based on the PWU pension and benefit programs. This included recently negotiated pension reforms as described in Ex. F4-3-1, pp. 15 and 16.

c) The base salary reflected in Ex. F4-3-1, Attachment 2 includes only the base rate of pay for a job, reflected as an annual salary. For example, for a PWU employee paid on an hourly basis, the employee’s base salary is equal to:

\[
\text{base salary} = \text{the hourly wage rate} \times \text{scheduled hours of work} \times 52 \text{ weeks a year.}
\]

Base salaries are reflected on a gross basis, before any tax or other deductions are made.

d) There is an inadequate sample of employers in Canada to benchmark the costs of skill sets specific to the generation of Nuclear Power. Comparisons can be made to similar skill sets specific to other forms of power, however, there are specialized knowledge sets specific to the science of nuclear power. To quantify the premium between the skill and knowledge set specific to nuclear operations management relative to operations management for other forms of power, Towers compared the compensation of nuclear operations management roles in the United States with the compensation of comparable US roles associated with other forms of energy. This helped Towers to systematically understand the specific job families for which premiums apply for a nuclear knowledge set. This ensured, using a market where both skill sets reside with adequate sample size, that Towers isolate premiums exclusively to relevant job families rather than taking a broader assumptions.

The 10% premium was applied to the following 9 supervisory and management positions in Nuclear operations:

Witness Panel: Corporate Groups, Compensation
With only 287 incumbents in the above positions, the impact of applying a 10% premium was not significant on the benchmarking results shown in Ex. F4-3-1, Attachment 2. Excluding the 10% premium, OPG's Total Direct Compensation remains at 5% above the 50th percentile and is considered to be “at market”, as shown in Attachment 1 to this response. Attachment 1 presents the results of Ex. F4-3-1, Attachment 2, without applying the 10% adjustment.

Note, Attachment 1 is marked “confidential”, however, OPG has determined this attachment to be non-confidential in its entirety.

e) Yes, all of the items noted were included in the Towers analysis. Towers included the registered and supplementary pension plans, health and dental care for active employees, retirees and their dependents, short term and long term disability for employees, and death benefits (i.e. group life insurance).
Overview: Compensation Analysis Results

Scenario with 10% Nuclear Premium Removed

- Willis Towers Watson considers compensation for benchmark jobs to be aligned with the competitive market when it falls within +/- 10% of the target market position. OPG's compensation philosophy defines a target market position at the 50th percentile for Utility and General Industry segments and the 75th percentile for the Nuclear Authorized Segment (based on role complexity).

- Overall, OPG's Total Direct Compensation is positioned within 5% of the target market. The Utility segment, which includes approximately three quarters of the incumbents, is positioned within 2% of the target market.

<table>
<thead>
<tr>
<th>OPG Group and Segment</th>
<th># OPG Matched Incumbents</th>
<th>% +/- Target Market Base Salary</th>
<th>% +/- Target Market TDC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PWU</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utility</td>
<td>3,169</td>
<td>11%</td>
<td>5%</td>
</tr>
<tr>
<td>Nuclear Authorized</td>
<td>255</td>
<td>7%</td>
<td>10%</td>
</tr>
<tr>
<td>General Industry</td>
<td>1,051</td>
<td>31%</td>
<td>27%</td>
</tr>
<tr>
<td><strong>Society</strong></td>
<td>2,151</td>
<td>19%</td>
<td>8%</td>
</tr>
<tr>
<td>Utility</td>
<td>1,808</td>
<td>17%</td>
<td>7%</td>
</tr>
<tr>
<td>Nuclear Authorized</td>
<td>53</td>
<td>-7%</td>
<td>-14%</td>
</tr>
<tr>
<td>General Industry</td>
<td>290</td>
<td>38%</td>
<td>27%</td>
</tr>
<tr>
<td><strong>Management Group</strong></td>
<td>754</td>
<td>-7%</td>
<td>-13%</td>
</tr>
<tr>
<td>Utility</td>
<td>355</td>
<td>-12%</td>
<td>-19%</td>
</tr>
<tr>
<td>Nuclear Authorized</td>
<td>37</td>
<td>-18%</td>
<td>-27%</td>
</tr>
<tr>
<td>General Industry</td>
<td>362</td>
<td>3%</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td>7,380</td>
<td>13%</td>
<td>5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPG Segment</th>
<th>% +/- Target Market Base Salary</th>
<th>% +/- Target Market TDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility</td>
<td>11%</td>
<td>3%</td>
</tr>
<tr>
<td>Nuclear Authorized</td>
<td>1%</td>
<td>-3%</td>
</tr>
<tr>
<td>General Industry</td>
<td>25%</td>
<td>19%</td>
</tr>
</tbody>
</table>

Note: Target positioning for roles in the Nuclear Authorized segment is the 75th percentile, except for Senior Executive roles which target the 50th percentile.
Board Staff Interrogatory #155

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref Exh F4-3-1, Attachment 2, page 26

As part of their total compensation benchmarking exercise, Towers compared the level of pension and benefits offered by OPG with those offered by comparator organizations (market) used in the study. The study determined that OPG’s pension and benefits as a % of base salary is above the 50th percentile of the market. Please quantify (estimate) the impact on the test period if the revenue requirement had been determined using the market level of pension and benefits from the study (i.e. 50th percentile).

Response

Please refer to L-06.6-15 SEC 83.
Board Staff Interrogatory #156

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: Exh F4-3-2 page 5

Chart 1 shows the annual nuclear pension and OPEB cash amounts.

Why is there a significant drop in the cash amount for pensions between 2016 and 2017?

Response

The pre-filed evidence reflected projected contributions for the 2017-2021 period determined by OPG’s independent actuary, Aon Hewitt, by extrapolating information available as of December 31, 2015 to the assumed January 1, 2017 and January 1, 2020 valuation dates in order to project going concern and solvency funded status of the plan. The projected January 1, 2017 valuation indicated a lower going concern deficit and therefore lower going concern special payments than the January 1, 2014 valuation. This is the primary reason for the decrease in contributions between 2016 and 2017 shown at Ex. F4-3-2 Chart 1.

The Pension Benefits Act (Ontario) governs registered pension plans in Ontario and requires that actuarial valuations of the plans be performed at least once every three years and filed with the Financial Services Commission of Ontario (FSCO). As discussed at Ex. F4-3-2, p. 9, line 23 to p. 10, line 14, the last filed actuarial valuation of the OPG pension plan was as of January 1, 2014 and, at the time of the filing of the pre-filed evidence, it was expected that the next actuarial valuation would be completed as of that latest permitted date of January 1, 2017 and that a subsequent valuation would be completed as of January 1, 2020.

During 2016, OPG observed a decrease in long-term bond yields compared to the beginning of the year. This increased the likelihood of higher 2017 and 2018 required contributions under a valuation as of January 1, 2017 compared to the required contributions from a valuation as of January 1, 2016. In September 2016, OPG approved an updated pension funding valuation as of January 1, 2016. The valuation sets out minimum required contributions for 2016 to 2018, and was filed with FSCO on September 30, 2016.

The updated valuation results in a lower minimum required contribution in 2016 than the January 1, 2014 valuation, reflecting lower going concern special payments. As attributed to the nuclear operations, the updated 2016 projected contribution is approximately $203M,
compared to $283M (set out in Ex. F4-3-2 Chart 1) based on the January 1, 2014 valuation.\(^1\)

The new valuation also changes the projected contributions for 2017 and 2018, which are now estimated at approximately $200M and $203M.\(^2\)

The consequential update of the projected 2019-2021 contributions is in progress, assuming January 1, 2019 as the date of the next actuarial funding valuation. Once the updated 2019-2021 projections have been finalized, OPG will bring forward the new forecast as part of an update to the pre-filed evidence. As OPG proposes to continue the Pension & OPEB Cash Payment Variance Account (see Ex. H1-1-1, p. 17), any differences between actual pension contributions and the forecast amounts reflected in the approved revenue requirement for the IR term would be captured in this account.

The January 1, 2016 actuarial funding valuation is provided in Attachment 1, with total OPG minimum required contributions for 2016-2018 summarized at page 4. Note, Attachment 1 is marked “confidential”, however, OPG has determined this attachment to be non-confidential in its entirety.

\(^1\) For both nuclear and regulated hydroelectric operations, the reduction in the 2016 contribution will result in a reduction of about $90M in the debit balance in the Pension & OPEB Cash Payment Variance Account, with an offsetting increase in the debit balance in the Pension & OPEB Cash to Accrual Differential Deferral Account.

\(^2\) The estimated new projection of total OPG amounts for 2017 and 2018 has been attributed to the nuclear operations in the same proportion as in the pre-filed evidence.
Actuarial Valuation as at January 1, 2016 for Ontario Power Generation Inc. Pension Plan

Regulatory Registration Number: 1059120

September 2016
Table of Contents

Executive Summary 3
Section 1: Introduction 6
Section 2: Going Concern Valuation Results 9
Section 3: Solvency Valuation Results 15
Section 4: Hypothetical Wind Up Valuation Results 18
Section 5: Contribution Requirements 20
Section 6: Actuarial Certificate 24
Appendix A: Glossary of Terms 27
Appendix B: Assets 31
Appendix C: Membership Data 35
Appendix D: Going Concern Assumptions and Methods 41
Appendix E: Solvency and Hypothetical Wind Up Assumptions and Methods 54
Appendix F: Summary of Plan Provisions 60
Appendix G: Administrator Certification 69
Executive Summary

An actuarial valuation has been prepared for the Ontario Power Generation Inc. Pension Plan (the "Plan") as at January 1, 2016 for the primary purpose of establishing a funding range in accordance with legislative requirements for the Plan until the next actuarial valuation is performed. This section provides an overview of the important results and the key valuation assumptions which have had a bearing on these results. The next actuarial valuation for the purposes of developing funding requirements should be performed no later than as at January 1, 2019.

Summary of Principal Results

Financial Position

<table>
<thead>
<tr>
<th>($000's)</th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Going Concern</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assets</td>
<td>$12,042,433</td>
<td>$10,908,000</td>
</tr>
<tr>
<td>Liabilities</td>
<td>12,527,175</td>
<td>12,050,676</td>
</tr>
<tr>
<td><strong>Surplus/(Deficit)</strong></td>
<td>$484,742</td>
<td>$(1,142,676)</td>
</tr>
<tr>
<td><strong>Solvency</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assets</td>
<td>$12,992,700¹</td>
<td>$10,834,700¹</td>
</tr>
<tr>
<td>Liabilities</td>
<td>13,247,491</td>
<td>11,008,169</td>
</tr>
<tr>
<td><strong>Surplus/(Deficit)</strong></td>
<td>$(254,791)</td>
<td>$(173,469)</td>
</tr>
<tr>
<td><strong>Hypothetical Wind Up</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assets</td>
<td>$12,992,700¹</td>
<td>$10,834,700¹</td>
</tr>
<tr>
<td>Liabilities</td>
<td>20,339,822</td>
<td>17,869,171</td>
</tr>
<tr>
<td><strong>Surplus/(Deficit)</strong></td>
<td>$(7,347,122)</td>
<td>$(7,034,471)</td>
</tr>
</tbody>
</table>

Normal Cost

<table>
<thead>
<tr>
<th>($000's)</th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Normal Cost</strong></td>
<td>$280,351</td>
<td>$300,085</td>
</tr>
<tr>
<td><strong>Required Member Contributions</strong></td>
<td>82,024</td>
<td>72,696</td>
</tr>
<tr>
<td><strong>Company Normal Cost</strong></td>
<td>$198,327</td>
<td>$227,389</td>
</tr>
<tr>
<td><strong>As a % of pensionable earnings</strong></td>
<td>18.9%</td>
<td>20.1%</td>
</tr>
</tbody>
</table>

¹ Net of estimated wind up expenses
### Legislative Ratios

<table>
<thead>
<tr>
<th>Ratio</th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solvency ratio</td>
<td>0.99</td>
<td>0.99</td>
</tr>
<tr>
<td>Transfer ratio</td>
<td>0.64</td>
<td>0.61</td>
</tr>
</tbody>
</table>

### Minimum Contribution Requirements

Considering the funding and solvency status of the Plan, the minimum Company contributions for the period from January 1, 2016 to December 31, 2018 in accordance with legislative requirements, are as follows:

<table>
<thead>
<tr>
<th>($000's)</th>
<th>Jan 1, 2016 to Dec 31, 2016</th>
<th>Jan 1, 2017 to Dec 31, 2017</th>
<th>Jan 1, 2018 to Dec 31, 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company normal cost</td>
<td>$ 198,327</td>
<td>$ 192,954</td>
<td>$ 195,828</td>
</tr>
<tr>
<td>Special payments toward amortizing unfunded liability</td>
<td>54,756</td>
<td>54,756</td>
<td>54,756</td>
</tr>
<tr>
<td><strong>Minimum Required Company Contribution</strong></td>
<td><strong>$ 253,083</strong></td>
<td><strong>$ 247,710</strong></td>
<td><strong>$ 250,584</strong></td>
</tr>
</tbody>
</table>
# Key Assumptions

The principal assumptions to which the valuation results are most sensitive are outlined in the following table.

## Going Concern

<table>
<thead>
<tr>
<th></th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discount rate</td>
<td>5.50% per year</td>
<td>5.60% per year</td>
</tr>
<tr>
<td>Inflation rate</td>
<td>2.00% per year</td>
<td>Same</td>
</tr>
<tr>
<td>Increase in pensionable earnings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active members</td>
<td>2.00% per year for 3 years,</td>
<td>2.50% per year for 3 years,</td>
</tr>
<tr>
<td></td>
<td>2.75% per year thereafter; plus promotion, progression and merit (“PPM”) scale</td>
<td>3.00% per year thereafter; plus PPM scale</td>
</tr>
<tr>
<td>Disabled members</td>
<td>2.00% per year</td>
<td>Same</td>
</tr>
<tr>
<td>Increase in year’s maximum pensionable earnings (“YMPE”)</td>
<td>2.75% per year</td>
<td>2.50% per year for 3 years, 3.00% per year thereafter</td>
</tr>
<tr>
<td>Increase in <em>Income Tax Act</em> maximum pension</td>
<td>2.75% per year</td>
<td>2.50% per year for 3 years, 3.00% per year thereafter</td>
</tr>
<tr>
<td>Mortality table</td>
<td>OPG-specific mortality table with generational mortality improvements using Canadian Pensioner Mortality Improvement Scale B (&quot;CPM-B&quot;) (Table B in Appendix D)</td>
<td>Same</td>
</tr>
</tbody>
</table>

## Solvency/Hypothetical Wind Up

<table>
<thead>
<tr>
<th></th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discount rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypothetical Wind Up</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(includes indexation):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commuted Value</td>
<td>1.20% per year for 10 years;</td>
<td>1.70% per year for 10 years;</td>
</tr>
<tr>
<td></td>
<td>1.70% per year thereafter</td>
<td>2.30% per year thereafter</td>
</tr>
<tr>
<td>Annuity Purchase</td>
<td>-0.05% per year</td>
<td>0.15% per year</td>
</tr>
<tr>
<td>Solvency:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commuted Value</td>
<td>1.90% per year for 10 years;</td>
<td>3.10% per year for 10 years;</td>
</tr>
<tr>
<td></td>
<td>3.60% per year thereafter</td>
<td>4.60% per year thereafter</td>
</tr>
<tr>
<td>Annuity Purchase</td>
<td>3.09% per year</td>
<td>3.92% per year</td>
</tr>
<tr>
<td>Increase in pensionable earnings</td>
<td>Not applicable</td>
<td>Same</td>
</tr>
<tr>
<td>Mortality table</td>
<td>2014 Canadian Pensioner Mortality Table (“CPM2014”) with generational mortality improvements using CPM-B</td>
<td>1994 Uninsured Pensioners Mortality Table with generational mortality improvements using Scale AA</td>
</tr>
</tbody>
</table>
Section 1: Introduction

Purpose and Terms of Engagement

We have been engaged by Ontario Power Generation Inc. and hereafter referred to as the Company, to conduct an actuarial valuation of the Plan, registered in Ontario, as at January 1, 2016 for the general purpose of determining the minimum and maximum funding contributions required by pension standards, based on the actuarial assumptions and methods summarized herein. More specifically, the purposes of the valuation are to:

- Determine the financial position of the Plan on a going concern basis as at January 1, 2016;
- Determine the financial position of the Plan as at January 1, 2016 on a solvency and hypothetical wind up basis;
- Determine the funding requirements of the Plan as at January 1, 2016; and
- Provide the necessary actuarial certification required under the Pension Benefits Act (Ontario) and the Income Tax Act.

The results of this report may not be appropriate for accounting purposes or any other purposes not listed above.

The next required valuation will be as at January 1, 2019.

Summary of Changes Since the Last Valuation

The last such actuarial valuation in respect of the Plan was performed as at January 1, 2014. Since the time of the last valuation, we note that the following events have occurred:

- Effective April 1, 2015, required member contributions for participants represented by the PWU have increased to 6.00% of pensionable earnings below the YMPE plus 8.00% of pensionable earnings above the YMPE.
- Effective January 1, 2016, required member contributions for participants hired before July 1, 2014 and not represented by the Society or the PWU (i.e., Management Group employees) increased to 7.30% of pensionable earnings below the YMPE, plus 8.25% of pensionable earnings above the YMPE, but not exceeding the Earnings Limit, plus 2.00% of pensionable earnings above the Earnings Limit.
- Effective January 1, 2016, required member contributions for participants hired on and after July 1, 2014 and not represented by the Society or the PWU (i.e., Management Group employees) increased to 7.60% of pensionable earnings below the YMPE, plus 9.50% of pensionable earnings above the YMPE, but not exceeding the Earnings Limit, plus 2.00% of pensionable earnings above the Earnings Limit.
- Effective January 1, 2016, required member contributions for participants represented by the Society increased to 8.00% of pensionable earnings.
- The above plan changes were reflected in the May 2015 Interim Actuarial Certificate, the October 2015 Interim Actuarial Certificate, and the May 2016 Interim Actuarial Certificate.
The Canadian Institute of Actuaries ("CIA") made revisions to the guidance for assumptions for hypothetical wind up and solvency valuations effective September 30, 2015 and October 1, 2015 (for annuity purchase and commuted value assumptions respectively). The key change to the guidance is the requirement to use the CPM2014 Mortality Table combined with generational mortality improvements using CPM-B to determine the liabilities.

Effective with this valuation, a number of changes have been made to the going concern assumptions including:

- Changes to key economic assumptions (e.g., discount rate, increase in pensionable earnings, increase in YMPE, increase in maximum pension limit under Income Tax Act);
- Changes to the demographic assumptions (e.g., termination rates and disability rates) to better reflect observed data.

The going concern actuarial value of assets has been determined using a smoothed value of assets with all investment gains and losses since January 1, 2014 deferred and amortized over five years.

**Company Information and Inputs**

In order to prepare our valuation, we have relied upon the following information:

- A copy of the previous valuation report as at January 1, 2014;
- A copy of the interim actuarial certificates as at May 2015, October 2015, and May 2016;
- Membership data compiled as at January 1, 2016 by the Company;
- Asset data taken from the Plan's audited financial statements; and
- A copy of the latest Plan text and amendments up to and including January 1, 2016.

Furthermore, our actuarial assumptions and methods have been chosen with due respect to accepted actuarial practice and regulatory constraints.
Subsequent Events

As of the date of this report, we have not been made aware of any subsequent events which would have an effect on the results of this valuation. However, the following points should be noted in this regard:

- Actual experience deviating from expected after January 1, 2016 will result in gains or losses which will be reflected in the next actuarial valuation report.

- The Company has announced the following plan changes which have been reflected in this actuarial valuation:
  - Effective April 1, 2016, required member contributions for participants represented by the PWU will increase to 7.00% of pensionable earnings below the YMPE, plus 9.00% of pensionable earnings above the YMPE.
  - Effective January 1, 2017, required member contributions for participants not represented by the Society or the PWU (i.e., Management Group employees) will increase to 7.60% of pensionable earnings below the YMPE, plus 9.50% of pensionable earnings above the YMPE, but not exceeding the Earnings Limit, plus 4.50% of pensionable earnings above the Earnings Limit.
  - Effective January 1, 2017, required member contributions for participants represented by the Society will increase to 9.00% of pensionable earnings.
  - Effective April 1, 2017, required member contributions for participants represented by the PWU will increase to 7.50% of pensionable earnings below the YMPE, plus 10.00% of pensionable earnings above the YMPE.

- To the best of our knowledge, the results contained in this report are based on the regulatory and legal environment in effect at the date of this report and do not take into consideration any potential changes that may be currently under review. To the extent that actual changes in the regulatory and legal environment transpire, any financial impact on the Plan as a result of such changes will be reflected in future valuations.
Section 2: Going Concern Valuation Results

Going Concern Financial Position of the Plan

The going concern valuation provides an assessment of the Plan’s financial position at the valuation date on the premise that the Plan continues indefinitely into the future.

The selection of the applicable actuarial assumptions and methods reflect actuarial standards of practice and pension standards.

On the basis of the Plan provisions, membership data, going concern assumptions and methods, and asset information described in the Appendices, the going concern financial position of the Plan as at January 1, 2016 is shown in the following table. The results as at January 1, 2014 are also shown for comparison purposes.

Going Concern Financial Position

<table>
<thead>
<tr>
<th>($000's)</th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market Value of Assets</td>
<td>$ 13,066,000</td>
<td>$ 10,908,000</td>
</tr>
<tr>
<td>Asset Smoothing Adjustment</td>
<td>(1,023,567)</td>
<td>0</td>
</tr>
<tr>
<td><strong>Actuarial Value of Assets</strong></td>
<td>$ 12,042,433</td>
<td>$ 10,908,000</td>
</tr>
</tbody>
</table>

| **Going Concern Liabilities** |                |                |
| Active members and disabled members | $ 4,993,452   | $ 5,426,807   |
| Deferred vested members        | 139,089        | 106,554        |
| Retired members and beneficiaries | 7,394,556    | 6,517,237      |
| Voluntary contributions with interest | 78             | 78             |
| **Total Liabilities**          | $ 12,527,175   | $ 12,050,676   |

| **Going Concern Position**     |                |                |
| Prior year credit balance      | 0              | 0              |
| **Surplus/(Unfunded Liability)** | $ (484,742)     | $ (1,142,676)  |

| **Funded Ratio**               | 0.96           | 0.91           |
On the basis of the Plan provisions, membership data, going concern assumptions and methods and asset information described in the Appendices, the going concern normal cost of the Plan as at January 1, 2016 is shown in the following table. The normal cost as at January 1, 2014 is also shown for comparison purposes.

### Going Concern Normal Cost

<table>
<thead>
<tr>
<th></th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normal Cost</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total normal cost</td>
<td>$ 280,351</td>
<td>$ 300,085</td>
</tr>
<tr>
<td>Required member contributions</td>
<td>(82,024)</td>
<td>(72,696)</td>
</tr>
<tr>
<td><strong>Company Normal Cost</strong></td>
<td>$ 198,327</td>
<td>$ 227,389</td>
</tr>
</tbody>
</table>

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total pensionable earnings (in year following valuation date)</td>
<td>$ 1,049,134</td>
<td>$ 1,129,462</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Company Normal Cost</strong></th>
<th>18.9%</th>
<th>20.1%</th>
</tr>
</thead>
</table>

As a % of Total Pensionable Earnings
Change in Financial Position

During the period from January 1, 2014 to January 1, 2016, the going concern financial position of the Plan changed from an unfunded liability of $1,142,676 to an unfunded liability of $484,742. The major components of this change are summarized in the following table.

Reconciliation of the Going Concern Financial Position for the Period from January 1, 2014 to January 1, 2016

($000's)

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surplus/(Unfunded Liability) as at January 1, 2014</td>
<td>$(1,142,676)</td>
</tr>
<tr>
<td>Expected interest on surplus/(unfunded liability)</td>
<td>$(131,563)</td>
</tr>
<tr>
<td>Company special payments in inter-valuation period with interest</td>
<td>278,945</td>
</tr>
<tr>
<td><strong>Expected Surplus/(Unfunded Liability) as at January 1, 2016</strong></td>
<td>$(995,294)</td>
</tr>
<tr>
<td>Change in liabilities due to experience gains/(losses)</td>
<td></td>
</tr>
<tr>
<td>Gain/(loss) from investment earnings greater/lower than expected</td>
<td>1,610,191</td>
</tr>
<tr>
<td>Gain/(loss) due to salary increases lower/greater than expected</td>
<td>93,493</td>
</tr>
<tr>
<td>Gain/(loss) due to indexation experience</td>
<td>756</td>
</tr>
<tr>
<td>Gain/(loss) due to retirement experience</td>
<td>5,999</td>
</tr>
<tr>
<td>Gain/(loss) due to mortality experience</td>
<td>24,307</td>
</tr>
<tr>
<td>Gain/(loss) due to disability experience</td>
<td>(13,227)</td>
</tr>
<tr>
<td>Gain/(loss) due to termination experience</td>
<td>(42,736)</td>
</tr>
<tr>
<td>Net gain/(loss) due to other experience and miscellaneous items</td>
<td>53,678</td>
</tr>
<tr>
<td><strong>Surplus/(Unfunded Liability) After Experience Gains/(Losses) as at January 1, 2016</strong></td>
<td>$737,167</td>
</tr>
<tr>
<td>Change due to asset smoothing</td>
<td>(1,023,567)</td>
</tr>
<tr>
<td>Provision for retirements higher than assumed in short-term inter-valuation period</td>
<td>(100,000)</td>
</tr>
<tr>
<td>Change in discount rate (0.1% decrease)</td>
<td>(179,246)</td>
</tr>
<tr>
<td>Change in salary scale / YMPE / ITA maximum pension increase rates (reset and decrease)</td>
<td>134,214</td>
</tr>
<tr>
<td>Change in termination assumption</td>
<td>10,960</td>
</tr>
<tr>
<td>Change due to removal of the disability assumption</td>
<td>(64,270)</td>
</tr>
<tr>
<td><strong>Surplus/(Unfunded Liability) as at January 1, 2016</strong></td>
<td>$(484,742)</td>
</tr>
</tbody>
</table>

1 Net of prior $100 million provision for retirements higher than assumed in short-term inter-valuation period
Discussion of Changes in Assumptions

Effective January 1, 2016, the following assumptions were changed:

Economic Assumptions
- The nominal discount rate has been changed from 5.60% per year to 5.50% per year.
- The net impact of the change in the nominal discount rate is a change in the real discount rate from 3.60% per year to 3.50% per year.
- The assumed increase in pensionable earnings for active members has been changed from 2.50% per year for three years and 3.00% per year thereafter, plus progression, promotion and merit (“PPM”) scale to 2.00% per year for three years and 2.75% thereafter, plus PPM scale.
- The assumed increase in the YMPE and in the maximum pension under the Income Tax Act has been changed from 2.50% for three years and 3.00% per year thereafter, to 2.75% per year.

In combination, these changes in assumptions increased the going concern liabilities by $45,032,000 and the total normal cost by $4,472,000.

Demographic Assumptions
- The assumed termination rates have been changed based on an analysis of the Company’s experience since 2010.
- The disability decrement assumption has been eliminated based on the Company’s experience since 2010 and materiality of this assumption.

In combination, these changes in assumptions increased the going concern liabilities by $53,310,000 and the total normal cost by $3,313,000.

Asset Valuation Method
- As anticipated in the January 1, 2014 Actuarial Valuation Report, the actuarial value of assets has been changed from market value of assets to a value reflecting an asset smoothing approach. All investment gains and losses since January 1, 2014 are deferred and amortized over five years.

Discussion of Plan Amendments

This valuation reflects the following plan amendments which came into effect during the period covered by the prior valuation.

- Effective April 1, 2015, required member contributions for participants represented by the PWU have increased to 6.00% of pensionable earnings below the YMPE plus 8.00% of pensionable earnings above the YMPE.
- Effective January 1, 2016, required member contributions for participants hired before July 1, 2014 and not represented by the Society or the PWU (i.e., Management Group employees) increased to 7.30% of pensionable earnings below the YMPE, plus 8.25% of pensionable earnings above the
YMPE, but not exceeding the Earnings Limit, plus 2.00% of pensionable earnings above the Earnings Limit.

- Effective January 1, 2016, required member contributions for participants hired on or after July 1, 2014 and not represented by the Society or the PWU (i.e., Management Group employees) increased to 7.60% of pensionable earnings below the YMPE, plus 9.50% of pensionable earnings above the YMPE, but not exceeding the Earnings Limit, plus 2.00% of pensionable earnings above the Earnings Limit.

- Effective January 1, 2016, required member contributions for participants represented by the Society increased to 8.00% of pensionable earnings.

This valuation reflects the following plan changes coming into effect during the period covered by this report.

- Effective April 1, 2016, required member contributions for participants represented by the PWU will increase to 7.00% of pensionable earnings below the YMPE, plus 9.00% of pensionable earnings above the YMPE.

- Effective January 1, 2017, required member contributions for participants not represented by the Society or the PWU (i.e., Management Group employees) will increase to 7.60% of pensionable earnings below the YMPE, plus 9.50% of pensionable earnings above the YMPE, but not exceeding the Earnings Limit, plus 4.50% of pensionable earnings above the Earnings Limit.

- Effective January 1, 2017, required member contributions for participants represented by the Society will increase to 9.00% of pensionable earnings.

- Effective April 1, 2017, required member contributions for participants represented by the PWU will increase to 7.50% of pensionable earnings below the YMPE, plus 10.00% of pensionable earnings above the YMPE.

The impacts of these changes are reflected in the Company Normal Costs for each year.
## Going Concern Valuation Sensitivity Results

In accordance with the CIA Standards of Practice specific to pension plans that became effective December 31, 2010, the table below presents the sensitivity of the going concern liabilities and the total normal cost of using a discount rate 1% lower than that used for the going concern valuation.

<table>
<thead>
<tr>
<th>($000’s)</th>
<th>Valuation Basis January 1, 2016</th>
<th>Based on Rate of 1% Lower</th>
<th>Effect $</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Going concern liabilities</td>
<td>$12,527,175</td>
<td>$14,553,274</td>
<td>$2,026,099</td>
<td>16.2%</td>
</tr>
<tr>
<td>Total normal cost</td>
<td>$280,351</td>
<td>$357,825</td>
<td>$77,474</td>
<td>27.6%</td>
</tr>
</tbody>
</table>

Note that using a discount rate 1% higher than that assumed would result in a comparable reduction in the Plan's going concern liabilities and normal cost.
Section 3: Solvency Valuation Results

Solvency Financial Position of the Plan

The solvency valuation is a financial assessment of the Plan that is required by the Pension Benefits Act (Ontario) and is performed in accordance with requirements prescribed by that legislation. It is intended to provide an assessment of the Plan's financial position at the valuation date on the premise that certain obligations as prescribed by the Pension Benefits Act (Ontario) are settled on the valuation date for all members.

On the basis of the Plan provisions, membership data, solvency assumptions and methods and asset information described in the Appendices, as well as the requirements of the Pension Benefits Act (Ontario), the solvency financial position of the Plan as at January 1, 2016 is shown in the following table. The solvency financial position of the Plan as at January 1, 2014 is shown for comparison purposes.

Solvency Financial Position

($000's) January 1, 2016 January 1, 2014

Assets
Solvency assets $ 13,066,000 $ 10,908,000
Estimated wind up expenses (73,300) (73,300)
Total Assets $ 12,992,700 $ 10,834,700

Solvency Liabilities
Active members and disabled members $ 5,531,321 $ 5,048,305
Deferred vested members 136,828 94,482
Retired members and beneficiaries 7,579,264 5,865,304
Voluntary contributions with interest 78 78
Total Liabilities $ 13,247,491 $ 11,008,169

Solvency Position
$ (254,791) $ (173,469)
Solvency asset adjustment:
Present value of special payments 242,747 173,469
Solvency Surplus/(Deficiency) $ (12,044) $ 0

Solvency ratio 0.99 0.99

1 Limited to amount required to eliminate the deficit
Solvency Concerns

A report indicates solvency concerns under the Pension Benefits Act (Ontario) if the ratio of the solvency assets to solvency liabilities is less than 0.85.

Where a report indicates solvency concerns, the effective date of the next valuation that needs to be filed under the Pension Benefits Act (Ontario) is one year from the valuation date of the valuation that gave rise to the solvency concerns.

Since the ratio of solvency assets to solvency liabilities is equal to 0.99, this report does not indicate solvency concerns.

Solvency Asset Adjustment

The present value of scheduled special payments for solvency valuation purposes has been calculated by discounting the annual special payments to be remitted up to the end of their amortization period (to a maximum of five years) at the smoothed solvency discount rate of 2.90% per year compounded monthly in arrears determined proportionately by the solvency discount rates used to settle the solvency liabilities.

($000's)

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Effective Date</th>
<th>End Date</th>
<th>Annual Special Payment</th>
<th>Present Value as of January 1, 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Going concern</td>
<td>January 1, 2014</td>
<td>December 31, 2028</td>
<td>$52,164</td>
<td>$242,747</td>
</tr>
<tr>
<td><strong>Present Value of Special Payments</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$242,747</strong></td>
</tr>
</tbody>
</table>

Solvency Valuation Sensitivity Results

In accordance with the CIA Standards of Practice specific to pension plans that became effective December 31, 2010, the table below presents the sensitivity of the solvency liabilities to using a discount rate of 1% lower than that used for the solvency valuation.

($000's)

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Valuation Basis January 1, 2016</th>
<th>Based on Rate of 1% Lower</th>
<th>Effect</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solvency liabilities</td>
<td>$13,247,491</td>
<td>$15,314,876</td>
<td>$2,067,385</td>
<td>15.6%</td>
</tr>
</tbody>
</table>

Note that using a discount rate 1% higher than that assumed would result in a comparable reduction in the solvency liabilities.
Pension Benefits Guarantee Fund (“PBGF”)

The development of the PBGF Assessment Base is as follows:

(to the nearest dollar)

<table>
<thead>
<tr>
<th>PBGF Assessment Base</th>
<th>January 1, 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Solvency assets</td>
<td>$ 13,066,000,000</td>
</tr>
<tr>
<td>(2) PBGF liabilities</td>
<td>$ 13,247,491,000</td>
</tr>
<tr>
<td>(3) Solvency liabilities</td>
<td>$ 13,247,491,000</td>
</tr>
<tr>
<td>(4) Ontario asset ratio: [(2) divided by (3)]</td>
<td>1.0000</td>
</tr>
<tr>
<td>(5) Ontario portion of fund: [(1) multiplied by the ratio in (4)]</td>
<td>$ 13,066,000,000</td>
</tr>
<tr>
<td>PBGF assessment base: [(2) subtract (5); if negative, enter zero]</td>
<td>$ 181,491,000</td>
</tr>
</tbody>
</table>

**PBGF Assessment**

- 0.5% of any portion of the applicable PBGF assessment base that is less than 10% of the PBGF liabilities $ 907,455
- 1.0% of any portion of the applicable PBGF assessment base that is 10% or more but less than 20% of the PBGF liabilities -
- 1.5% of any portion of the applicable PBGF assessment base that is 20% or more of the PBGF liabilities -

(1) Total $ 907,455

Number of Ontario plan members, former members and other beneficiaries 21,776

(2) $5.00 x Number of Ontario Plan Members, Former Members and Other Beneficiaries $ 108,880

(3) $300.00 x Number of Ontario Plan Members, Former Members and Other Beneficiaries $ 6,532,800

**Total Guarantee Fund Assessment** Lesser of [(1)+(2)] and (3) $ 1,016,335

The Guarantee Fund Assessment may be adjusted to the extent that contributions during a plan year are in excess of the minimum required company contributions.

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1 Does not include retail sales tax
Section 4: Hypothetical Wind Up Valuation Results

Hypothetical Wind Up Financial Position of the Plan

A hypothetical wind up valuation is performed to determine the financial position of the Plan as at the valuation date on a wind up basis, reflecting market settlement rates as of the valuation date. Unlike the solvency valuation, all benefits are included that would be payable under the postulated scenario that would maximize benefits. The hypothetical wind up valuation is determined using benefit entitlements on the assumption that the Plan has neither a surplus nor a deficit and that a competitive market for indexed annuities exists. Contingent benefits are included in the liabilities that would be payable under the postulated scenario. Assets are set equal to market value net of estimated wind up expenses. All assumptions for the hypothetical wind up valuation are listed in Appendix E of the report.

On the basis of Plan provisions, membership data, hypothetical wind up assumptions and methods, and asset information described in the Appendices, as well as the requirements of the Pension Benefits Act (Ontario), the hypothetical wind up financial position of the Plan as at January 1, 2016 is shown in the following table. The hypothetical wind up financial position of the Plan as at January 1, 2014 is shown for comparison purposes.

Hypothetical Wind Up Financial Position

<table>
<thead>
<tr>
<th>($000's)</th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypothetical wind up assets</td>
<td>$ 13,066,000</td>
<td>$ 10,908,000</td>
</tr>
<tr>
<td>Estimated wind up expenses</td>
<td>(73,300)</td>
<td>(73,300)</td>
</tr>
<tr>
<td><strong>Total Assets</strong></td>
<td>$ 12,992,700</td>
<td>$ 10,834,700</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Hypothetical Wind Up Liabilities</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Active members and disabled members</td>
<td>$ 8,943,852</td>
<td>$ 8,650,749</td>
</tr>
<tr>
<td>Deferred vested members</td>
<td>228,235</td>
<td>172,438</td>
</tr>
<tr>
<td>Retired members and beneficiaries</td>
<td>11,167,657</td>
<td>9,045,906</td>
</tr>
<tr>
<td>Voluntary contributions with interest</td>
<td>78</td>
<td>78</td>
</tr>
<tr>
<td><strong>Total Liabilities</strong></td>
<td>$ 20,339,822</td>
<td>$ 17,869,171</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Hypothetical Wind Up Surplus/(Deficiency)</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$ (7,347,122)</td>
<td>$ (7,034,471)</td>
</tr>
</tbody>
</table>
Transfer Ratio

The transfer ratio is determined as follows:

($000's)  

<table>
<thead>
<tr>
<th>Description</th>
<th>January 1, 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Hypothetical wind up assets</td>
<td>$ 13,066,000</td>
</tr>
<tr>
<td>Prior year credit balance</td>
<td>$ 0</td>
</tr>
<tr>
<td>Total company normal cost and required special payments until next mandated valuation</td>
<td>(A) $ 0, (B) $ 751,377</td>
</tr>
<tr>
<td>(2) Asset adjustment</td>
<td>$ 0</td>
</tr>
<tr>
<td>Lesser of (A) and (B)</td>
<td>$ 0</td>
</tr>
<tr>
<td>(3) Hypothetical wind up liabilities</td>
<td>$ 20,339,822</td>
</tr>
</tbody>
</table>

Transfer Ratio [(1)-(2)] / (3) 0.64

Hypothetical Wind Up Valuation Sensitivity Results

In accordance with the CIA Standards of Practice specific to pension plans that became effective December 31, 2010, the table below presents the sensitivity of the hypothetical wind up liabilities to using a discount rate of 1% lower than that used for the hypothetical wind up valuation.

($000's)

<table>
<thead>
<tr>
<th>Valuation Basis</th>
<th>January 1, 2016</th>
<th>Based on Rate of 1% Lower</th>
<th>Effect</th>
<th>Effect %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothetical wind up liabilities</td>
<td>$ 20,339,822</td>
<td>$ 24,545,209</td>
<td>$ 4,205,387</td>
<td>20.7%</td>
</tr>
</tbody>
</table>

Note that using a discount rate 1% higher than that assumed would result in a comparable reduction in the hypothetical wind up liabilities.

Incremental Cost on a Hypothetical Wind Up Basis

The incremental cost on a hypothetical wind up basis represents the present value at January 1, 2016 of the expected aggregate change in the hypothetical wind up liabilities between January 1, 2016 and the next calculation date, that is, January 1, 2019. Appendix E gives more details on the calculation methodology and on assumptions.

Based on this methodology and on these assumptions, the incremental cost on a hypothetical wind up basis can be found in following table.

($000's)  

<table>
<thead>
<tr>
<th>Description</th>
<th>Jan 1, 2016 to Dec 31, 2016</th>
<th>Jan 1, 2017 to Dec 31, 2017</th>
<th>Jan 1, 2018 to Dec 31, 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incremental cost on a hypothetical wind up basis</td>
<td>$ 913,100</td>
<td>$ 1,018,553</td>
<td>$ 1,044,096</td>
</tr>
</tbody>
</table>
Section 5: Contribution Requirements

Contribution Requirements in Respect of the Normal Cost

The annual going concern cost of benefits in respect of service accruing after the valuation date is known as the normal cost. The following table sets out:

- The development of the rule to determine the normal cost until the next actuarial funding range in accordance with legislative requirements is certified;
- An estimate of the normal cost for the three year(s) following the valuation date; and
- The portion of the going concern normal cost that is to be paid by the members.

<table>
<thead>
<tr>
<th>($000's)</th>
<th>Jan 1, 2016 to Dec 31, 2016</th>
<th>Jan 1, 2017 to Dec 31, 2017</th>
<th>Jan 1, 2018 to Dec 31, 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normal Cost</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total normal cost</td>
<td>$ 280,351</td>
<td>$ 285,958</td>
<td>$ 291,677</td>
</tr>
<tr>
<td>Required member contributions</td>
<td>(82,024)</td>
<td>(93,004)</td>
<td>(95,849)</td>
</tr>
<tr>
<td><strong>Company Normal Cost</strong></td>
<td>$ 198,327</td>
<td>$ 192,954</td>
<td>$ 195,828</td>
</tr>
</tbody>
</table>

| Total pensionable earnings | $ 1,049,134                 | $ 1,070,117                 | $ 1,091,519                 |
| **Company Normal Cost As a % of Pensionable Earnings** | 18.9%                       | 18.0%                       | 17.9%                       |

In the event an updated funding range in accordance with legislative requirements is not certified before January 1, 2019, the rule for determining the company normal cost contributions outlined in the above table will continue to be appropriate for the plan year commencing on the next valuation date of January 1, 2019. Adjustment to the company contributions may be required once the next actuarial funding range in accordance with legislative requirements is certified.

Increases in required member contributions coming into effect during 2016 and 2017 are reflected in the Normal Cost calculations.
Development of Special Payments

The following table summarizes previously established amortization schedules of special payments before adjustment to reflect any gains or losses due to the going concern and solvency valuation results.

($000’s)

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Effective Date</th>
<th>End Date</th>
<th>Annual Special Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Going concern</td>
<td>January 1, 2005</td>
<td>December 31, 2019</td>
<td>$ 27,726</td>
</tr>
<tr>
<td>Going concern</td>
<td>January 1, 2011</td>
<td>December 31, 2025</td>
<td>$ 37,111</td>
</tr>
<tr>
<td>Going concern</td>
<td>January 1, 2014</td>
<td>December 31, 2028</td>
<td>$ 66,011</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$ 130,848</td>
</tr>
</tbody>
</table>

The following table summarizes the amortization schedules of special payments after adjustment to reflect any gains or losses due to the going concern and solvency valuation results.

($000's)

<table>
<thead>
<tr>
<th>Nature of Deficiency</th>
<th>Effective Date</th>
<th>End Date</th>
<th>Present Value of Annual Special Payment</th>
<th>For Going Concern Valuation</th>
<th>For Solvency Valuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Going concern</td>
<td>January 1, 2014</td>
<td>December 31, 2028</td>
<td>$ 52,164</td>
<td>$ 484,742</td>
<td>$ 242,747</td>
</tr>
<tr>
<td>Solvency</td>
<td>January 1, 2016</td>
<td>December 31, 2020</td>
<td>$ 2,592</td>
<td>n/a</td>
<td>12,044</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$ 54,756</td>
<td>$ 484,742</td>
<td>$ 254,791</td>
</tr>
</tbody>
</table>

Prior Year Credit Balance (“PYCB”)

There is no PYCB as at January 1, 2016.

Excess Surplus

The Income Tax Act requires that any excess surplus first be applied to reduce or eliminate the company contribution requirements. Excess surplus is defined in Section 147.2(2)(d) of the Income Tax Act, as the portion of surplus (if any) that exceeds 25% of the going concern liabilities.

Since the plan has unfunded liability and hypothetical wind up deficiency, there is no excess surplus and therefore it does not impact the development of the Company contribution requirements.

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1 The values in the table were developed using the going concern interest rate of 5.50% per year compounded monthly in arrears.
2 The values in the table were developed using the weighted average solvency interest rate of 2.90% per year compounded monthly in arrears with a maximum of five years of such payments included in the calculation.
# Development of Minimum Required Company Contribution

The table below presents the development of the minimum required company contribution for each of the plan years covered by this report.

While we have shown a fixed company normal cost in the table below, the Company may fund the normal cost as a percentage of pensionable earnings.

<table>
<thead>
<tr>
<th>($000's)</th>
<th>Jan 1, 2016 to Dec 31, 2016</th>
<th>Jan 1, 2017 to Dec 31, 2017</th>
<th>Jan 1, 2018 to Dec 31, 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company normal cost</td>
<td>$198,327</td>
<td>$192,954</td>
<td>$195,828</td>
</tr>
<tr>
<td>Special payments toward amortizing unfunded liability</td>
<td>52,164</td>
<td>52,164</td>
<td>52,164</td>
</tr>
<tr>
<td>Special payments toward amortizing solvency deficiency</td>
<td>2,592</td>
<td>2,592</td>
<td>2,592</td>
</tr>
<tr>
<td>Required application of excess surplus</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Permitted application of surplus</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Minimum Required Company Contribution</strong></td>
<td><strong>$253,083</strong></td>
<td><strong>$247,710</strong></td>
<td><strong>$250,584</strong></td>
</tr>
</tbody>
</table>
Development of Maximum Deductible Company Contribution

The table below presents the development of the maximum deductible company contribution for each of the plan years covered by this report.

The maximum deductible company contribution presented in the table below for a given plan year is calculated assuming that the Company makes the maximum deductible company contribution in the first plan year covered by this report.

While we have shown a fixed company normal cost in the table below, the Company may fund the normal cost as a percentage of pensionable earnings.

<table>
<thead>
<tr>
<th>($000's)</th>
<th>Jan 1, 2016 to Dec 31, 2016</th>
<th>Jan 1, 2017 to Dec 31, 2017</th>
<th>Jan 1, 2018 to Dec 31, 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company normal cost</td>
<td>$198,327</td>
<td>$192,954</td>
<td>$195,828</td>
</tr>
<tr>
<td>Greater of the unfunded liabilities and the hypothetical wind up deficiency</td>
<td>7,347,122</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Required application of excess surplus</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Maximum Deductible Company Contribution</strong></td>
<td><strong>$7,545,449</strong></td>
<td><strong>$192,954</strong></td>
<td><strong>$195,828</strong></td>
</tr>
</tbody>
</table>

If the Company wishes to make the maximum deductible company contribution, it is advisable to contact the Plan’s actuary before making such contribution to ensure that the contribution will be permissible and deductible and that any regulatory requirements are considered.
Section 6: Actuarial Certificate

Actuarial Opinion, Advice and Certification for the Ontario Power Generation Inc. Pension Plan

Financial Services Commission of Ontario Registration Number: 1059120
Canada Revenue Agency Registration Number: 1059120

Opinion

This actuarial certification forms an integral part of the actuarial valuation report for the Plan as at January 1, 2016. We confirm that we have prepared an actuarial valuation of the Plan as at January 1, 2016 for the purposes outlined in the Introduction section to this report and consequently:

Our advice on funding is the following:

- The Company should contribute the amounts within the range of minimum and maximum contribution amounts as outlined in Section 5 of this report, in accordance with legislative requirements.
- The next actuarial valuation for the purpose of developing funding requirements should be performed no later than as at January 1, 2019.

We hereby certify that, in our opinion:

- With respect to the purposes of determining the Plan's financial position on a going concern basis as at January 1, 2016 (all figures in $000's):
  - The Plan has a going concern unfunded liability of $484,742 as at January 1, 2016, based on going concern assets of $12,042,433 less going concern liabilities of $12,527,175.
  - There is no excess surplus as defined by Section 147.2(2) of the Income Tax Act in the Plan at January 1, 2016.
  - The pre-1990 maximum pension restrictions in Subsection 8504(6) of the Regulations to the Income Tax Act do not apply to any members of the Plan.
- With respect to the purpose of determining the Plan's financial position on a solvency basis and hypothetical wind up basis (all figures in $000's):
  - The Plan has a solvency deficiency (before solvency asset adjustment) of $254,791 as at January 1, 2016, determined as solvency assets of $12,992,700 (after deducting estimated wind up expenses of $73,300) less solvency liabilities of $13,247,491. After reflecting the solvency asset adjustment the solvency deficiency is $12,044.
  - The solvency ratio is 0.99 as at January 1, 2016.
  - The transfer ratio is 0.64 as at January 1, 2016.
  - The Plan's liabilities would exceed the Plan's assets, net of estimated wind up expenses, by $7,347,122 if the Plan was terminated and wound up as at January 1, 2016.
- A PBGF assessment is required to be paid where the PBGF assessment base is equal to $181,491,000 and the PBGF liabilities are $13,247,491,000.

With respect to determining the funding requirements of the Plan:
- The rule for determining the company’s normal cost in respect of the defined benefit plan provision of the Plan is 18.9% of pensionable earnings for 2016, 18.0% for 2017 and 17.9% for 2018.
- The estimated total normal cost for the three years following the valuation date, including the portions of the normal cost attributed to members and the employer are as follows:

<table>
<thead>
<tr>
<th>($000's)</th>
<th>January 1, 2016</th>
<th>January 1, 2017</th>
<th>January 1, 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normal Cost</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total normal cost</td>
<td>$ 280,351</td>
<td>$ 285,958</td>
<td>$ 291,677</td>
</tr>
<tr>
<td>Required member contributions</td>
<td>(82,024)</td>
<td>(93,004)</td>
<td>(95,849)</td>
</tr>
<tr>
<td><strong>Company Normal Cost</strong></td>
<td>$ 198,327</td>
<td>$ 192,954</td>
<td>$ 195,828</td>
</tr>
</tbody>
</table>

Total pensionable earnings (in year following valuation date) $1,049,134 $1,070,117 $1,091,519

**Company Normal Cost**

As a % of Total Pensionable Earnings 18.9% 18.0% 17.9%

- The special payments required to fund the going concern unfunded liability and the solvency deficiency are as summarized in the following table:

<table>
<thead>
<tr>
<th>($000's)</th>
<th>Nature of Deficiency</th>
<th>Effective Date</th>
<th>End Date</th>
<th>Annual Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Going concern</td>
<td>January 1, 2014</td>
<td>December 31, 2028</td>
<td>$ 52,164</td>
</tr>
<tr>
<td></td>
<td>Solvency</td>
<td>January 1, 2016</td>
<td>December 31, 2020</td>
<td>$ 2,592</td>
</tr>
</tbody>
</table>

| Total     | $ 54,756             |

- The prior year credit balance is $0 as at January 1, 2016.
- The contribution range as outlined in this report is expected to be sufficient to satisfy the Plan’s funding requirements.
- The company contribution range outlined in this report qualifies as eligible contributions under Section 147.2(2) of the Income Tax Act.
In our opinion, for the purposes of the valuation:

- The data on which this valuation is based are sufficient and reliable;
- The assumptions used are appropriate; and
- The actuarial cost methods and the asset valuation methods used are appropriate.

This report and its associated work have been prepared, and our opinion given, in accordance with accepted actuarial practice in Canada and in compliance with the requirements outlined in subparagraphs 147.2(2)(a)(iii) and (iv) of the Income Tax Act.

Notwithstanding the above certifications, emerging experience differing from the assumptions will result in gains or losses that will be revealed in subsequent valuations.

Linda M. Byron, FCIA, FSA  
Senior Partner

Rosy Santoro, FCIA, FSA  
Associate Partner

Aon Hewitt  
225 King Street West, Suite 1600  
Toronto, Ontario M5V 3M2

September 2016
Appendix A: Glossary of Terms

- The **actuarial value of assets** is the asset value used for going concern valuation purposes. Smoothing methods are sometimes used to smooth investment gains and losses over a certain period.

- The **estimated wind up expenses** is an estimate of the administrative and other expenses expected to be charged against the pension fund if the Plan were to terminate on the valuation date.

- The **going concern liabilities** are the actuarial present value of benefits earned in respect of service prior to the valuation date. The actuary may choose to omit indexing liabilities (i.e., “escalated adjustments”) from the going concern liabilities as per Section 11(1) of the *Pension Benefits Act* (Ontario). However, if escalated adjustments are omitted from the going concern liabilities, the amount of payment of an escalated adjustment that is made from the pension fund, to the extent that it has not been funded, must be included in the normal cost pursuant to Section 11(2) of the Regulation to the *Pension Benefits Act* (Ontario). The going concern liabilities are calculated using the going concern assumptions and methods summarized in Appendix D of this report.

- The **going concern position** is the difference between the actuarial value of assets and the going concern liabilities. Escalated adjustments may be omitted from the determination of the surplus/(unfunded liability) pursuant to Section 11(3) of the Regulation to the *Pension Benefits Act* (Ontario).

- The **maximum deductible company contribution** refers to an eligible contribution pursuant to Section 147.2(2) of the *Income Tax Act*. Under Subsection 8502(b) of the Regulations to the *Income Tax Act*, each Company contribution made after January 1, 1991 in respect of a defined benefit provision of a registered pension plan must be such eligible contribution.

In a company’s fiscal year, the following contributions are eligible under Section 147.2(2) of the *Income Tax Act*.

- The company normal cost, eligible under Section 147.2(2) subject to certification by the actuary and approval by the Canada Revenue Agency; plus

- Special payments eligible under Section 147.2(2) up to the amount of the unfunded liability, the solvency deficiency, or the hypothetical wind up deficiency, whichever is greater, subject to certification by the actuary and approval by the Canada Revenue Agency; less

- Required application of excess surplus.

The company normal cost and special payments for this Plan will be deductible under Section 147.2(2) of the *Income Tax Act*, subject to the approval of the Canada Revenue Agency.

Note that contributions to a plan are still permissible and deductible if there is an excess surplus, providing there is simultaneously a solvency or hypothetical wind up deficiency in the Plan or the contributions are required as minimum contributions under provincial or federal *Pension Benefits Standards Act* legislation, pursuant to Subsections 8516(2) and (3) of the Regulations to the *Income Tax Act*. 
One restriction under the *Income Tax Act* is that if there is an excess surplus, and a solvency or hypothetical wind up deficiency, the maximum deductible contribution is restricted to the full amount of the deficiency without allowance for interest or any other contributions such as company normal cost and/or transfer deficiency payments.

In order to be deductible in a given fiscal year, company contributions must be made not later than 120 days after the end of the fiscal year.

- The **minimum required company contribution** for each plan year is equal to:
  - The company normal cost; plus
  - Special payments toward amortizing any unfunded liability over 15 years beginning no later than 12 months from the date on which the unfunded liability was established; plus
  - Special payments toward amortizing any solvency deficiency over five years beginning no later than 12 months from the date on which the solvency deficiency was established (this period of years may be longer if the Company has elected temporary funding relief options 3 and/or 5); less
  - Required application of excess surplus; less
  - Permitted application of surplus; less
  - Permitted application of PYCB.

In order to satisfy the requirements of the *Pension Benefits Act* (Ontario) and its Regulations, contributions to the fund must be made in accordance with the following rules:

- Required member contributions (if any) must be remitted to the pension fund within 30 days following the month in which the contributions were received from the member or deducted from his or her remuneration.
- Company normal cost contributions must be remitted to the pension fund within 30 days after the end of the month for which the contributions are payable.
- Special payments must be remitted to the pension fund in the month for which they are payable.

- The **prior year credit balance** is
  - The PYCB stated in the last report in respect of the Plan under the Regulation; plus
  - The total amount of contributions made to the Plan by the Company after the valuation date of the last report in respect of the Plan and before the valuation date for the report being prepared; less
  - The total minimum amount of contributions required to have been made after the valuation date of the last report in respect of the Plan and before the valuation date for the report being prepared, if the contributions had been calculated without reference to any PYCB.

The Company may choose to set the PYCB between nil and the amount as calculated above, but may not recapture the amount forfeited at any time.

- **Solvency/Hypothetical wind up assets** are the market value of pension fund assets adjusted to reflect contributions, benefit payments, transfers and fees/expenses in-transit at the valuation date.

- The **solvency asset adjustment** is an adjustment that may be made to the solvency assets to reflect:
  - The impact of using an averaging method that stabilizes short-term fluctuations in the market value of the Plan’s assets calculated over a period of not more than five years; plus
- The present value of any remaining special payments required to liquidate any unfunded liability (for service not previously recognized for benefit determination purposes) established after December 31, 1987; plus

- The present value of any remaining special payments other than those above that are scheduled for payment within six years after the valuation date. This period of years may be longer if the Company has elected temporary funding relief options 3 and/or 5.

- The **solvency liabilities** are the actuarial present value of benefits earned in respect of service prior to the valuation date determined as if the Plan were wound up on the valuation date and taking into account Section 74 of the *Pension Benefits Act* (Ontario) (i.e., grow-in). In calculating the solvency liabilities, which includes plant closure benefits or permanent layoff benefits that would be immediately payable if the Plan sponsor’s business was discontinued on the valuation date, the *Pension Benefits Act* (Ontario) and its Regulations permit the exclusion of the following benefits:
  - Any escalated adjustments;
  - “Excluded plant closure benefits” that the Company elected on November 26, 1992 to exclude;
  - “Excluded permanent layoff benefits” that the Company elected on November 26, 1992 to exclude;
  - Special allowances other than those where the member has met all age and service eligibility requirements;
  - Consent benefits other than those where the member has met all eligibility requirements except the consent of the employer, or in the case of a jointly sponsored pension plan, the consent of the employer or the administrator;
  - Prospective benefit increases;
  - Potential early retirement window benefit values; and
  - Pension and ancillary benefits payable under a qualifying annuity contract.

The solvency liabilities are determined using benefit entitlements on the assumption that the Plan has neither a surplus nor a deficit. The solvency liabilities are calculated using the solvency valuation assumptions summarized in Appendix E of this report.

- The **solvency liability adjustment** is an adjustment that may be made to the solvency liabilities to reflect the impact of using a solvency valuation discount rate for discounting the liability that is the average of market discount rates calculated over the same period of time as that used in the calculation of the solvency asset adjustment.

- The **solvency position** is the difference between the solvency assets (net of estimated wind up expenses) and the solvency liabilities.

- The **solvency ratio** compares the solvency assets to the solvency liabilities for purposes of Subsections 14(2) and (3) of the Regulations of the *Pension Benefits Act* (Ontario) to determine the latest effective date of the next required valuation.

- The **solvency surplus/(deficiency)** is the solvency position, increased by the solvency asset adjustment and the solvency liability adjustment, then decreased by the PYCB.

- The **special payments** are payments required to liquidate the unfunded liability and/or solvency deficiency:
The going concern special payments are payments required to liquidate the unfunded liability, with interest at the going concern valuation discount rate, by equal monthly instalments over a period of 15 years beginning no later than 12 months from the valuation date of the report in which the going concern unfunded liability was determined.

The solvency special payments are payments required to liquidate the solvency deficiency, with interest at the solvency valuation discount rate, by equal monthly instalments over a period of five years beginning no later than 12 months from the valuation date of the report in which the solvency deficiency was determined. This period of years may be longer if the Company has elected temporary funding relief options 3 and/or 5.

- The surplus/(unfunded liability) is the difference between the actuarial value of assets and the sum of the going concern liabilities and the PYCB.

- The total normal cost is the actuarial present value of benefits expected to be earned in respect of service for each year starting on the valuation date. Required member contributions (if any) are deducted from the total normal cost to determine the company normal cost. The total normal cost is calculated using the going concern valuation assumptions and methods summarized in Appendix D of this report.

- The transfer ratio compares the solvency assets, minus the lesser of the PYCB and the required company contributions until the next required valuation (before application of the PYCB), to the solvency liabilities plus the liability of any excluded benefits (except for pension benefits and ancillary benefits payable under a qualifying annuity contract). If the transfer ratio is less than 1.00, lump-sum transfers from the pension fund under Section 42 of the Pension Benefits Act (Ontario) are limited to the commuted value of the member’s pension multiplied by the transfer ratio. The administrator may transfer the entire commuted value if:

  - The administrator is satisfied that an amount equal to the transfer deficiency has been remitted to the pension fund; or

  - The aggregate of transfer deficiencies for all transfers made since the last valuation date does not exceed 5% of the Plan’s assets at that time.

In June 2009, Subsection 19 of the Regulations of the Pension Benefits Act (Ontario) was amended and Policy T800-402 was released. The Policy imposes additional restrictions for payment of commuted values under certain circumstances.
Appendix B: Assets

Asset Data

The Plan’s assets are held by CIBC Mellon Trust Company. The asset information presented in this report is based on the audited financial statements of the pension fund for 2014 and 2015 prepared by Ernst & Young LLP.

Tests of the sufficiency and reliability of the asset data were performed and the results were satisfactory. The tests included:

- A reconciliation of actual cash flow with expected cash flow from the previous actuarial report; and
- A reconciliation of any anticipated benefit payments in 2014 and 2015 (for retirees, terminated or deceased employees) against the financial statements of the pension fund for confirmation of payments.

Market Value of Assets

The following is a summary of the composition of the Plan’s assets by asset type as reported by OPG as at January 1, 2016. For comparison purposes, the composition at the previous valuation date of January 1, 2014 is also shown.

<table>
<thead>
<tr>
<th>($000's)</th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash and short term</td>
<td>1.5%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Canadian structured fixed income</td>
<td>14.5%</td>
<td>16.0%</td>
</tr>
<tr>
<td>Corporate fixed income</td>
<td>3.0%</td>
<td>2.9%</td>
</tr>
<tr>
<td>Real return bonds</td>
<td>14.6%</td>
<td>15.0%</td>
</tr>
<tr>
<td>Canadian equities</td>
<td>12.7%</td>
<td>19.6%</td>
</tr>
<tr>
<td>Global equities</td>
<td>30.2%</td>
<td>41.3%</td>
</tr>
<tr>
<td>Real assets</td>
<td>9.3%</td>
<td>3.8%</td>
</tr>
<tr>
<td>Return diversifying assets</td>
<td>14.2%</td>
<td>0.0%</td>
</tr>
<tr>
<td><strong>Total Invested Assets</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>

1 Distribution is based on a roll up of the investment strategies/accounts.
Target Asset Mix

The target asset mix of the Plan is contained in the Plan's Statement of Investment Policies and Procedures ("SIPP") dated November 2015 and is as follows:

<table>
<thead>
<tr>
<th>Target</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash and short term</td>
<td>1.0%</td>
</tr>
<tr>
<td>Canadian structured fixed income</td>
<td>15.0%</td>
</tr>
<tr>
<td>Corporate fixed income</td>
<td>3.0%</td>
</tr>
<tr>
<td>Real return bonds</td>
<td>15.0%</td>
</tr>
<tr>
<td>Canadian equities</td>
<td>10.0%</td>
</tr>
<tr>
<td>Global equities</td>
<td>21.0%</td>
</tr>
<tr>
<td>Emerging markets equities</td>
<td>2.0%</td>
</tr>
<tr>
<td>Real assets</td>
<td>20.0%</td>
</tr>
<tr>
<td>Return diversifying assets</td>
<td>13.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

A new SIPP dated August 2016 has been adopted. A review of the impact on the expected return on assets was done and was determined to not be materially different than the result based on the target mix in the November 2015 SIPP.
Reconciliation of Changes in Market Value of Assets

The table below reconciles changes in the market value of assets between January 1, 2014 and January 1, 2016.

<table>
<thead>
<tr>
<th>($000's)</th>
<th>Jan 1, 2014 to Dec 31, 2014</th>
<th>Jan 1, 2015 to Dec 31, 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Market Value of Assets, Beginning of Plan Year</strong></td>
<td>$10,908,000</td>
<td>$12,324,000</td>
</tr>
<tr>
<td><strong>Contributions During Plan Year</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Required member contributions</td>
<td>$69,000</td>
<td>$71,000</td>
</tr>
<tr>
<td>Company normal cost</td>
<td>227,000</td>
<td>228,000</td>
</tr>
<tr>
<td>Company special payments</td>
<td>133,000</td>
<td>131,000</td>
</tr>
<tr>
<td>Company transfer deficiency payments</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Company ongoing expenses</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$429,000</td>
<td>$430,000</td>
</tr>
<tr>
<td><strong>Benefit Payments During Plan Year</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-retired members1</td>
<td>$220,000</td>
<td>$321,000</td>
</tr>
<tr>
<td>Retired members</td>
<td>478,000</td>
<td>514,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$698,000</td>
<td>$835,000</td>
</tr>
<tr>
<td><strong>Transfers During Plan Year</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Into plan</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Out of plan</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Fees/Expenses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment fees/expenses</td>
<td>$37,000</td>
<td>$48,000</td>
</tr>
<tr>
<td>Non-investment fees/expenses</td>
<td>10,000</td>
<td>12,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$47,000</td>
<td>$60,000</td>
</tr>
<tr>
<td><strong>Investment Income</strong></td>
<td>$1,732,000</td>
<td>$1,207,000</td>
</tr>
<tr>
<td><strong>Market Value of Assets, End of Plan Year</strong></td>
<td>$12,324,000</td>
<td>$13,066,000</td>
</tr>
</tbody>
</table>

1 Includes members who have terminated employment or died

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Aon Hewitt

Proprietary and Confidential

Actuarial Valuation as at January 1, 2016 for
Ontario Power Generation Inc. Pension Plan

Page 33 of 70
Development of Actuarial Value of Assets

The actuarial value of assets is determined by modifying the market value of assets to recognize asset gains (losses) (i.e., the difference between actual investment return and expected investment return based on the valuation discount rate assumption) over a five-year period.

The development of the actuarial value of assets as of January 1, 2016 is shown below:

<table>
<thead>
<tr>
<th>Year Ending</th>
<th>Original Amount of (Gain) Loss</th>
<th>(Gain) Loss Admitted in Prior Years</th>
<th>(Gain) Loss Admitted in 2015</th>
<th>(Gain) Loss to be Admitted in Future Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 31, 2014</td>
<td>$(1,081,684)</td>
<td>$(216,337)</td>
<td>$(216,337)</td>
<td>$(649,010)</td>
</tr>
<tr>
<td>December 31, 2015</td>
<td>$(468,196)</td>
<td>0</td>
<td>$(93,639)</td>
<td>$(374,557)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$(216,337)</td>
<td>$(309,976)</td>
<td>$(1,023,567)</td>
</tr>
</tbody>
</table>

Adjusted Market Value of Assets, January 1, 2016  
13,066,000

Actuarial Value of Assets, January 1, 2016  
$ 12,042,433
Appendix C: Membership Data

Source of Data

This funding valuation was based on member data provided by the Company as of January 1, 2016. Tests of the sufficiency and reliability of the member data were performed and the results were satisfactory. The tests included:

- A reconciliation of membership status against the membership status at the last valuation. This test was performed to ensure that all members were accounted for. A summary of this reconciliation follows on the next page;
- A reconciliation of birth, hire, and participation dates against the corresponding dates provided for the last valuation to ensure consistency of data;
- A reconciliation of credited service against the corresponding amount provided for the last valuation to ensure that no member accrued more than 2 years of credited service from January 1, 2014, except for those who transferred service from their previous employer. This test also revealed any members who accrued less than 2 years of credited service;
- A reconciliation of pensionable earnings against the corresponding amounts provided for the last valuation to identify any unusual increases or decreases;
- A reconciliation of accrued benefits against the corresponding amounts provided for the last valuation to identify any unusual benefit accruals;
- A reconciliation of any stated benefit payments in 2014 and 2015 (for retired, terminated or deceased employees) against the financial statements of the pension fund for confirmation of the payments; and
- A reconciliation of inactive member benefit amounts against the corresponding amounts provided for the last valuation to ensure consistency of data.

There was no information missing from the data, so no assumptions were required with respect to such data.

A copy of the administrator certification certifying the accuracy and completeness of the member data (and the Plan provisions summarized in this report) is included in Appendix G of this report.
### Membership Summary

The table below reconciles the number of members as of January 1, 2016 with the number of members as of January 1, 2014 and the changes due to experience in the period.

<table>
<thead>
<tr>
<th></th>
<th>Actives</th>
<th>Disabled</th>
<th>Deferred Vested</th>
<th>Pensioners</th>
<th>Survivors</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Members, January 1, 2014</strong></td>
<td>10,271</td>
<td>373</td>
<td>804</td>
<td>8,600</td>
<td>2,045</td>
<td>22,093</td>
</tr>
<tr>
<td><strong>Changes due to:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New entrants</td>
<td>453</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>453</td>
</tr>
<tr>
<td>Rehired members</td>
<td>35</td>
<td>0</td>
<td>(35)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Returned from LTD</td>
<td>31</td>
<td>(31)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Terminations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deferred vested pension</td>
<td>(138)</td>
<td>(4)</td>
<td>142</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lump sum payment</td>
<td>(308)</td>
<td>(10)</td>
<td>(74)</td>
<td>0</td>
<td>0</td>
<td>(392)</td>
</tr>
<tr>
<td>Retirements</td>
<td>(981)</td>
<td>(38)</td>
<td>(61)</td>
<td>1,080</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Disability</td>
<td>(59)</td>
<td>59</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Deaths</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No further benefits</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>(89)</td>
<td>(106)</td>
<td>(195)</td>
</tr>
<tr>
<td>Lump sum</td>
<td>(3)</td>
<td>(1)</td>
<td>(5)</td>
<td>(90)</td>
<td>(97)</td>
<td>(196)</td>
</tr>
<tr>
<td>Surviving beneficiary</td>
<td>(11)</td>
<td>(5)</td>
<td>(2)</td>
<td>(256)</td>
<td>0</td>
<td>(274)</td>
</tr>
<tr>
<td>New Survivors</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>274</td>
<td>274</td>
</tr>
<tr>
<td>Non-Member Former Spouses¹</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Data corrections</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

| **Members, January 1, 2016**   | 9,290   | 343      | 769            | 9,246      | 2,128     | 21,776  |

¹ Former spouses of OPG pensioners as a result of marriage breakdowns
## Membership Summary (to the nearest dollar)

### Active Members

<table>
<thead>
<tr>
<th></th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>9,290</td>
<td>10,271</td>
</tr>
<tr>
<td>Average age (years)</td>
<td>46.8</td>
<td>46.8</td>
</tr>
<tr>
<td>Average credited service (years)</td>
<td>15.7</td>
<td>15.9</td>
</tr>
<tr>
<td>Average pensionable earnings for the following year</td>
<td>$109,297</td>
<td>$105,909</td>
</tr>
<tr>
<td>Accumulated contributions with interest</td>
<td>$824,900,414</td>
<td>$874,907,417</td>
</tr>
<tr>
<td>Proportion of female</td>
<td>23.1%</td>
<td>23.2%</td>
</tr>
</tbody>
</table>

### Members on Long Term Disability

<table>
<thead>
<tr>
<th></th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>343</td>
<td>373</td>
</tr>
<tr>
<td>Average age (years)</td>
<td>55.2</td>
<td>54.5</td>
</tr>
<tr>
<td>Average credited service (years)</td>
<td>24.8</td>
<td>23.9</td>
</tr>
<tr>
<td>Average pensionable earnings for the following year</td>
<td>$85,007</td>
<td>$82,113</td>
</tr>
<tr>
<td>Accumulated contributions with interest</td>
<td>$21,318,514</td>
<td>$23,061,938</td>
</tr>
<tr>
<td>Proportion of female</td>
<td>44.0%</td>
<td>41.6%</td>
</tr>
</tbody>
</table>

### Deferred Vested Members

<table>
<thead>
<tr>
<th></th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>739&lt;sup&gt;1&lt;/sup&gt;</td>
<td>804</td>
</tr>
<tr>
<td>Average age (years)</td>
<td>53.8</td>
<td>52.4</td>
</tr>
<tr>
<td>Average annual lifetime pension</td>
<td>$10,043</td>
<td>$9,796</td>
</tr>
<tr>
<td>Proportion of female</td>
<td>27.2%</td>
<td>18.9%</td>
</tr>
</tbody>
</table>

<sup>1</sup> Excludes 30 in-transit commuted value transfers (commuted value reflected in liabilities)
### Retired Members

<table>
<thead>
<tr>
<th></th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>9,245¹</td>
<td>8,600</td>
</tr>
<tr>
<td>Average age (years)</td>
<td>69.6</td>
<td>69.4</td>
</tr>
<tr>
<td>Average annual lifetime pension</td>
<td>$48,041</td>
<td>$43,117</td>
</tr>
<tr>
<td>Total annual bridge pension²</td>
<td>$49,317,384</td>
<td>$49,515,891</td>
</tr>
<tr>
<td>Proportion of female</td>
<td>16.4%</td>
<td>15.1%</td>
</tr>
</tbody>
</table>

### Survivors (excluding children)

<table>
<thead>
<tr>
<th></th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>2,117</td>
<td>2,027</td>
</tr>
<tr>
<td>Average age (years)</td>
<td>77.7</td>
<td>77.2</td>
</tr>
<tr>
<td>Average annual pension</td>
<td>$24,494</td>
<td>$22,952</td>
</tr>
<tr>
<td>Proportion of female</td>
<td>95.4%</td>
<td>95.6%</td>
</tr>
</tbody>
</table>

### Children

<table>
<thead>
<tr>
<th></th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>Average age (years)</td>
<td>21.6</td>
<td>23.0</td>
</tr>
<tr>
<td>Total annual temporary pension</td>
<td>$217,759</td>
<td>$262,480</td>
</tr>
</tbody>
</table>

¹ Excludes 1 retiree death early in 2016
² As at January 1, 2016, there were 3,163 retired members with an average age of 60.1 receiving a bridge benefit
### Active/Disabled Membership Distribution

The following table provides a detailed summary of the active/disabled membership at the valuation date by years of credited service and by age group.

<table>
<thead>
<tr>
<th>Age</th>
<th>&lt; 5</th>
<th>5–10</th>
<th>10–15</th>
<th>15–20</th>
<th>20–25</th>
<th>25–30</th>
<th>&gt;=30</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 30</td>
<td>341</td>
<td>176</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>517</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average Earnings 1</td>
<td>$71,906</td>
<td>$100,312</td>
<td></td>
<td></td>
<td></td>
<td>$81,576</td>
<td></td>
</tr>
<tr>
<td>30–35</td>
<td>131</td>
<td>672</td>
<td>166</td>
<td></td>
<td></td>
<td></td>
<td>969</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average Earnings</td>
<td>$83,682</td>
<td>$97,907</td>
<td>$113,979</td>
<td></td>
<td></td>
<td>$98,600</td>
<td></td>
</tr>
<tr>
<td>35–40</td>
<td>90</td>
<td>437</td>
<td>557</td>
<td>88</td>
<td></td>
<td></td>
<td>1,172</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average Earnings</td>
<td>$96,741</td>
<td>$99,981</td>
<td>$111,159</td>
<td>$116,876</td>
<td></td>
<td>$106,313</td>
<td></td>
</tr>
<tr>
<td>40–45</td>
<td>72</td>
<td>325</td>
<td>412</td>
<td>203</td>
<td>21</td>
<td></td>
<td>1,033</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average Earnings</td>
<td>$92,262</td>
<td>$104,195</td>
<td>$109,630</td>
<td>$116,851</td>
<td></td>
<td>$108,057</td>
<td></td>
</tr>
<tr>
<td>45–50</td>
<td>41</td>
<td>293</td>
<td>345</td>
<td>200</td>
<td>276</td>
<td>367</td>
<td>3</td>
<td>1,525</td>
</tr>
<tr>
<td></td>
<td>Average Earnings</td>
<td>$103,689</td>
<td>$104,352</td>
<td>$110,682</td>
<td>$111,902</td>
<td>$119,624</td>
<td>$116,320</td>
<td>$88,464</td>
</tr>
<tr>
<td>50–55</td>
<td>54</td>
<td>255</td>
<td>336</td>
<td>246</td>
<td>238</td>
<td>883</td>
<td>126</td>
<td>2,138</td>
</tr>
<tr>
<td></td>
<td>Average Earnings</td>
<td>$120,188</td>
<td>$103,084</td>
<td>$107,140</td>
<td>$111,464</td>
<td>$118,637</td>
<td>$118,625</td>
<td>$119,689</td>
</tr>
<tr>
<td>55–60</td>
<td>25</td>
<td>153</td>
<td>230</td>
<td>171</td>
<td>154</td>
<td>386</td>
<td>289</td>
<td>1,408</td>
</tr>
<tr>
<td>60–65</td>
<td>8</td>
<td>59</td>
<td>81</td>
<td>122</td>
<td>103</td>
<td>189</td>
<td>155</td>
<td>717</td>
</tr>
<tr>
<td>&gt;=65</td>
<td>0</td>
<td>15</td>
<td>26</td>
<td>31</td>
<td>9</td>
<td>40</td>
<td>33</td>
<td>154</td>
</tr>
<tr>
<td></td>
<td>Average Earnings</td>
<td>N/A</td>
<td>$109,975</td>
<td>$106,730</td>
<td>$113,132</td>
<td>$105,454</td>
<td>$110,384</td>
<td>$117,334</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total</th>
<th>Count</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>762</td>
<td>2,385</td>
<td>2,153</td>
<td>1,061</td>
<td>801</td>
<td>1,865</td>
<td>606</td>
<td>9,633</td>
</tr>
</tbody>
</table>

1 Pensionable earnings as defined in plan documents.
# Deferred Vested/Retired Membership Distribution

The following table provides a detailed summary of the deferred vested/retired membership at the valuation date by age group.

<table>
<thead>
<tr>
<th>Age</th>
<th>Retired Members and Beneficiaries</th>
<th>Deferred Vested Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 50</td>
<td>Count 34</td>
<td>Count 190</td>
</tr>
<tr>
<td></td>
<td>Average lifetime pension $17,220 per year</td>
<td>$8,462 per year</td>
</tr>
<tr>
<td></td>
<td>Average bridge pension $3,608 per year</td>
<td>$2,058 per year</td>
</tr>
<tr>
<td>50–55</td>
<td>Count 225</td>
<td>Count 178</td>
</tr>
<tr>
<td></td>
<td>Average lifetime pension $47,922 per year</td>
<td>$10,620 per year</td>
</tr>
<tr>
<td></td>
<td>Average bridge pension $15,247 per year</td>
<td>$2,312 per year</td>
</tr>
<tr>
<td>55–60</td>
<td>Count 1,137</td>
<td>Count 192</td>
</tr>
<tr>
<td></td>
<td>Average lifetime pension $56,742 per year</td>
<td>$10,516 per year</td>
</tr>
<tr>
<td></td>
<td>Average bridge pension $16,509 per year</td>
<td>$2,263 per year</td>
</tr>
<tr>
<td>60–65</td>
<td>Count 1,908</td>
<td>Count 146</td>
</tr>
<tr>
<td></td>
<td>Average lifetime pension $52,741 per year</td>
<td>$11,523 per year</td>
</tr>
<tr>
<td></td>
<td>Average bridge pension $15,687 per year</td>
<td>$2,288 per year</td>
</tr>
<tr>
<td>65¹–70</td>
<td>Count 2,591</td>
<td>Count 32</td>
</tr>
<tr>
<td></td>
<td>Average lifetime pension $46,416 per year</td>
<td>$5,952 per year</td>
</tr>
<tr>
<td></td>
<td>Average bridge pension</td>
<td></td>
</tr>
<tr>
<td>70–75</td>
<td>Count 1,874</td>
<td>Count 1</td>
</tr>
<tr>
<td></td>
<td>Average lifetime pension $41,580 per year</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>Average bridge pension</td>
<td></td>
</tr>
<tr>
<td>75–80</td>
<td>Count 1,358</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average lifetime pension $37,150 per year</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average bridge pension</td>
<td></td>
</tr>
<tr>
<td>&gt;=80</td>
<td>Count 2,246</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average lifetime pension $31,640 per year</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average bridge pension</td>
<td></td>
</tr>
</tbody>
</table>

**Total**

<table>
<thead>
<tr>
<th>Count</th>
<th>11,373²</th>
<th>739³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average lifetime pension</td>
<td>$43,631 per year</td>
<td>$10,043 per year</td>
</tr>
<tr>
<td>Average bridge pension</td>
<td>$15,839 per year</td>
<td>$2,229 per year</td>
</tr>
</tbody>
</table>

* Due to confidentiality

---

¹ Includes all Deferred Vested Members over age 65
² Excludes 30 in-transit commuted value transfers (commuted value reflects in liabilities)
³ Excludes 1 retiree death early in 2016
Appendix D: Going Concern Assumptions and Methods

Assumptions and Methods

A member's entitlements under a pension plan are generally funded during the period over which service is accrued by the member. The cost of each member's benefits is allocated in some fashion over the member's service. An actuarial valuation provides an assessment of the extent to which allocations relating to periods prior to a valuation date (often referred to as the actuarial liabilities) are covered by the plan's assets.

The going concern valuation provides an assessment of a pension plan on the premise that the plan continues on into the future indefinitely based on assumptions in respect of future events upon which a plan's benefits are contingent and methods that effectively determine the way in which a plan's costs will be allocated over the members' service. The true cost of a plan, however, will emerge only as experience develops, investment earnings are received, and benefit payments are made.

This appendix summarizes the going concern assumptions and methods that have been used for the going concern valuation of the Plan at the valuation date. The going concern assumptions and methods have been chosen with due respect to accepted actuarial practice and regulatory constraints. For purposes of this valuation, the going concern methods and assumptions were reviewed and changes as indicated were made.
The actuarial assumptions and methods used in the current and previous valuations are summarized below and described on the following pages.

### Economic Assumptions

<table>
<thead>
<tr>
<th></th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Discount rate</strong></td>
<td>5.50% per year</td>
<td>5.60% per year</td>
</tr>
<tr>
<td><strong>Inflation rate</strong></td>
<td>2.00% per year</td>
<td>Same</td>
</tr>
<tr>
<td><strong>Real discount rate</strong></td>
<td>3.50% per year</td>
<td>3.60% per year</td>
</tr>
<tr>
<td><strong>Increases in pensionable earnings</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>2.00% per year for 3 years, 2.75% per year thereafter; plus PPM scale (Table A following)</td>
<td>2.50% per year for 3 years, 3.00% per year thereafter; plus PPM scale (Table A following)</td>
</tr>
<tr>
<td>Disabled</td>
<td>2.00% per year</td>
<td>Same</td>
</tr>
<tr>
<td><strong>Increases in YMPE</strong></td>
<td>2.75% per year</td>
<td>2.50% per year for 3 years, 3.00% per year thereafter</td>
</tr>
<tr>
<td><strong>Increases in Income Tax Act maximum pension limit</strong></td>
<td>2.75% per year</td>
<td>2.50% per year for 3 years, 3.00% per year thereafter</td>
</tr>
<tr>
<td><strong>Interest on member contributions</strong></td>
<td>4.50% per year</td>
<td>4.60% per year</td>
</tr>
<tr>
<td><strong>Investment and non-investment expenses</strong></td>
<td>Implicit in discount rate</td>
<td>Same</td>
</tr>
</tbody>
</table>

### Demographic Assumptions

<table>
<thead>
<tr>
<th></th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mortality</strong></td>
<td>OPG-specific mortality table with generational mortality improvements using CPM-B (Table B following)</td>
<td>Same</td>
</tr>
<tr>
<td><strong>Retirement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active Participants</td>
<td>Variable by age (Table C following)</td>
<td>Same</td>
</tr>
<tr>
<td>Disabled Participants</td>
<td>Age 65</td>
<td>Same</td>
</tr>
<tr>
<td>Deferred Vested Participants</td>
<td>Earliest Unreduced Age Age 65</td>
<td>Same</td>
</tr>
<tr>
<td><strong>Margin</strong></td>
<td>$100 million provision for retirements higher than assumed in short-term inter-valuation period</td>
<td>Same</td>
</tr>
<tr>
<td><strong>Termination of employment</strong></td>
<td>Variable by age (Table D following)</td>
<td>Variable by age (Table D1 following)</td>
</tr>
<tr>
<td><strong>Disability</strong></td>
<td>None</td>
<td>Variable by age (Table E following)</td>
</tr>
</tbody>
</table>
### Proportion married

<table>
<thead>
<tr>
<th>Non-retired proportion with spouse</th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>90%</td>
<td>Male spouse is three years older than a female spouse</td>
<td>Same</td>
</tr>
</tbody>
</table>

| Non-retired spousal age differential | Same | Same |

### Retired members

| Actual marital status and spousal age used where known; otherwise male spouse is assumed to be three years older than a female spouse | Same |

### Methods

<table>
<thead>
<tr>
<th>Actuarial cost method</th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projected unit credit cost method and prorated on credited service</td>
<td>Same</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Asset valuation method</th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoothed value of assets with gains/losses deferred and amortized</td>
<td>Smoothed value of assets with gains/losses deferred and amortized</td>
<td>Same</td>
</tr>
</tbody>
</table>

Assets were reset to equal the market value at January 1, 2014. It was expected that an asset smoothing approach would continue to be used in the future.
Table A—Promotion, Progression and Merit (PPM) Scale

<table>
<thead>
<tr>
<th>Age</th>
<th>First Four Years of Employment</th>
<th>Subsequent Years of Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 25</td>
<td>9.00%</td>
<td>2.50%</td>
</tr>
<tr>
<td>25 to 29</td>
<td>6.50%</td>
<td>2.50%</td>
</tr>
<tr>
<td>30 to 34</td>
<td>5.00%</td>
<td>2.00%</td>
</tr>
<tr>
<td>35 to 39</td>
<td>4.50%</td>
<td>1.50%</td>
</tr>
<tr>
<td>40 to 44</td>
<td>4.00%</td>
<td>1.00%</td>
</tr>
<tr>
<td>45 to 49</td>
<td>3.00%</td>
<td>1.00%</td>
</tr>
<tr>
<td>50 to 54</td>
<td>2.00%</td>
<td>1.00%</td>
</tr>
<tr>
<td>55 to 59</td>
<td>2.00%</td>
<td>0.60%</td>
</tr>
<tr>
<td>60+</td>
<td>1.50%</td>
<td>0.60%</td>
</tr>
</tbody>
</table>

Table B
Mortality rates per 1,000 lives at selected ages are summarized in the table below:

**OPG-Specific Mortality Table**

<table>
<thead>
<tr>
<th>Age</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>0.463</td>
<td>0.305</td>
</tr>
<tr>
<td>25</td>
<td>0.525</td>
<td>0.257</td>
</tr>
<tr>
<td>30</td>
<td>0.683</td>
<td>0.328</td>
</tr>
<tr>
<td>35</td>
<td>0.725</td>
<td>0.440</td>
</tr>
<tr>
<td>40</td>
<td>0.876</td>
<td>0.617</td>
</tr>
<tr>
<td>45</td>
<td>1.201</td>
<td>0.835</td>
</tr>
<tr>
<td>50</td>
<td>1.828</td>
<td>1.208</td>
</tr>
<tr>
<td>55</td>
<td>3.091</td>
<td>2.204</td>
</tr>
<tr>
<td>60</td>
<td>3.381</td>
<td>4.668</td>
</tr>
<tr>
<td>65</td>
<td>7.165</td>
<td>8.519</td>
</tr>
<tr>
<td>70</td>
<td>12.656</td>
<td>12.955</td>
</tr>
<tr>
<td>75</td>
<td>22.040</td>
<td>19.633</td>
</tr>
<tr>
<td>80</td>
<td>43.436</td>
<td>32.751</td>
</tr>
<tr>
<td>85</td>
<td>78.201</td>
<td>54.145</td>
</tr>
<tr>
<td>90</td>
<td>141.309</td>
<td>91.669</td>
</tr>
</tbody>
</table>
### Table C— Retirement Rates

Age based retirement rates are in accordance with the following table:

<table>
<thead>
<tr>
<th>Age</th>
<th>Eligible for Reduced Pension</th>
<th>Eligible for Unreduced Pension</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>20</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>25</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>30</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>35</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>40</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>45</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>50</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>55</td>
<td>2.00%</td>
<td>5.00%</td>
</tr>
<tr>
<td>56</td>
<td>2.00%</td>
<td>5.00%</td>
</tr>
<tr>
<td>57</td>
<td>2.00%</td>
<td>5.00%</td>
</tr>
<tr>
<td>58</td>
<td>2.00%</td>
<td>5.00%</td>
</tr>
<tr>
<td>59</td>
<td>2.00%</td>
<td>5.00%</td>
</tr>
<tr>
<td>60</td>
<td>2.00%</td>
<td>5.00%</td>
</tr>
<tr>
<td>61</td>
<td>7.00%</td>
<td>10.00%</td>
</tr>
<tr>
<td>62</td>
<td>7.00%</td>
<td>10.00%</td>
</tr>
<tr>
<td>63</td>
<td>7.00%</td>
<td>10.00%</td>
</tr>
<tr>
<td>64</td>
<td>7.00%</td>
<td>10.00%</td>
</tr>
<tr>
<td>65</td>
<td>100.00%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>
### Table D—Termination Rates (2016)

Sample rates used in this valuation are shown in the following table:

<table>
<thead>
<tr>
<th>Age</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>2.90%</td>
<td>3.30%</td>
</tr>
<tr>
<td>25</td>
<td>2.20%</td>
<td>2.50%</td>
</tr>
<tr>
<td>30</td>
<td>1.60%</td>
<td>2.40%</td>
</tr>
<tr>
<td>35</td>
<td>1.30%</td>
<td>2.00%</td>
</tr>
<tr>
<td>40</td>
<td>1.00%</td>
<td>1.60%</td>
</tr>
<tr>
<td>45</td>
<td>0.90%</td>
<td>1.40%</td>
</tr>
<tr>
<td>50</td>
<td>0.90%</td>
<td>1.40%</td>
</tr>
<tr>
<td>55</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>56</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>57</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>58</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>59</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>60</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>61</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>62</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>63</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>64</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>65</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
### Table D1—Termination Rates (2014)

Sample rates used in the January 1, 2014 valuation are shown in the following table:

<table>
<thead>
<tr>
<th>Age</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>2.90%</td>
<td>4.40%</td>
</tr>
<tr>
<td>25</td>
<td>2.20%</td>
<td>3.30%</td>
</tr>
<tr>
<td>30</td>
<td>1.60%</td>
<td>2.40%</td>
</tr>
<tr>
<td>35</td>
<td>1.10%</td>
<td>1.70%</td>
</tr>
<tr>
<td>40</td>
<td>0.80%</td>
<td>1.20%</td>
</tr>
<tr>
<td>45</td>
<td>0.70%</td>
<td>1.10%</td>
</tr>
<tr>
<td>50</td>
<td>0.70%</td>
<td>1.10%</td>
</tr>
<tr>
<td>55</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>56</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>57</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>58</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>59</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>60</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>61</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>62</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>63</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>64</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>65</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
Table E—Disability Rates (2014)

Sample rates used in this valuation are shown as rates per 1,000 lives in the following table:

<table>
<thead>
<tr>
<th>Age</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>1.00</td>
</tr>
<tr>
<td>25</td>
<td>1.00</td>
</tr>
<tr>
<td>30</td>
<td>1.05</td>
</tr>
<tr>
<td>35</td>
<td>1.10</td>
</tr>
<tr>
<td>40</td>
<td>1.15</td>
</tr>
<tr>
<td>45</td>
<td>1.20</td>
</tr>
<tr>
<td>50</td>
<td>2.95</td>
</tr>
<tr>
<td>55</td>
<td>10.00</td>
</tr>
<tr>
<td>56</td>
<td>12.00</td>
</tr>
<tr>
<td>57</td>
<td>13.00</td>
</tr>
<tr>
<td>58</td>
<td>14.75</td>
</tr>
<tr>
<td>59</td>
<td>16.37</td>
</tr>
<tr>
<td>60</td>
<td>18.78</td>
</tr>
<tr>
<td>61</td>
<td>21.14</td>
</tr>
<tr>
<td>62</td>
<td>24.70</td>
</tr>
<tr>
<td>63</td>
<td>28.40</td>
</tr>
<tr>
<td>64</td>
<td>30.62</td>
</tr>
<tr>
<td>65</td>
<td>0.00</td>
</tr>
</tbody>
</table>
Justification of Actuarial Assumptions and Methods

Economic Assumptions

Discount Rate

We have used a discount rate of 5.50% per year.

Development of Discount Rate

<table>
<thead>
<tr>
<th></th>
<th>Overall expected return</th>
<th>Non-investment expenses</th>
<th>Investment expenses</th>
<th>Additional returns due to active management</th>
<th>Margin for adverse deviations</th>
<th>Unrounded Discount Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6.15%</td>
<td>(0.13)%</td>
<td>(0.07)%</td>
<td>0.00%</td>
<td>(0.45)%</td>
<td>5.50%</td>
</tr>
<tr>
<td>Passive</td>
<td>(1)</td>
<td>(1)+2</td>
<td>(0.7)%</td>
<td>0.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actively managed</td>
<td>(2)</td>
<td></td>
<td>0.00%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The overall expected return (“best-estimate”) is 6.15% per year, which is based on an inflation rate of 2.00% per year, yielding a real rate of return on the pension fund assets of 4.15% per year. This overall expected return was developed using best-estimate returns for each major asset class in which the pension fund is invested. A Monte Carlo simulation is performed where the portfolio returns are projected assuming annual rebalancing. Expected plan cash flows are projected reflecting the plan’s time horizon and discounted using the simulated returns. The internal rate of return is then calculated for each scenario and the average is used to develop an overall best-estimate rate of return for the entire pension fund. Gains from rebalancing and diversification are implicit to this return.

The above determined rate of return has been established based on the Company’s investment policy. There may be some barriers to achieving this return such as inflation higher than expected, asset returns lower than expected, and assets and liabilities that are mismatched. We have derived a going concern discount rate which reflects the Company’s investment policy combined with a margin for adverse deviation so as to account for the variables mentioned above.

Inflation Rate

The assumption reflects a rate of approximately 2.00% implicit in the market yields of Government of Canada real return and nominal return bonds as at the valuation date and the 1% to 3% band that Bank of Canada has set for inflation, with monetary policy aimed at a 2% target midpoint.

Increases in Pensionable Earnings

We have assumed future salary increases will be 2.00% per year for three years and 2.75% per year thereafter, plus PPM scale. The assumption reflects an assumed increase in earnings consistent with the
long-term assumption for increases in average industrial wage. In the short-term, we have assumed salary increases will be lower due to current wage pressures. In addition to the base rate, we assume rates of increase as a result of individual employee merit and promotion based on a scale which varies by age and service as shown in Table A.

Increases in YMPE

As the benefits paid to a member from the Plan are dependent on the future YMPE, it is necessary to make an assumption regarding the future increases in the YMPE.

The YMPE is assumed to increase up until the time the member retires, dies or terminates from active employment at the rate of 2.75% per year. This is comprised of an annual increase of 2.00% on account of inflation, plus 0.75% in the long-term on account of productivity growth, which is consistent with historical real economic growth.

Increases in the Maximum Pension Limit

Pensions are limited to the maximum limits under the Income Tax Act. The maximum lifetime annual pension per year of pensionable service payable under the Income Tax Act is $2,890 in 2016. It is assumed that the maximum limit will increase at the rate of 2.75% per year. This is comprised of an annual increase of 2.00% on account of inflation, plus 0.75% in the long-term on account of productivity growth, which is consistent with historical real economic growth.

Interest on Member Contributions

Interest is credited on member contributions at 4.50% per year. The assumption reflects the expected long-term return on assets.

Expenses

Since the discount rate has been established net of all investment expenses, no explicit assumption is required for all expenses.

Economic Margins for Adverse Deviations

Margins for conservatism or provisions for adverse deviation have been built into the going concern assumptions where appropriate.

The margins have been chosen so as to balance the need for financial security for existing Plan members against overly conservative contribution requirements that potentially result in intergenerational inequity among members and unnecessary financial strain on the Plan sponsor.

A margin for adverse deviations of 0.45% has been reflected in the interest rate assumption.

The actuary has discussed the Plan’s experience with the Company and compared it to the expected experience. The margins for adverse deviations incorporated in the assumptions reflect this review and have been accepted by Company management.
Demographic Assumptions

Mortality

During 2013, Aon Hewitt undertook a study of the mortality experience of OPG’s pensioners. Aon Hewitt developed an OPG-specific base mortality table, which has been used for the prior valuation and this valuation, that reflects the experience of OPG’s pensioners over the period from 2005 to 2012. Future mortality improvements on a generational basis are assumed in accordance with improvement scale CPM-B and are applied to the base mortality rates from 2009 onward (the mid-point of the study). This improvement scale was developed by the Canadian Institute of Actuaries and reflects expected improvements in mortality for Canadian pensioners.

Retirement

The rates of retirement have been developed as our expectation of the best-estimate rates of retirement based on the plan provisions and the historical retirement experience of the Plan. In the most recent years, retirement rates have been influenced by business conditions. This appears to be a temporary deviation from the long-term normative experience. We continue to believe the assumed retirement rates reflect the long term anticipated retirement pattern in the plan. To account for potential higher retirement rates in the short term, we have built in a margin for conservatism of $100 million to the liabilities.

Disabled members are assumed to retire at age 65, since their company-provided disability benefits are assumed to continue to that age, and earlier retirement election could jeopardize those disability benefits.

Termination of Employment

A member’s benefit entitlement under the Plan is affected by whether the member terminates employment prior to retirement for reasons other than death. In order to account for this in the calculation of the actuarial liability, an assumption regarding the probability that a member will terminate employment for reasons other than death has been made.

The termination rates were developed based on a review of Plan experience since 2010. Consequently, the termination rates are considered to be best estimate.

Option Elections on Termination

We have assumed 100% of members will elect a deferred annuity on termination.

Disability

If an active Plan member becomes disabled, service continues to accrue until pension commencement age, but employee contributions are waived. Disabled members are assumed to stay disabled until the age of 65.

Previous valuations assumed a disability incidence rate based on age. We have reviewed OPG’s disability experience since 2010 and have removed this assumption on the basis of this review and materiality.
Proportion of Members with Spouses and Spousal Age Differential

These assumptions are relevant to the valuation of benefits since there is a subsidized joint and survivor benefit available for members with a spouse. The spousal age differential is based on an analysis of pensioner data. The proportion of members who are assumed to have a spouse at retirement is consistent with observed plan experience.

Other

Actuarial Cost Method

An actuarial cost method is a technique used to allocate in a systematic and consistent manner the expected cost of a pension plan over the years of service during which plan members earn benefits under the Plan. By funding the cost of a pension plan in an orderly and rational manner, the security of benefits provided under the terms of the plan in respect of service that has already been rendered is significantly enhanced.

The projected unit credit actuarial cost method (prorated on credited service) has been used for this valuation. Under this method, the actuarial present value of benefits in respect of service prior to the valuation date, but based on pensionable earnings projected to retirement, is compared with the actuarial asset value, revealing either a surplus or an unfunded actuarial liability.

With respect to service after the valuation date, the expected value of benefits for service in the year following the valuation date (i.e., the normal cost) net of any required employee contributions is expressed as a percentage of the expected value of participating payroll for that year. The employer normal cost contributions are determined each year by applying this percentage to the actual participating payroll for the year.

When calculating the actuarial present value of benefits at the valuation date, the present value of all retirement, withdrawal and preretirement death benefits are included. For each member, the retirement, withdrawal and preretirement death benefits for a particular period of service are first projected each year into the future taking into account future vesting, early retirement entitlements and minimum pension/value entitlements. These projected benefits for each future year are then capitalized, multiplied by the probability of the member leaving the Plan in that year and discounted with interest and survivorship to the valuation date. The actuarial present value of benefits for the particular period of service is then determined by summing the present values of these projected benefits.

The pattern of future contributions necessary to pre fund future benefit accruals for any one particular individual will increase gradually as a percentage of their pensionable earnings as the individual approaches retirement. For a stable population (i.e., one where the demographics of the group remain constant from year to year), the normal cost will remain relatively level as a percentage of payroll. The projected unit credit actuarial cost method therefore allocates contributions among different periods in an orderly and rational manner for a stable population group.

In the event of future adverse experience, contributions in addition to the normal cost calculated under the projected unit credit actuarial cost method may be required to ensure that the Plan assets are adequate to provide the benefits. Conversely, favourable experience may generate surplus which may serve to reduce future contribution requirements.
Asset Valuation Method
The Company uses asset-smoothing which can reduce the volatility in the Company’s contribution requirements.
Appendix E: Solvency and Hypothetical Wind Up Assumptions and Methods

Valuation Assumptions

<table>
<thead>
<tr>
<th>Economic Assumptions</th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discount Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hypothetical wind up (includes indexation)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benefits assumed to be settled by commuted value</td>
<td>1.20% per year for 10 years; 1.70% per year thereafter</td>
<td>1.70% per year for 10 years; 2.30% per year thereafter</td>
</tr>
<tr>
<td>Benefits assumed to be settled by annuity purchase</td>
<td>-0.05% per year</td>
<td>0.15% per year</td>
</tr>
<tr>
<td><strong>Solvency (excludes indexation)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benefits assumed to be settled by commuted value</td>
<td>1.90% per year for 10 years; 3.60% per year thereafter</td>
<td>3.10% per year for 10 years; 4.60% per year thereafter</td>
</tr>
<tr>
<td>Benefits assumed to be settled by annuity purchase</td>
<td>3.09% per year</td>
<td>3.92% per year</td>
</tr>
</tbody>
</table>
## Demographic Assumptions

<table>
<thead>
<tr>
<th></th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality table</td>
<td>CPM2014 with generational mortality improvements using CPM-B(^1) (sex-distinct rates)</td>
<td>1994 Uninsured Pensioners Mortality Table with generational mortality improvements using Scale AA(^1) (sex-distinct rates)</td>
</tr>
<tr>
<td>Termination rates</td>
<td>Not applicable</td>
<td>Same</td>
</tr>
<tr>
<td>Retirement age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active and disabled members</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With 55 or more age-plus-service points as of valuation date</td>
<td>Age that produces the highest lump-sum value</td>
<td>Same</td>
</tr>
<tr>
<td>Other active members</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deferred vested members</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 65 or current age if older</td>
<td>Age that produces the highest lump-sum value</td>
<td>Same</td>
</tr>
<tr>
<td>Retired members and beneficiaries</td>
<td>Not applicable</td>
<td>Same</td>
</tr>
<tr>
<td>Termination of employment</td>
<td>Terminate with full vesting</td>
<td>Same</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-retired spousal proportion</td>
<td>90% assumed to have a spouse at retirement</td>
<td>Same</td>
</tr>
<tr>
<td>Non-retired spousal age differential</td>
<td>Male spouse is assumed to be three years older than a female spouse</td>
<td>Same</td>
</tr>
<tr>
<td>Retired members</td>
<td>Actual marital status and ages are used where known; if not known, a male spouse is assumed to be three years older than a female spouse</td>
<td>Same</td>
</tr>
</tbody>
</table>

## Other

<table>
<thead>
<tr>
<th></th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind up expenses</td>
<td>$73.3 million</td>
<td>Same</td>
</tr>
<tr>
<td>Actuarial cost method</td>
<td>Unit credit</td>
<td>Same</td>
</tr>
<tr>
<td>Asset valuation method</td>
<td>Market value of assets adjusted to reflect contributions, benefit payments, transfers and fees/expenses in transit as of the valuation date</td>
<td>Same</td>
</tr>
</tbody>
</table>

\(^1\) No preretirement mortality was applied
Hypothetical Wind Up Incremental Cost

Increases in pensionable earnings

<table>
<thead>
<tr>
<th></th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active</td>
<td>2.00% per year, plus PPM scale (Table A preceding)</td>
<td>2.50% per year, plus PPM scale (Table A preceding)</td>
</tr>
<tr>
<td>Disabled</td>
<td>2.00% per year</td>
<td>Same</td>
</tr>
<tr>
<td>Increases in YMPE</td>
<td>2.75% per year</td>
<td>2.50% per year</td>
</tr>
<tr>
<td>Increases in maximum pension limit</td>
<td>2.75% per year</td>
<td>2.50% per year</td>
</tr>
<tr>
<td>Inflation Rate</td>
<td>2.00% per year</td>
<td>Same</td>
</tr>
</tbody>
</table>

Based on the CIA’s Guidance and information such as pension legislation, Plan provisions and Plan experience, we have made the following assumptions regarding how the Plan’s benefits would be settled on Plan wind up:

<table>
<thead>
<tr>
<th></th>
<th>January 1, 2016</th>
<th>January 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active, Disabled and Deferred Members Electing a Lump Sum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retirement eligible</td>
<td>20.00%</td>
<td>Same</td>
</tr>
<tr>
<td>Not retirement eligible</td>
<td>60.00%</td>
<td>Same</td>
</tr>
<tr>
<td>Active, Disabled and Deferred Members Electing Annuity Purchase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retirement eligible</td>
<td>80.00%</td>
<td>Same</td>
</tr>
<tr>
<td>Not retirement eligible</td>
<td>40.00%</td>
<td>Same</td>
</tr>
<tr>
<td>Pensioners Electing Annuity Purchase</td>
<td>100.00%</td>
<td>Same</td>
</tr>
</tbody>
</table>

Benefits Valued

<table>
<thead>
<tr>
<th></th>
<th>Solvency Valuation</th>
<th>Hypothetical Wind Up Valuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vesting</td>
<td>We have treated all accrued benefits as vested on Plan wind up.</td>
<td>We have treated all accrued benefits as vested on Plan wind up.</td>
</tr>
<tr>
<td>Grow-In benefits</td>
<td>Active members employed in Ontario with at least 55 age-plus-service points are eligible to receive grow-in benefits.</td>
<td>Active members employed in Ontario with at least 55 age-plus-service points are eligible to receive grow-in benefits.</td>
</tr>
<tr>
<td>Indexing</td>
<td>Not included in the valuation</td>
<td>Included in the valuation</td>
</tr>
</tbody>
</table>
Justification for Valuation Assumptions

Development of Discount Rates

The development of the discount rates is shown below.

Solvency lump-sum discount rate for 10 years
\[ = V_{122542} + 90 \text{ bps} \]
\[ = 1.04\% + 0.90\% \]
\[ = 1.94\% \text{ (rounded to 1.90\%) per year} \]

Solvency lump-sum discount rate thereafter
\[ = V_{122544} + 0.5 \times (V_{122544} - V_{122542}) + 90 \text{ bps} \]
\[ = 2.16\% + 0.5 \times (2.16\% - 1.04\%) + 0.90\% \]
\[ = 3.62\% \text{ (rounded to 3.60\%) per year} \]

Solvency annuity purchase discount rate
\[ = V_{39062} + \text{Duration Adjustment} \]
\[ = 2.03\% + 1.06\% \]
\[ = 3.09\% \]

We have set the aforementioned assumptions based on guidance prepared by the CIA Committee on Pension Plan Financial Reporting ("PPFRC") in the Educational Note Assumptions for Hypothetical Wind Up and Solvency Valuations with Effective Dates Between December 31, 2015 and December 30, 2016 ("CIA Guidance") released on January 28, 2016.

The CIA’s Guidance indicates that the cost of purchasing non-indexed annuities would be estimated based on the duration of the liabilities expected to be settled through annuity purchase. The duration of this Plan was estimated to be 12.6 years and the resulting duration adjustment to the unadjusted CANSIM series V39062 interest rate is 1.06%.

For benefit entitlements that are expected to be settled by purchase of annuities, we based the assumptions on information compiled by the PPFRC from insurance companies active in the group annuity market.

For benefit entitlements that are expected to be settled by lump-sum transfer, we based the assumptions on the CIA Standards of Practice for Pension Commuted Values, effective April 1, 2009, using rates corresponding to a valuation date of January 1, 2016.

Mortality Table

We have used the CPM2014 mortality table with generational improvements using CPM-B in accordance with the CIA Guidance.

Preretirement Mortality

We have made no allowance for preretirement mortality. The impact of including such an assumption would not have a material impact on the valuation, since the value of the death benefit is approximately equal to the value of the accrued pension.

\(^1\) CANSIM Series (annualized)
Pensionable Earnings

To estimate active and disabled members’ best average earnings, we have used actual historical member earnings.

Assumptions Not Needed

The following are not relevant to the solvency valuation:

- Increases in pensionable earnings;
- Increase in YMPE (we used the January 1, 2016 rate);
- Termination of employment rates;
- Increases in *Income Tax Act* maximum pension limit (we used the 2016 maximum); and
- Disability rates.

Estimated Wind Up Expenses

Plan wind up expenses would normally include such items as fees related to preparation of the actuarial wind up report, fees imposed by a pension supervisory authority, legal fees, administration, custodial and investment management expenses. We have assumed these fees would be $73.3 million.

Calculation of Special Solvency Payments

We used a discount rate of 2.90% per year to calculate the special payments necessary to liquidate the solvency deficiency. This rate is a weighted average based on the relative proportions of benefit entitlements that are expected to be settled by purchase of annuities and lump-sum transfer.

Actuarial Cost Methods

Unit credit (accrued benefit) cost method as prescribed.

Asset Valuation Method Considerations

Assets for solvency purposes have been determined using market value.
Incremental Cost on a Hypothetical Wind Up Basis

The incremental cost on a Hypothetical Wind Up basis represents the present value, at the calculation date (time 0), of the expected aggregate change in the Hypothetical Wind Up liabilities between time 0 and the next calculation date (time t), adjusted upwards for expected benefit payments between time 0 and time t.

An educational note was published in December 2010 by the Canadian Institute of Actuaries' Committee on Pension Plan Financial Reporting to provide guidance for actuaries on the calculation of this new information.

The calculation methodology can be summarized as follows:

- The present value at time 0 of expected benefit payments between time 0 and time t, discounted to time 0,
  - Projected Hypothetical Wind Up liabilities at time t, discounted to time 0, allowing for, if applicable to the pension plan being valued:
    - expected decrements and related changes in membership status between time 0 and time t,
    - accrual of service to time t,
    - expected changes in benefits to time t,
    - a projection of pensionable earnings to time t,
  - The Hypothetical Wind Up liabilities at time 0.

The projection calculations take into account the following assumptions and additional considerations:

- The assumptions for the expected benefit payments and decrement probabilities, service accruals, and projected changes in benefits and/or pensionable earnings would be consistent with the assumptions used in the pension plan's going concern valuation.
- The assumptions used to calculate the projected liability at time t are consistent with the assumptions for the Hypothetical Wind Up liabilities at time 0, assuming that interest rates remain at the levels applicable at time 0, that the select period is reset at time t for interest rate assumptions that are select and ultimate and that the Standards of Practice for the calculation of commuted values and the guidance for estimated annuity purchase costs in effect at time 0 remain in effect at time t.
  - Active and inactive plan members as of time 0 are considered in calculating the incremental cost.
## Appendix F: Summary of Plan Provisions

This funding valuation was based on Plan design information provided by the Company as of January 1, 2016. The following is a summary of the main provisions of the Plan.

### Plan Provisions—DB Provision

<table>
<thead>
<tr>
<th><strong>Effective Date</strong></th>
<th>January 1, 2000.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Jurisdiction of Registration</strong></td>
<td>Ontario.</td>
</tr>
<tr>
<td><strong>Eligibility for Membership</strong></td>
<td></td>
</tr>
<tr>
<td>Regular Employees</td>
<td>(a) All regular and probationary employees join the Plan on the date of hire;</td>
</tr>
<tr>
<td></td>
<td>(b) Employees for whom the Office and Professional employees International Union was the bargaining agent prior to July 30, 1982 joined the Plan in accordance with the Plan rules at the time of hire; and,</td>
</tr>
<tr>
<td></td>
<td>(c) Employees who became continuing construction clerical employees after July 29, 1982 and before August 8, 1984 joined the Plan in accordance with the Plan rules at the time of hire.</td>
</tr>
<tr>
<td>Other Employees</td>
<td>Other employees (with the exception of construction trades, machinists, hotel and restaurant employees, and temporary Management Group employees who were not eligible to join effective July 1, 2014) may join the Plan after completion of 24 months of continuous service, and either</td>
</tr>
<tr>
<td></td>
<td>(a) earning 35% of the YMPE; or</td>
</tr>
<tr>
<td></td>
<td>(b) having 700 hours of employment in each of the two preceding calendar years.</td>
</tr>
</tbody>
</table>
Normal Retirement

Eligibility

The attainment of age 65 (Age 60 for female employees hired before January 1, 1976 or any subsequent day when she in fact retires which is not later than her sixty-fifth birthday).

Benefit

Annual benefit equal to (a) minus (b) below:

(a) 2.0% of Highest Three-Year Average Earnings times Credited Service, maximum 35 years (unless employee elects to contribute beyond 35 years and earn Credited Service).

(b) 0.5% of Highest Five-Year Average Earnings up to the Average YMPE times Credited Service after December 31, 1965.

Early Retirement

Eligibility

(a) Attainment of 82 age-plus-continuous service points for Society and PWU represented employees or attainment of 84 age-plus-continuous service points for Management Group employees hired before July 1, 2014 or attainment of 90 age-plus-continuous service points for Management Group employees hired on or after July 1, 2014.

(b) Age 55 with 25 years of continuous service.

(c) A female employee whose continuous employment commenced prior to 1976 with age 50 and at least 15 years of continuous service or any other employee with age 55 and 15 years of continuous service, but less than 25 years of continuous service.

(d) Age 55.
Early Retirement (continued)

Benefit

(a) Normal retirement benefit earned to early retirement date, unreduced for early commencement.

(b) Normal retirement benefit earned to early retirement date, reduced by 3% for each year that early retirement date precedes age 60.

(c) Normal retirement benefit earned to early retirement date, reduced by 2% for each year up to five years and 3% for each additional year that early retirement date precedes age 65 (age 60 for females hired prior to 1976).

(d) Normal retirement benefit earned to early retirement date, actuarially reduced for early commencement.

Supplement (Bridge Pension)

Eligibility

(a), (b), (c) and (d) as described under Early Retirement.

Benefit

0.625% of Highest Five-Year Average Earnings up to the Average YMPE times Credited Service (maximum 30 years), multiplied by the ratio 35/30 plus the number of years that the member contributed beyond 35 years, payable from early retirement date to age 65.

The supplement is subject to the same early retirement reductions as the lifetime pension.

Under (d), the lifetime pension plus the supplement are the actuarial equivalent of the defined benefit lifetime pension payable at age 65.
Disability Benefit
Eligibility
Qualification for benefits from an income replacement plan.

Benefit
Credited Service continues to accrue. Member required contributions cease. Base Annual Earnings prior to disability is indexed on an annual basis by 100% of the increase in CPI (Ontario) for the 12 month period ending on the preceding June 30th, subject to a maximum increase of 8% with carry forward provisions. Actual YMPE at retirement date is used (subject to maximum indexation provisions).

Termination of Employment
Eligibility
(a) Less than 25 years of continuous service and not a Management Group employee hired on or after July 1, 2014.

(b) Management Group employee hired on or after July 1, 2014 with less than 25 years of continuous service.

(c) Twenty-five or more years of continuous service.

Benefit
(a) Accrued Normal Retirement Benefit payable on an unreduced basis at the earlier of age 65, or the date the member attains 82 age-plus-service points (84 age-plus-service points for Management Group) holding service constant at termination, or as early as age 55 on an actuarially reduced basis or on some other date as determined in accordance with the rules pertaining to terminated members in effect upon termination of employment.

(b) Accrued Normal Retirement Benefit payable at age 65, or as early as age 55 on an actuarially reduced basis.

(c) Accrued Normal Retirement Benefit payable at age 65, or as early as age 55. The pension is reduced 0.25% for each month that Early Retirement Date precedes age 60.
Termination of Employment (continued)

For members other than Management Group employees hired on or after July 1, 2014, the pension is payable on an unreduced basis if the member has 82 age-plus-service points (84 age-plus-service points for Management Group hired before July 1, 2014) using age at retirement and service at termination.

In lieu of the deferred pension described in (a), (b) and (c) above, the member may be eligible to transfer the commuted value of the deferred pension to a locked-in RRSP or other retirement vehicle or be entitled to a refund of contributions.

Portions of the pre-1987 benefit may be taken as a cash payment by members.

Preretirement Survivor Benefit

Eligibility

(a) Less than 10 years of continuous service.

(b) Ten or more years of continuous service.

Benefit

(a) Commuted value of accrued Normal Retirement Pension.

(b) (i) Member with a Spouse

Greater of an immediate pension of 66-2/3% of accrued Normal Retirement Benefit, (with no early retirement reductions) or an immediate pension equivalent in value to the commuted value of the member’s accrued Normal Retirement Pension.

In lieu of (i) the surviving spouse may elect a deferred pension equivalent in value to the commuted value of the member’s accrued pension at the date of death or may elect to receive the commuted value of the accrued Normal Retirement Pension.
Preretirement Survivor Benefit (continued)

(ii) Member with Eligible Children but no Spouse.

Immediate pension of 66-2/3% of accrued Normal Retirement Benefit paid to the children until age 18 (longer if in school or disabled).

(iii) Member without a Spouse or Eligible Children.

Commuted value of accrued Normal Retirement Benefit.

Required Member Contributions

(a) For PWU represented employees:

Effective April 1, 2015, 6.00% of Base Annual Earnings up to the YMPE, plus 8.00% of Base Annual Earnings in excess of the YMPE.

Effective April 1, 2016, 7.00% of Base Annual Earnings up to the YMPE, plus 9.00% of Base Annual Earnings in excess of the YMPE.

Effective April 1, 2017, 7.50% of Base Annual Earnings up to YMPE, plus 10.00% of Base Annual Earnings in excess of the YMPE.

(b) For Society employees:

Effective January 1, 2016, 8.00% of Base Annual Earnings.

Effective January 1, 2017, 9.00% of Base Annual Earnings.

(c) Management Group employees hired before July 1, 2014:

Effective January 1, 2016, 7.30% of Base Annual Earnings up to YMPE, plus 8.25% of Base Annual Earnings in excess of the YMPE, but not exceeding the Earnings Limit, plus 2.00% of Base Annual Earnings above the Earnings Limit.

Effective January 1, 2017, 7.60% of Base Annual Earnings up to YMPE, plus 9.50% of Base Annual Earnings in excess of the YMPE, but not exceeding Earnings Limit, plus 4.50% of Base Annual Earnings above the Earnings Limit.
Required Member Contributions (continued)

(d) For Management Group employees hired on or after July 1, 2014:
Effective January 1, 2016, 7.60% of Base Annual Earnings up to YMPE, plus 9.50% of Base Annual Earnings in excess of the YMPE, but not exceeding the Earnings Limit, plus 2.00% of Base Annual Earnings above the Earnings Limit.
Effective January 1, 2017, 7.60% of Base Annual Earnings up to YMPE, plus 9.50% of Base Annual Earnings in excess of the YMPE, but not exceeding Earnings Limit, plus 4.50% of Base Annual Earnings above the Earnings Limit.

Maximum Pension

The benefits in respect of continuous employment after 1991 are limited to the maximum allowable under the Income Tax Act.

Excess Contributions

On retirement, death, or termination, the required member contributions made since January 1, 1987 with interest cannot provide more than 50% of the commuted value of the benefit earned for Credited Service after January 1, 1987.

In the event the required member contributions with interest provide more than 50% of the benefit, the excess will be refunded to the member or beneficiary.

On retirement, death, or termination of a member who was not represented by the PWU, the required member contributions made prior to December 31, 1986 with interest cannot exceed the commuted value of the benefits earned for Credited Service prior to December 31, 1986. The excess is refunded to the member (to the spouse, beneficiary or estate in the case of death).

Normal Form of Payment

Member without a Spouse or Dependent Children at Retirement

Life annuity with a guarantee of at least 60 monthly payments.
Member With a Spouse or Dependent Children at Retirement

Joint and 66-2/3% survivor annuity (no reduction for survivor benefit).

Indexation

Pensions to retired and deferred vested members (and their survivors) are increased each January 1st (while in payment or during the deferral period) by 100% of the increase in CPI (Ontario) for the 12 month period ending on the preceding June 30th, subject to a maximum increase of 8% with carry forward provisions.

Definitions

Base Annual Earnings

Member’s Base Annual Earnings include Bonuses up to:

- a maximum of 5% of a member’s base annual earnings for Management Group employees in Bands A to M;
- a maximum of 28% of a member’s base annual earnings for Authorized Nuclear Operators;
- a maximum of 25.2% of a member’s base annual earnings for Certified Unit 0 Control Room Operators;
- a monthly maximum of 28% of a member’s base annual earnings divided by 12 for Society-represented control Room Shift Supervisors and Control Room Shift Operating Supervisors;
- a maximum of 21% of a member’s base annual earnings for Society-represented Authorization Training Supervisors; and
- a maximum of 18.9% of a member’s base annual earnings for Unit 0 Training Specialists who were formerly certified Unit 0 control Room Operators.

Highest Three-Year Average Earnings

The average of a member’s Base Annual Earnings during the 36 consecutive months which gives the highest amount, up to the date of retirement, termination, or death.

Definitions (continued)

Highest Five-Year Average Earnings

The average of a member’s Base Annual Earnings during the 60 consecutive months which gives the
highest amount, up to the date of retirement, termination, or death.

Credited Interest
Average yield of five-year personal fixed term chartered bank deposits as determined under CANSIM B 14045 for the 12-month period ending June 30th.

Credited/Established Service
Credited service under the Prior Plan plus credited service while a member of the Plan on and after January 1, 2000, to a maximum of 35 years of credited service. Members may elect to contribute beyond 35 years and receive credited service.

Earnings Limit
$261,986 in 2016; in future years, is the 2016 Earnings Limit increased at the same percentage as the increase in the Income Tax Act maximum pension.

Average YMPE
The Average YMPE (i.e., Year's Maximum Pensionable Earnings under the Canada/Quebec Pension Plan) during the 60 consecutive months when Base Annual Earnings were highest.

A copy of the letter from the Company certifying the accuracy and completeness of the plan provisions summarized in this report is included in Appendix G of this report.
Appendix G: Administrator Certification

With respect to the Ontario Power Generation Inc. Pension Plan, forming part of the actuarial report as at January 1, 2016, I hereby certify that, to the best of my knowledge and belief:

- The asset data provided or made available to the actuary is complete and accurate;
- The membership data and subsequent query answers provided or made available to the actuary are complete and accurate for all persons who are entitled to benefits under the terms of the Plan in respect of service up to the date of the valuation;
- The Plan provisions provided or made available to the actuary are complete and accurate up to and including Amendment 27;
- The actuary has been notified of all relevant events subsequent to the valuation measurement date;

Craig Halket
Name (print) of Authorized Signatory

Vice President - Total Rewards and Solutions Centre
Title

Signature

Date: SEP 30/16
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Board Staff Interrogatory #157

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: Exh F4-3-2
Ref: EB-2013-0321 Exhibit JT2.12, Attachment 1

In EB-2013-0321, OPG filed a CHRC Briefing Report prepared by Towers Watson. The report reviewed the challenges OPG was facing regarding the costs of its employee pensions and benefits.

a) The report filed in EB-2013-0321 had last been updated in 2013. Has the report been updated since then? If so, please provide a copy.

b) Has OPG received any other reports regarding the costs and sustainability of its employee pensions and benefits? If so, please provide.

c) The report assessed the sustainability of OPG’s pensions and benefits plans against four metrics. The report concluded that all four metrics had been exceeded (p. 2, 6- 9). Does OPG still exceed the thresholds established in all four metrics?

d) The report identified six “interventions” that OPG could undertake to improve the sustainability of its pensions and benefits. Please describe what activities OPG has taken with regard to these six interventions, and the results of these activities.

e) At page 2, the report states that (as of 2013) “OPG’s P&B plans are unsustainable”. At page 11 it states: “a number of current cost levels exceed the thresholds which OPG views as necessary to maintain a sustainable business (across all key measures)”. Are OPG’s pensions and benefits plans currently sustainable? Do the current costs of pensions and benefits allow OPG to maintain a sustainable business? If not, how does OPG plan to address this situation? Will ratepayers be asked to provide additional funding for pensions and benefits now or in the future?

f) At page 11, the report states: “the risk of costs escalating far beyond an affordable level is very plausible.” Is this statement still accurate?
Response

a) No, the report has not been further updated since 2013.

b) OPG has obtained the following externally prepared reports regarding the costs of OPG’s pension and benefit program costs, attached to this response as Attachments 1-2. Attachments 1-2 are being filed confidentially in accordance with the Board’s practice direction on confidential filings.

   a. Potential Changes to Pension and Benefits Programs for Represented Members – Prepared by AON Hewitt, June 2014
   b. Benefit Index Report (value based benchmarking) – Prepared by AON Hewitt, July 2013,

c) OPG does not update or monitor the four referenced metrics found in the briefing at EB-2013-0321, Ex. JT2.12, Attachment 1. For the purposes of this interrogatory, OPG estimated the values for each of the metrics and determined that from 2015-2021, most of the values are within their threshold values as stated in the report.

d) It should be noted that while the six “interventions” were observations into areas that Towers Watson believed might be worth pursuing, they did not represent specific recommendations for management. With reference to these six observations from the Towers Watson report, OPG has undertaken the following activities:

1) Pensionable Earnings & Future Wage Increases: As described in Ex. F4-3-1, pp. 15-18, the lump sum payments and Hydro One shares awards negotiated with the PWU and Society in exchange for the identified pension reforms, are non-pensionable payments that will be made only to eligible existing employees as of April 1, 2015 (for PWU) and January 1, 2016 (for Society).

2) Pension Design: As described in Ex. F4-3-1, pp. 15-16, a number of pension reforms were introduced for management group staff and negotiated through bargaining for represented employees. Considerable effort was required to negotiate these reforms which included the direct involvement of the Government and other
electricity sector stakeholders. These reforms reduce costs associated with OPG’s pension plan by immediately increasing employee contributions, changing the rules used to determine when an employee becomes eligible for an undiscounted pension, and increasing the number of years used to determine pensionable earnings.

4) Drug Costs: In November 2014, following a competitive procurement process, OPG selected Sun Life Financial (Sun Life) as its new Health and Dental benefits administrator. As part of their service, Sun Life has been able to negotiate savings for various high use prescription medications to provide plan sponsors, such as OPG, with reduced costs. Sun Life has also developed mobile applications that give plan members convenient drug information more quickly including drug coverage, potential generic and/or therapeutic drug alternatives and other cost-saving opportunities.

5) Voluntary Settlement for Post-Retirement Benefits: OPG has not pursued this intervention that was identified for consideration in the Towers Watson report (p.12). In the Towers Watson report, this intervention was assessed as having low benefit and high cost.

6) Health and Dental Plan Administration: As noted above, OPG completed a competitive procurement process and selected Sun Life Financial as its benefits administrator in 2014. The new contract is delivering savings through lower administration costs and more stringent adjudication against plan terms reflecting OPG’s commitment to cost efficiency efforts.

e) Using metrics estimated in part (c) based on current projections, OPG’s pensions and benefits are currently “sustainable” and allow OPG to “maintain a sustainable business”.

Overall, OPG believes that the “sustainability” of the plan is improving, reflecting the above noted reforms, stable or gradually decreasing cash requirements, declining accounting costs, and a strong funded position of the pension plan according to the latest actuarial valuation filed with the Financial Services Commission of Ontario, as of January 1, 2016. The valuation indicates that the pension plan is 96% funded on a going concern basis and 99% on a solvency basis (see Ex. L-6.6-1 Staff-156, Attachment 1, pp. 9 and 15).

OPG will continue to seek recovery of its prudently incurred pension and benefit costs for the regulated operations through its payment amounts applications.

f) Although OPG does not update or maintain the stochastic analysis relied upon by Towers Watson to support the referenced statement, based on current projections, OPG does not believe that the referenced statement from the 2011 report is true today, for the reasons discussed in part (e). However, OPG acknowledges that there are inherent risks related to the impact of financial market conditions on pension and OPEB obligations, as with any material obligations that span several decades. This is acknowledged in the summary of key risks to OPG’s business plan, as discussed in Ex. L-1.2-5 CCC-4.
Potential Changes to Pension and Benefits Programs For Represented Members

Privileged and Confidential – Prepared in Contemplation of Possible Litigation

Ontario Power Generation

June 2014
Confidential – Draft for Discussion
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>3</td>
</tr>
<tr>
<td>Registered and Supplemental Arrangements</td>
<td>4</td>
</tr>
<tr>
<td>Summary of Current OPG Pension and Supplemental Plans</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td>16</td>
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</tr>
</tbody>
</table>
Introduction

Ontario Power Generation ("OPG") recently announced changes to the OPG Pension Plan ("Pension Plan") and the OPG Supplementary Pension Plan ("SPP") for non-represented (i.e., Management Group) staff.

OPG has requested that Aon Hewitt prepare cost estimates of extending the changes to represented staff as well as provide cost estimates for other requested plan changes. All the cost estimates are based on the January 1, 2014 actuarial valuation of the Pension Plan.

Summary of Key Changes for Management Group

OPG Pension Plan

- Migrate to 50/50 sharing of cost for current service cost:
  - A contribution schedule has been developed in two phases with an increase in contributions for Management Group employees effective January 1, 2016 and a second increase effective January 1, 2017.
  - Management Group employees hired by OPG on and after July 1, 2014 will pay the January 1, 2017 contribution rate from date of hire.

- Transition from unreduced retirement at 84 points ("Rule of 84") to unreduced retirement at 90 points ("Rule of 90"):
  - Members with 84 points on January 1, 2016 would retain eligibility for unreduced pension for all service.
  - For all other members, benefits earned for service on and after January 1, 2016 will be subject to Rule of 90 rather than Rule of 84.
  - Benefits earned for service prior to January 1, 2016 will continue to be subject to Rule of 84.
  - Management Group employees hired by OPG on and after July 1, 2014 will have all benefits subject to Rule of 90.

- Elimination of enhanced early retirement benefits for employees who terminate prior to retirement eligibility.

OPG SPP

- Mirror design changes in RPP
- Change eligibility rules for ESPS
## Summary of Current OPG Pension and Supplemental Plans

### OPG Pension Plan

OPG sponsors a defined benefit plan for employees. The key provisions of the pension plan are shown below.

<table>
<thead>
<tr>
<th>Pensionable Earnings</th>
<th>Base earnings plus bonus up to 5% of base earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Averaging Period For Earnings</td>
<td>3 years</td>
</tr>
<tr>
<td>Benefit Rate After Age 65</td>
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</tr>
<tr>
<td>Below CPP Wage Base</td>
<td>1.50%</td>
</tr>
<tr>
<td>Above CPP Wage Base</td>
<td>2.00%</td>
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<tr>
<td>Benefit Rate Before Age 65</td>
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<tr>
<td>Subsidized Payment Form</td>
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<td>With Spouse</td>
<td>66⅔% J&amp;S</td>
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<tr>
<td>Without Spouse</td>
<td>LG5</td>
</tr>
<tr>
<td>Eligibility For Unreduced Early Retirement Pension</td>
<td>The earliest of:</td>
</tr>
<tr>
<td></td>
<td>▪ 82 points (84 points for Non-Represented )</td>
</tr>
<tr>
<td></td>
<td>▪ Age 60 with 25 years of service</td>
</tr>
<tr>
<td></td>
<td>▪ 35 years of service</td>
</tr>
<tr>
<td>Early Retirement Reductions (Age 55 and Over)</td>
<td>▪ 25 or more years of service</td>
</tr>
<tr>
<td></td>
<td>▪ 3% per year prior to age 60</td>
</tr>
<tr>
<td></td>
<td>▪ 15 but less than 25 years of service</td>
</tr>
<tr>
<td></td>
<td>▪ 2% per year from ages 65 to 60, plus</td>
</tr>
<tr>
<td></td>
<td>▪ 3% per year from ages 60 to 55</td>
</tr>
<tr>
<td></td>
<td>▪ Less than 15 years of service</td>
</tr>
<tr>
<td></td>
<td>▪ Actuarial reduction</td>
</tr>
<tr>
<td>Automatic Indexation of Pension Benefits</td>
<td>100% of CPI (Ontario) up to 8% (with carry forward)</td>
</tr>
<tr>
<td>Member Contribution Rates</td>
<td></td>
</tr>
<tr>
<td>Below/Above CPP Wage Base</td>
<td></td>
</tr>
<tr>
<td>PWU:</td>
<td>5.0% / 7.0%</td>
</tr>
<tr>
<td>Society:</td>
<td>7.0%</td>
</tr>
<tr>
<td>Non-Represented:</td>
<td>7.0% or 7.6%/9.5% if hired after July 1, 2014</td>
</tr>
</tbody>
</table>
OPG Supplementary Pension Plan

OPG provides pension benefits above the Income Tax Act (ITA) maximum pension limit, for post-1991 service, through the OPG SPP. Benefits earned for service prior to 1992 are not limited by the ITA maximum pension. The OPG SPP is composed of two broad-based supplemental schedules:

- Supplementary Payment Schedule (SPS),
- Executive Supplementary Payment Schedule (ESPS)

The details of the OPG SPS are as follows:

- Mirrors the OPG Pension Plan in every detail (pensionable earnings, formula, early retirement, indexation)
- No member contributions are made to SPS
- SPS is closed to new non-represented members hired into Band H or higher
- PWU and Society members are covered by SPS

Represented members are not eligible for the ESPS.
Ontario Power Generation Pension Plan—
Breakdown of Total Current Service Cost as a Percentage of Earnings by Benefit Component (based on January 1, 2014 actuarial valuation)
Maximum Contribution and Benefit Provisions Under the Income Tax Act

It is first important to understand the Income Tax Act restrictions on both member contributions to and benefits earned from a registered pension plan, and how those limits impact members of the Pension Plan.

Maximum Member Contribution in 2014 Under the Income Tax Act

The dollar limit on the maximum member contribution in 2014 is calculated as follows:

\[
\begin{align*}
\text{Maximum Contribution} &= \$1,000 + (70\% \times \text{maximum pension credit in 2014}) \\
&= \$1,000 + (70\% \times ((9 \times \$2,770.00) - \$600)) \\
&= \$18,031.00
\end{align*}
\]

Maximum Pension Under the Income Tax Act

The maximum pension benefit under the Income Tax Act in 2014 is $2,770.00 per year of pensionable service.

Based on the benefit formula under the OPG Pension Plan, the maximum pension is reached in 2014 at a highest 3-year average earnings of approximately $151,000.

Interaction of Maximum Contribution and Maximum Pension Limits
Under the January 1, 2014 actuarial valuation, the total current service cost for all employee groups is 26.0% of pensionable earnings.
Schedule of Increases for Management Group

Management Group employees will transition from a flat 7% of pensionable earnings to the following percentages of pensionable earnings up to and above the YMPE:

- January 1, 2016:  7.30% up to YMPE plus 8.25% above YMPE
- January 1, 2017:  7.60% up to YMPE plus 9.50% above YMPE

Notes

- OPG intends to apply for a waiver of the maximum member contribution limit prior to 2016
- Management employees hired on or after July 1, 2014 will contribute at the January 1, 2017 contribution rate from date of hire
PWU members participating in the OPG Pension Plan currently contribute at 5.0% of pensionable earnings up to the YMPE ($52,500 in 2014) plus 7.0% of pensionable earnings above the YMPE, compared to the current Management Group and Society Group which contribute at 7.0% of all pensionable earnings.

Data Used for Analysis

The analysis is based on data provided by OPG for the 2014 Pension Plan valuation. The characteristics of the PWU group are shown below:

- Number of Active Members: 6,006
- Average Pensionable Earnings (2014): [value]
- Total Pensionable Earnings (2014): [value]
- Number of Members with Earnings in Excess of $151,000 (2013): [value]
Society members participating in the OPG Pension Plan currently contribute at the same level as Management Group employees – 7.0% of all pensionable earnings.

Data Used for Analysis

The analysis is based on data provided by OPG for the 2014 Pension Plan valuation. The characteristics of the Society group are shown below.

- Number of Active Members: 3,164
- Average Pensionable Earnings (2014): [redacted]
- Total Pensionable Earnings (2014): [redacted]
- Number of Members with Earnings in Excess of $151,000 (2013): [redacted]
Current Early Retirement Provisions Under OPG Pension Plan

The current early retirement provisions under OPG Pension Plan are summarized below:

- Unreduced early retirement pension available at 82 points for PWU and Society Members, regardless of age
- Unreduced early retirement pension also available after attaining age 60 with 25 or more years of continuous service or at any age with 35 or more years of continuous service (both of these provisions are not relevant with the Rule of 82 however, would become relevant if that rule is changed)
- Reduced early retirement available after age 55:
  - For a member less than age 60 but with more than 25 years of continuous service, reduction is 3% per year from age 60
  - For a member with 15 or more years of continuous service but less than 25 years of continuous service, reduction is 2% per year from ages 65 to 60 plus 3% per year from ages 60 to 55;
  - Otherwise, pension is actuarially reduced from age 65

Early Retirement Provisions for Post-2015 Service – Management Group

- Unreduced early retirement available at earlier of:
  - 90 points
  - Age 60 with 25 years of continuous service (no change from current provisions)
  - 35 years of continuous service (no change from current provisions)
- Reduced retirement available on or after age 55 (no change to current provisions):
  - For a member less than age 60 but with more than 25 years of continuous service, reduction is 3% per year from age 60
  - For a member with 15 or more years of continuous service but less than 25 years of continuous service, reduction is 2% per year from ages 65 to 60 plus 3% per year from ages 60 to 55 otherwise, pension is actuarially reduced from age 65
- Benefits earned for service prior to January 1, 2016 continue to fall under the Rule of 84
- Management Group employees who attain Rule of 84 on or before January 1, 2016 will continue to have rule of 84 apply to all service
Early Retirement Reductions for Terminated Vested Employees

Under the OPG Pension Plan, the following terms apply to a PWU or Society member who terminates employment prior to retirement:

- An unreduced pension is available to a deferred vested member at the earlier of:
  - Age 60 with 25 years of continuous service
  - 82 points, based on age at pension commencement and continuous service at termination; or
  - Age 65

- A reduced pension is available on or after age 55:
  - For a member with 25 years of continuous service or more at termination, the pension is reduced 3% from age 60
  - For a member with less than 25 years of continuous service and less than 82 points, the pension is reduced actuarially from age 65

- The commuted value offered to a terminated member includes the value of the above early retirement subsidies if the member would be entitled to these subsidies if he or she elected a deferred pension

Example

<table>
<thead>
<tr>
<th>Service at Termination</th>
<th>Unreduced Pension Available at Age</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>65</td>
<td>82</td>
</tr>
<tr>
<td>18</td>
<td>64</td>
<td>82</td>
</tr>
<tr>
<td>19</td>
<td>63</td>
<td>82</td>
</tr>
<tr>
<td>20</td>
<td>62</td>
<td>82</td>
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<tr>
<td>21</td>
<td>61</td>
<td>82</td>
</tr>
<tr>
<td>22</td>
<td>60</td>
<td>82</td>
</tr>
<tr>
<td>23</td>
<td>59</td>
<td>82</td>
</tr>
<tr>
<td>24</td>
<td>58</td>
<td>82</td>
</tr>
<tr>
<td>25</td>
<td>57</td>
<td>82</td>
</tr>
<tr>
<td>26</td>
<td>56</td>
<td>82</td>
</tr>
</tbody>
</table>

For Management Group employees, service will be frozen at January 1, 2016 for the purpose of determining the early retirement reductions for employees who terminate prior to retirement, but after January 1, 2016.
The changes to early retirement reductions would have an immediate impact on the current service cost for the pension plan as well as the SPS.

The table below shows the reduction in current service cost as a percentage of pensionable earnings in the short-term. In the long-term, it is expected to influence overall retirement patterns, thus reducing the cost.

<table>
<thead>
<tr>
<th>Reduction Due to Change in Early Retirement Eligibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1.7%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Current Service Cost</th>
<th>Rule of 90</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.8%</td>
<td>26.6%</td>
</tr>
</tbody>
</table>

As a % of Pensionable Earnings
Based on the Society and PWU demographics we outlined earlier, the annual dollar value of the savings to OPG (based on 2014 pay information) would be approximately as follows.

<table>
<thead>
<tr>
<th>PWU</th>
<th>Society</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 Points / 0.5% Bridge for Future Service</td>
<td>$1.8 million</td>
</tr>
</tbody>
</table>

Re-Filed: 2017-02-10, EB-2016-0152
Exhibit L, Tab 6.6, Schedule 1 Staff-157
Attachment 1, Page 22 of 22
Benefit Index® Report

Ontario Power Generation

July 2013
About This Material

In this study, the value of the Ontario Power Generation (“OPG”) salaried employee benefits program for the PWU group is compared to a norm of the values of the salaried employee benefits programs of the following 16 base companies selected by OPG:

Some of these organizations may have more than one benefits program covering salaried employees. This study is based on one program offered by each company—generally the one for corporate salaried employees. Of course, in some cases, the same benefits may be provided to both hourly and salaried employees.

This material is intended to be diagnostic in nature. One should not expect to find a prescription in this material. This study provides a thorough analysis of your benefits program as it exists today compared to the norm of these 16 base companies.

The study is divided into four major sections:

- The **Methodology** section defines the methods used in determining index values and the benefit areas that are included in this study.
- The **Index Displays** section illustrates the competitive position of each of the major elements of your benefits program (individually and in aggregate) relative to the base company norm. We have also included a summary of the major elements of the benefits programs of OPG and the base companies on facing pages.
- The **Comments** section describes the similarities and differences within the base and explains why your benefit values rank where they do relative to the 16 base company norm.
- The **Specifications** section summarizes in more detail the major elements of the benefits programs of OPG and the base companies.
# Table of Contents

## About This Material

### Suggested Method for Reviewing Benefit Index

### Applying the Results

## Methodology

- General Premises M-1
- Employee Population Base M-1
- Developing the Relative Value Indexes M-1
- Treatment of Flexible Benefits M-2
- A Note of Clarification M-2
- Benefit Areas Included M-3
- Summary of Benefits Included M-4
- Distribution of Benefit Values M-5

## Index Displays

- Key I-1
- Index Displays for Each Benefit Area I-23
- Overall Results Display I-23

## Comments

- General Comments C-1
- Comments on Overall Results C-3

## Specifications

S-1
Suggested Method for Reviewing Benefit Index

The heart of this study (the Index Displays section) is a series of pages showing your organization’s competitive position in each benefit area relative to the base companies. The key at the beginning of the Index Displays section outlines the format of the display pages. On each page, two comparisons are presented—the “total” value index (the outer ring) and the “employer-paid” value index (the inner ring). The total value index reflects the value of all available benefits taking into consideration anticipated participation in optional programs. The employer-paid value index is based on the excess of the total value of benefits over the value of employee contributions.

Index Values and Rankings

In any benefit area, an index of 100.0 (for either the total value index or the employer-paid value index) always indicates the average value of the base company plans. The arrows on the index displays show how the value of your plan compares to the average. For example, if your medical plan had an index of 104.1, this would mean that the value of your plan was 4.1% above average. If your medical plan had an index of 97.6, this would mean that the value of your plan was 2.4% below average.

The study also indicates where the value of your plan ranks relative to the value of the base company plans. Continuing the medical plan example, if three of the base companies had higher medical plan values than yours, your plan would rank between the third and fourth base companies (3rd/4th).

Finally, the study indicates the range of base company plan values. The shaded area in the rings showing both the total value and the employer-paid value represents the range of base company plan values.

Initial Review

After you review the key, an appropriate second step might be to quickly review the index displays for each benefit area to get an overall impression of where your organization stands and to become familiar with the various benefit areas covered. You might also want to review the first index display, which covers all benefit areas.

In-Depth Review

As a third step, we suggest reviewing the index displays in depth, considering the indexes and the rankings in light of the brief specifications (Notes) presented on facing pages. In many cases, the reasons for the relative position of your benefit and the characteristics of the base companies that ranked high and low will be obvious from studying these pages. In making this more thorough review, keep the following questions in mind:
In each specific benefit area and in the overall benefits program:

- Is this where I thought we would be? Higher? Lower?
- Is this where management thinks we are?
- Is this where our employees think we are?
- If we are high, is this by design? Do we intend to be a leader in this area (or what does it mean to be a leader in this area)?
- If we are low, is this intentional? Is this an area that needs attention? How much priority should this area have?
- Is our strategy with regards to the overall benefits program still appropriate? Should we be placing more (or less) emphasis on more direct forms of compensation?

In comparing the total value index with the employer-paid value index in each benefit area:

- How does our use (or lack) of employee contributions change our relative position in this area?
- How does our overall use of employee contributions compare with others? Do we have higher contributions? Are we using employee contributions because of cost considerations? Are we using employee contributions to provide more flexibility for an employee to elect only the benefits that are needed? Are we using employee contributions because we feel employees should share the benefit cost?
- Has management consciously decided on the relative employer-employee sharing (through our use of employee contributions) versus other organizations?

After completing your own analysis, you may want to read the Comments section. It contains our comments developed during our analysis of the benefits programs.
Applying the Results

These indexes and rankings, the accompanying analysis, and a manager’s own view of the results should provide a comprehensive basis (and perhaps some supportive information) for review with other executives. The items to be reviewed might include:

- Whether the benefits program is providing comparative values consistent with your objectives (or to raise the question of organization objectives where they have not been formalized; or to review or question objectives when they have been formalized).
- The high and low elements of your organization’s present benefits program.
- The use of employee contributions within the present benefits program.
- Suggestions for change in the benefits program:
  - For new benefits.
  - For “trading” unnecessarily high areas of coverage for improvements in low areas of coverage.
  - For increasing (or decreasing) employee contributions within the program.

This material is intended to be diagnostic in nature. It may (or may not) corroborate other analyses done by the organization’s compensation and benefits management. In any event, one should not expect to find a prescription in this material. In our experience, suggestions for change come more appropriately from consideration of your organization’s objectives, and careful consideration of the business and competitive environment in which your organization operates.
Methodology
Methodology

General Premises

We use different methods to value the different elements of a benefits program. In developing and refining these methods, we have used the following criteria:

- The method must give a reasonable comparison of the value of the different types of plans within a benefit area (e.g., a reasonable comparison of a final (average) pay pension formula with a career (average) pay pension formula requires an assumption about pay increases; a comparison of the value of medical benefits should not depend on whether or not the benefits are insured).

- The method must give a reasonable comparison of the overall value of the benefits program, recognizing that certain benefits are more valuable than others.

Employee Population Base

To facilitate comparisons, one common population is used in determining the relative value indexes. This population has the characteristics of the salaried personnel found in a typical Canadian organization.

This population does not represent your actual salaried employee workforce. However, we do not think the use of your actual salaried employee workforce would have significantly altered the relative values shown in this report or the conclusions to be drawn from them.

Developing the Relative Value Indexes

In general, the value of a benefit is determined in one of two ways:

- For each individual in the population, the probability of an event (such as disability) is multiplied by the lump sum value of all amounts to be paid arising from that event

  OR

- A value is calculated by establishing the value as a percent of pay for the year (an allocation of postretirement values to working years).

The actuarial and employee participation assumptions used are chosen with the intention of being as "realistic" as possible. In effect, these values are summed up for all the employees in the model population, recognizing that the value of the various benefits varies with each individual’s circumstances—age, service, sex, and compensation level. The relative value in any benefit area then recognizes, on a composite basis, the value to an entire employee group—using a mix of employees who have a variety of individual circumstances.

The overall benefits program indexes are not based on an arbitrary weighting of the individual benefit plan indexes; instead, the composite indexes reflect the relative value calculated for each program for each organization. Therefore, the Defined Benefit Pension index has more impact than the Postretirement Death index in determining the All Benefits index. The composite indexes are determined by first adding
together your organization’s benefit plan values for the benefit areas included and then comparing the result with the corresponding average for the base companies.

Treatment of Flexible Benefits

For companies with broad flexible benefits programs, the procedure for developing values is as follows:

- The employees in the model population are assumed to elect the various benefits in the same percentages as each employer’s own experience.
- Based on these elections and the price tags associated with each option, the required employee contributions are calculated.
- The pool of flexible credits is calculated based on the employer’s credit-generation formula(s).
- Flexible credits are subtracted from employee price tags to determine the net employee contribution for each option.
- Where the credits are not generated in respect of a particular benefit area, the credits are allocated to each benefit area in proportion to the price tags.
- Where the flexible credits are in excess of the price tags, these are referred to as “excess credits”.

In general, when qualitatively comparing flexible benefits program designs, it is recommended that you focus on those options that either have the highest employee participation (driver of total value) or the option for which the employer pays (driver of employer-paid value).

A Note of Clarification

This study is an analysis of the value of the benefits provided within an organization’s benefits program. This has been done with the objective of focusing on the question of benefits program design and is not intended to be an analysis of cost. An organization’s benefits “costs” are affected not only by the benefits themselves, but also by accounting and financing decisions and background, such as:

- The use of a conservative versus a liberal basis for funding the pension plan (e.g., low discount rate versus high discount rate);
- The number of years a pension plan has been in existence and its asset performance during that time;
- Decisions to provide directly or insure a particular benefit;
- An organization’s internal accounting practices (e.g., for vacation time);
- Pooling of experience among groups (e.g., a disability benefit plan covering both hourly and salaried employees).

The items in the above list do not impact the underlying value of the benefits design and therefore are not elements in this analysis. The question of whether the present funding-financing-accounting decisions are the most appropriate or the best “buy” is a separate subject.
Benefit Areas Included

The benefits included are those which have substantial value and which can be fairly compared. Additional forms of direct compensation and government-required programs are not included.

The benefits are grouped as shown below. Some of the benefits not included are benefits like severance pay, supplemental unemployment benefits, business travel accident insurance, extra individual accident coverage, tuition refund programs, matching donation programs, work and family benefits, and government-required programs.

- **Retirement**
  - Defined Benefit Pension
    Includes all postretirement payments to an employee and spouse. Vested benefits and disability benefits payable from the pension plan after age 65 are included. Preretirement death benefits (lump sum and annuity-type) and the portion of any disability benefit payable from the pension plan prior to age 65 are not included (these benefits are reflected in the Death and Disability indexes respectively).
  - Defined Contribution
    Includes savings, profit sharing, money purchase pension, and stock purchase plans with a direct and significant employer subsidy. Only the retirement value of defined contribution accounts has been included. Any assumed payment due to death prior to retirement has been reflected in the Death indexes. Payments that occur upon disability are considered to be retirement benefits.

- **Death**
  Includes all lump sum payments and annuity or periodic payments resulting from preretirement death, including those that are insured, self-insured, or payable from the defined benefit and/or defined contribution plans. The traditional “group life” benefits have been shown in a separate index as well to allow some additional analysis. Postretirement death benefits do not include postretirement benefits which result from pensions paid on other than a life annuity basis (whether automatic or through an option); these are reflected in the Defined Benefit Pension area.

- **Disability**
  Has been split into short-term disability and long-term disability by defining short-term benefits as those payable in the first six months, without regard to source. That is, the Short-Term Disability index includes long-term disability plan benefits if they are payable in the first six months of disability. Similarly, the Long-Term Disability index includes accident and sickness and salary continuation benefits payable beyond six months.

- **Health Care**
  Includes the traditional hospital-medical-surgical benefits as well as dental, hearing, and vision benefits. Preretirement health care values are shown separately for medical and dental plans to allow for specific analysis of each. The Postretirement Health Care index includes not only benefits available to a retiree (including dependent coverage) who is over age 65, but also the coverage in the postretirement, pre-age 65 period for the “early” retiree.

- **Time Off With Pay**
  Includes holidays and vacations, which are shown combined as well as separately, recognizing that planning decisions on the number of holidays are sometimes influenced by the amount of vacation provided and by the flexibility an employee has in scheduling vacation.
Summary of Benefits Included

The illustration below shows how benefit areas are grouped in this analysis. For example, the All Preretirement Death index includes both group life benefits and survivor income benefits (from stand-alone plans, preretirement pension death benefits, or payouts of defined contribution plan accounts). Separate index values are shown for all areas with a page number (referring to a page in the Index Displays section of this report). The size of the segments shown below does not indicate their relative importance to the overall results.

Diagram: Flowchart showing the categorization of benefits into Retirement, Time Off With Pay, Special Provisions, All Security Benefits, All Health Care, All Disability, and All Death categories. Each category is further divided into specific benefits like Defined Benefit Pension, Defined Benefit & Employer Defined Contribution, Group Life, Survivors Income, and more.
Distribution of Benefit Values

Employer-Paid Value

Base Average
Distribution of Benefit Values

Total Value

Base Average
Index Displays
<table>
<thead>
<tr>
<th>Ranking Among Plans in Study</th>
<th>Employer Index</th>
<th>Total Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>131.7</td>
<td>129.6</td>
</tr>
<tr>
<td>4th</td>
<td>118.7</td>
<td>113.4</td>
</tr>
<tr>
<td>8th</td>
<td>98.3</td>
<td>96.1</td>
</tr>
<tr>
<td>12th</td>
<td>78.4</td>
<td>83.2</td>
</tr>
<tr>
<td>15th</td>
<td>67.7</td>
<td>67.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Your Position Relative to the Base Companies</th>
<th>Employer Value</th>
<th>Total Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index</td>
<td>97.6</td>
<td>104.1</td>
</tr>
<tr>
<td>Ranking</td>
<td>8th / 9th</td>
<td>5th / 6th</td>
</tr>
</tbody>
</table>
All Benefits

The benefit areas included in this index are:

- Defined Benefit Pension
- Defined Contribution
- Preretirement Death
  - Group Life
  - Survivors’ Income
- Postretirement Death
- Short-Term Disability
- Long-Term Disability
- Preretirement Health Care
  - Medical
  - Dental
  - Vision and Hearing
  - Health Care Savings Accounts
  - Excess Credits
- Postretirement Health Care
  - Medical
  - Dental
  - Vision and Hearing
  - Health Care Savings Accounts
  - Excess Credits
- Time Off With Pay
  - Holidays
  - Vacations
  - “Special” Time Off Provisions
## All Benefits

### Ranking Among Plans in Study

<table>
<thead>
<tr>
<th>Rank</th>
<th>Employer Index</th>
<th>Total Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>134.4</td>
<td>127.5</td>
</tr>
<tr>
<td>4th</td>
<td>105.1</td>
<td></td>
</tr>
<tr>
<td>8th</td>
<td>94.9</td>
<td>99.3</td>
</tr>
<tr>
<td>12th</td>
<td>92.3</td>
<td>95.2</td>
</tr>
<tr>
<td>16th</td>
<td>83.3</td>
<td>87.2</td>
</tr>
</tbody>
</table>

### Your Position Relative to the Base Companies

<table>
<thead>
<tr>
<th>Index</th>
<th>Employer Value</th>
<th>Total Value</th>
</tr>
</thead>
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<tr>
<td>Index</td>
<td>111.1</td>
<td>110.9</td>
</tr>
<tr>
<td>Ranking</td>
<td>2nd / 3rd</td>
<td>2nd / 3rd</td>
</tr>
</tbody>
</table>
All Security Benefits

The benefit areas included in this index are:

- Defined Benefit Pension
- Defined Contribution
- Preretirement Death
  - Group Life
  - Survivors’ Income
- Postretirement Death
- Short-Term Disability
- Long-Term Disability
- Preretirement Health Care
  - Medical
  - Dental
  - Vision and Hearing
  - Health Care Savings Accounts
  - Excess Credits
- Postretirement Health Care
  - Medical
  - Dental
  - Vision and Hearing
  - Health Care Savings Accounts
  - Excess Credits
### All Security Benefits

<table>
<thead>
<tr>
<th>Ranking Among Plans in Study</th>
<th>Employer Index</th>
<th>Total Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>4th</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>8th</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
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</tr>
<tr>
<td>Organization</td>
<td>Yr</td>
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<td>---------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>average YMPE + 2.000% highest average pay (over 3-year average YMPE) x participation</td>
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<td>Ranking Among Plans in Study</td>
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<tr>
<td>Ontario Power</td>
<td>13</td>
<td>(1.500% highest average pay up to 3-year average YMPE + 2.000% highest average pay over 3-year average YMPE) x participation</td>
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### Defined Benefit Pension

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Defined Contribution

Ranking Among Employer Plans in Study

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Your Position Relative to the Employer Base Companies

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Retirement: Defined Benefit Pension and Employer Defined Contribution

The benefit areas included in this index are:

- Defined Benefit Pension
- Defined Contribution
## Defined Benefit Pension and Employer Defined Contribution

### Ranking Among Plans in Study

<table>
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<tr>
<td>Ontario Power</td>
<td>Monthly Employee Contributions per</td>
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<td>13</td>
<td>2.00 x pay; No maximum</td>
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<tr>
<td></td>
<td>1.00 x pay; No maximum</td>
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### Your Position Relative to Base Companies

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<td>Ranking</td>
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</tr>
<tr>
<td>Organization</td>
<td>Yr Employer-Paid Amount</td>
<td>Contributory Amount</td>
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<td>1.20 x pay; No maximum</td>
<td>1.00 x pay; No maximum</td>
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<th>Total Index</th>
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<td>16th</td>
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<th>Total Value</th>
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<tr>
<td>Ranking</td>
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<tr>
<td>Organization</td>
<td>Yr</td>
<td>Benefit Amount</td>
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</tr>
<tr>
<td>Ontario Power</td>
<td>13</td>
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# All Preretirement Death

## Ranking Among Employer Total Plans in Study

<table>
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<th>Employer Index</th>
<th>Total Index</th>
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## Your Position Relative to the Base Companies

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<thead>
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<th>Employer Value</th>
<th>Total Value</th>
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<tr>
<td>Ranking</td>
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<tr>
<td>Organization</td>
<td>Yr</td>
<td>Initial Amount</td>
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<td>----</td>
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<td>Ontario Power</td>
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<td>0.50 x pay; No maximum</td>
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</tbody>
</table>

Re-Filed: 2017-02-10, EB-2016-0152
Exhibit L, Tab 6.6, Schedule 1 Staff-157
Attachment 2, Page 48 of 200
### Ranking Among Plans in Study

<table>
<thead>
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<tr>
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### Your Position Relative to the Base Companies

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<tr>
<td>Ranking</td>
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</tbody>
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All Death

The benefit areas included in this index are:

- Preretirement Death
  - Group Life
  - Survivors' Income
- Postretirement Death
<table>
<thead>
<tr>
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<p>| Ranking                                      |                |             |</p>
<table>
<thead>
<tr>
<th>Organization</th>
<th>Yr</th>
<th>Benefit Percent</th>
<th>Benefit Begins</th>
<th>Benefit Duration</th>
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<tbody>
<tr>
<td>Ontario Power</td>
<td>13</td>
<td>100.0%</td>
<td>1st day</td>
<td>6 months</td>
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## Short-Term Disability

<table>
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<tr>
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<td><img src="image" alt="Index" /></td>
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<tr>
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<td><img src="image" alt="Index" /></td>
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<tr>
<td>Organization</td>
<td>Yr Benefit Percentage</td>
<td>C/QPP Offset</td>
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<td>Ontario Power</td>
<td>13</td>
<td>Lesser of:</td>
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<tr>
<td></td>
<td></td>
<td>65% (no offset)</td>
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<td></td>
<td></td>
<td>75% (employee offset)</td>
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<td></td>
<td>(taxable)</td>
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<td></td>
<td>Employee offset for 75% only</td>
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### Ranking Among Plans in Study

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### Your Position Relative to the Base Companies

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All Disability

The benefit areas included in this index are:

- Short-Term Disability
- Long-Term Disability
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<table>
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<td>100%</td>
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**Preretirement Health Care (Including Vision and Hearing)**

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<tr>
<td>Ranking</td>
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<tr>
<td>Organization</td>
<td>Yr Annual Deductible</td>
<td>Coinsurance</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Ontario Power</td>
<td>13</td>
<td>100% exams, 100% cleaning, 100% x-rays, 100% fillings, 85% endodontics, 85% periodontics, 85% inlays, 85% crowns, 85% dentures, 85% bridgework</td>
</tr>
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<td>Ranking Among Plans in Study</td>
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<tr>
<td>Organization</td>
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<td>Coinsurance</td>
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<td>Ontario Power</td>
<td>13</td>
<td>100% exams, 100% cleaning, 100% x-rays, 100% fillings, 85% endodontics, 85% periodontics, 85% inlays, 85% crowns, 85% dentures, 85% bridgework</td>
</tr>
</tbody>
</table>
### Ranking Among Plans in Study

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Employer Index</th>
<th>Total Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td></td>
<td></td>
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<tr>
<td>4th</td>
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<tr>
<td>8th</td>
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<tr>
<td>12th</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16th</td>
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</tbody>
</table>

### Your Position Relative to the Base Companies

<table>
<thead>
<tr>
<th>Position</th>
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<tr>
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<tr>
<td>Ranking</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
All Preretirement Health Care

The benefit areas included in this index are:

- Preretirement Health Care
  - Medical
  - Dental
  - Vision and Hearing
  - Health Care Savings Accounts
  - Excess Credits
### All Pre-retirement Health Care

#### Ranking Among Employer Total Plans in Study

<table>
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<tr>
<th>Position</th>
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<th>Total Index</th>
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</tr>
<tr>
<td>8th</td>
<td>★★★</td>
<td>★★★</td>
</tr>
<tr>
<td>12th</td>
<td>★★★</td>
<td>★★★</td>
</tr>
<tr>
<td>16th</td>
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#### Your Position Relative to the Base Companies

<table>
<thead>
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<td>★★★</td>
</tr>
<tr>
<td>Ranking</td>
<td>★★★</td>
<td>★★★</td>
</tr>
<tr>
<td>Ontario Power</td>
<td>Monthly Retiree</td>
<td>Monthly Retiree</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td></td>
<td>Same as active</td>
<td>Same as active</td>
</tr>
<tr>
<td></td>
<td>None</td>
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### Ranking Among Employer Total Plans in Study

<table>
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<tr>
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<td><img src="image" alt="16th Employer Index" /></td>
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### Your Position Relative to the Base Companies

<table>
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<tr>
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<td><img src="image" alt="Ranking Employer Value" /></td>
<td><img src="image" alt="Ranking Total Value" /></td>
</tr>
</tbody>
</table>
All Health Care

The benefit areas included in this index are:

- Preretirement Health Care
  - Medical
  - Dental
  - Vision and Hearing
  - Health Care Savings Accounts
  - Excess Credits

- Postretirement Health Care
  - Medical
  - Dental
  - Vision and Hearing
  - Health Care Savings Accounts
  - Excess Credits
<table>
<thead>
<tr>
<th>Ranking Among Plans in Study</th>
<th>Employer Index</th>
<th>Total Index</th>
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</thead>
<tbody>
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<tr>
<td>16th</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Your Position Relative to the Base Companies</th>
<th>Employer Value</th>
<th>Total Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ranking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization</td>
<td>Yr Holidays</td>
<td>Special Provisions</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Ontario Power</td>
<td>13/11.0</td>
<td>Plus additional 1 day’s pay x service over 25 years (maximum 10 days’ pay)</td>
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</tbody>
</table>
# Holidays

## Ranking Among Employer Total Plans in Study

<table>
<thead>
<tr>
<th>Rank</th>
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<th>Total Index</th>
</tr>
</thead>
<tbody>
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<tr>
<td>16th</td>
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</tr>
</tbody>
</table>

## Your Position Relative to the Base Companies

<table>
<thead>
<tr>
<th>Position</th>
<th>Employer Value</th>
<th>Total Value</th>
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<tbody>
<tr>
<td>Index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ranking</td>
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</tr>
<tr>
<td>Ontario Power</td>
<td>13</td>
<td>3.0</td>
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</tbody>
</table>
## Vacations

<table>
<thead>
<tr>
<th>Ranking Among Plans in Study</th>
<th>Employer Index</th>
<th>Total Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
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<td>16th</td>
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</table>

<table>
<thead>
<tr>
<th>Your Position Relative to the Base Companies</th>
<th>Employer Value</th>
<th>Total Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ranking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization</td>
<td>Yr 3 Weeks</td>
<td>4 Weeks</td>
</tr>
<tr>
<td>--------------------</td>
<td>------------</td>
<td>---------</td>
</tr>
<tr>
<td>Ontario Power</td>
<td>13.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>
### Ranking Among Plans in Study

<table>
<thead>
<tr>
<th>Position</th>
<th>Employer Index</th>
<th>Total Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
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<tr>
<td>16th</td>
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</tbody>
</table>

### Your Position Relative to the Base Companies

<table>
<thead>
<tr>
<th>Position</th>
<th>Employer Value</th>
<th>Total Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ranking</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
All Postretirement Benefits

The benefit areas included in this index are:

- Defined Benefit Pension
- Defined Contribution
- Postretirement Death
- Postretirement Health Care
  - Medical
  - Dental
  - Vision and Hearing
  - Health Care Savings Accounts
  - Excess Credits
<table>
<thead>
<tr>
<th>Ranking Among Plans in Study</th>
<th>Employer Index</th>
<th>Total Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>□□</td>
<td>□□</td>
</tr>
<tr>
<td>4th</td>
<td>□□</td>
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<tr>
<td>8th</td>
<td>□□</td>
<td>□□</td>
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<tr>
<td>12th</td>
<td>□□</td>
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<tr>
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<td>□□</td>
<td>□□</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Your Position Relative to the Base Companies</th>
<th>Employer Value</th>
<th>Total Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index</td>
<td>□□</td>
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</tr>
<tr>
<td>Ranking</td>
<td>□□</td>
<td>□□</td>
</tr>
</tbody>
</table>
### Ranking Among Plans in Study

<table>
<thead>
<tr>
<th>Position</th>
<th>Employer Index</th>
<th>Total Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
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<td>8th</td>
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<td>12th</td>
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<td>□□</td>
</tr>
<tr>
<td>16th</td>
<td>□□</td>
<td>□□</td>
</tr>
</tbody>
</table>

### Your Position Relative to the Base Companies

<table>
<thead>
<tr>
<th>Position</th>
<th>Employer Value</th>
<th>Total Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index</td>
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<td>□□</td>
</tr>
<tr>
<td>Ranking</td>
<td>□□</td>
<td>□□</td>
</tr>
</tbody>
</table>
## Overall Results

<table>
<thead>
<tr>
<th>Your Position Relative to the Base Companies</th>
<th>Employer Value Index</th>
<th>Total Value Index</th>
<th>Employer Value Ranking</th>
<th>Total Value Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Benefits (A)</td>
<td>111.1</td>
<td>110.9</td>
<td>2nd / 3rd</td>
<td>2nd / 3rd</td>
</tr>
<tr>
<td>Defined Benefit (P)</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Defined Contribution (C)</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Death (De)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Disability (Di)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Health Care (H)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time Off With Pay (T)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Comments
General Comments

Base Companies

In this study, the value of the Ontario Power Generation ("OPG") salaried employee benefits program for the PWU group is compared to a norm of the values of the salaried employee benefits programs of 16 base companies.

The results suggest that the 16 companies provide a reasonable norm. Within individual benefit areas and in total, the 16 companies' benefit values are spread fairly evenly over the range from highest to lowest. There is little similarity or grouping evident from the indexes or from the benefit specifications themselves. No one company or group of companies dominates the index.

Benefit Areas

There are five major benefit areas—retirement (defined benefit pension and defined contribution), death, disability, health care, and time off with pay. Of these areas, retirement, health care, and time off with pay are major value areas within the context of the overall benefits program; death and disability typically account for a less significant portion of the value of the overall benefits program.

Contributory Plans

For each benefit area, two comparisons are presented—the "total" value index and the "employer-paid" value index. The total value index reflects the value of all available benefits taking into consideration anticipated participation in optional programs. The employer-paid value index is based on the excess of the total value of benefits over the value of employee contributions.

Base Company Results

The base company indexes show the widest variation in the retirement and health care areas. The spread in values typically occurs throughout the range and is not just the result of one high or one low company. There is often a greater percentage variation in a sub-area, such as postretirement health care.
Composite Indexes

Several composite indexes have been created to facilitate the benefit value comparisons. The first major composite index is the All Benefits index, which compares the value associated with all benefits—retirement, death, disability, health care, and time off with pay.

The next major composite index is the All Security Benefits index, which compares the values of the overall benefits programs excluding time off with pay. The All Security Benefits index enables a comparison of “hard dollar” benefits by excluding only the value of holidays and vacations.

Supplementing the All Benefits index are two special indexes. The All Postretirement Benefits index includes values for postretirement death, postretirement health care, and the retirement portion of defined benefit and defined contribution plans. This is a comparison of benefits available to employees after retirement.

The All Preretirement Group Benefits index includes values for group life and survivor income insurance, short-term disability, long-term disability, and health care benefits provided to active employees. The relationship between this index and the All Postretirement Benefits index also allows a comparison of the relative level of benefits, versus the base companies, for retirees and active employees.
Comments on Overall Results

Competitive Position

<table>
<thead>
<tr>
<th></th>
<th>Employer-Paid Value</th>
<th>Total Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Index</td>
<td>Ranking</td>
</tr>
<tr>
<td>All Benefits</td>
<td>111.1</td>
<td>2nd / 3rd</td>
</tr>
<tr>
<td>All Security Benefits</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ontario Power Generation

The above average total All Benefits index at OPG

Use of Employee Contributions
Distribution of Overall Results

The following tables and graphs show how your values for each major benefit area impact your overall results (i.e., the All Benefits index). For example, the employer-paid All Benefits index is 11.1 percentage points above average and defined pension benefits contribute to this All Benefits position. In each benefit area, the Impact on All Benefits is calculated as the Relative Weight multiplied by the difference between Your Index and 100.

<table>
<thead>
<tr>
<th>Employer-Paid Value</th>
<th>Relative Weight</th>
<th>Your Index</th>
<th>Impact on All Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retirement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Defined Benefit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Defined Contribution</td>
<td></td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Death</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preretirement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postretirement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Care</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Preretirement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postretirement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time Off With Pay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Benefits</td>
<td>100.0%</td>
<td>111.1</td>
<td>11.1</td>
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</table>

<table>
<thead>
<tr>
<th>Total Value</th>
<th>Relative Weight</th>
<th>Your Index</th>
<th>Impact on All Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retirement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Defined Benefit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Defined Contribution</td>
<td></td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Death</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preretirement</td>
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<tr>
<td>Disability</td>
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<td></td>
</tr>
<tr>
<td>Health Care</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preretirement</td>
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<td></td>
</tr>
<tr>
<td>Postretirement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time Off With Pay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Benefits</td>
<td>100.0%</td>
<td>110.9</td>
<td>10.9</td>
</tr>
</tbody>
</table>
Comments—Retirement

Competitive Position

<table>
<thead>
<tr>
<th>Employer-Paid Value</th>
<th>Total Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Index</td>
</tr>
<tr>
<td>Defined Benefit Pension</td>
<td></td>
</tr>
<tr>
<td>Defined Contribution</td>
<td>0.0</td>
</tr>
<tr>
<td>All Retirement</td>
<td></td>
</tr>
</tbody>
</table>

Overall Retirement Program

Prevalence

The following table shows the different combinations of defined benefit pension plans and defined contribution plans among the base companies.

<table>
<thead>
<tr>
<th></th>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defined benefit plan only; no defined contribution plan</td>
<td>13/16</td>
</tr>
<tr>
<td>Defined benefit plan only for a grandfathered group of employees; defined contribution plan for all new employees</td>
<td>0/16</td>
</tr>
<tr>
<td>Defined contribution plan for all employees; no defined benefit plan</td>
<td>0/16</td>
</tr>
<tr>
<td>Defined benefit plan and defined contribution plan¹</td>
<td>3/16</td>
</tr>
</tbody>
</table>

The comments that follow do not reflect the base companies that have a defined benefit plan only for a grandfathered group of employees.

¹ Includes situations where employees have a choice between a defined benefit plan and a defined contribution plan
Flexibility

The following table shows how many base companies have some flexibility for employees in their retirement program.

<table>
<thead>
<tr>
<th>Flexibility</th>
<th>Number of Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choice between defined benefit pension plan and defined contribution plan</td>
<td>2/16</td>
</tr>
<tr>
<td>Flexibility in defined benefit plan</td>
<td></td>
</tr>
<tr>
<td>Choice between non-contributory and contributory benefits</td>
<td>0/16</td>
</tr>
<tr>
<td>Choice of two or more options</td>
<td>0/16</td>
</tr>
<tr>
<td>Optional contributions to enhance ancillary benefits</td>
<td>1/16</td>
</tr>
</tbody>
</table>

For base companies that offer a choice between a defined benefit plan and a defined contribution plan, we have assumed that employees under age 45 would participate in the defined contribution plan and that employees over age 45 would participate in the defined benefit plan. As a result, the total retirement program value for these companies is split between the Defined Benefit Pension and Defined Contribution benefit areas.

Similarly, for the base company that provides a hybrid Defined Benefit/Defined Contribution plan, the total retirement value is split between the two benefit areas.

**Defined Benefit Pension**

The primary drivers of value are the type of plan (highest average pay plans are generally more valuable than career average pay plans), the inclusion of bonus in the pay definition, the level of normal retirement benefits, the normal form of payment, and the extent of any early retirement subsidies.

**Base Company Practices**

For base companies that offer a choice between a defined benefit plan and a defined contribution plan, the comments that follow reflect the defined benefit plan.

**Type of Plan**

<table>
<thead>
<tr>
<th>Type of Plan</th>
<th>Number of Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest average pay plan</td>
<td></td>
</tr>
<tr>
<td>Five-year average</td>
<td>13/16</td>
</tr>
<tr>
<td>Three-year average</td>
<td>3/16</td>
</tr>
<tr>
<td>Other</td>
<td>0/16</td>
</tr>
<tr>
<td>Career average pay plan</td>
<td>0/16</td>
</tr>
</tbody>
</table>
### Inclusion of Bonus\(^2\) in Pay Definition

<table>
<thead>
<tr>
<th></th>
<th>Number of Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bonus not included</td>
<td>6/16</td>
</tr>
<tr>
<td>Bonus included</td>
<td>10/16</td>
</tr>
</tbody>
</table>

### Inclusion of Automatic Indexing

<table>
<thead>
<tr>
<th></th>
<th>Number of Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indexing not included</td>
<td>2/16</td>
</tr>
<tr>
<td>Indexing included</td>
<td>13/16</td>
</tr>
<tr>
<td>Ad hoc indexing</td>
<td>1/16</td>
</tr>
</tbody>
</table>

### Normal Retirement Benefit

The “average” base company defined benefit plan (for those companies with a plan) provides a normal retirement benefit of \(\_\) of pay up to the YMPE plus \(\_\) of pay above the YMPE.

### Normal Form of Payment

<table>
<thead>
<tr>
<th></th>
<th>Number of Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life annuity</td>
<td>1/16</td>
</tr>
<tr>
<td>Life annuity with 5-year guarantee</td>
<td>1/16</td>
</tr>
<tr>
<td>Life annuity with 10-year guarantee</td>
<td>2/16</td>
</tr>
<tr>
<td>Partially subsidized joint and survivor annuity</td>
<td>0/16</td>
</tr>
<tr>
<td>Life annuity if single</td>
<td>0/0</td>
</tr>
<tr>
<td>Life annuity with guarantee if single</td>
<td>0/0</td>
</tr>
<tr>
<td>Fully subsidized joint and survivor annuity</td>
<td>9/12</td>
</tr>
<tr>
<td>Life annuity if single</td>
<td>12/16</td>
</tr>
<tr>
<td>Life annuity with guarantee if single</td>
<td>3/12</td>
</tr>
</tbody>
</table>

### Early Retirement Subsidies

<table>
<thead>
<tr>
<th>Earliest Unreduced Retirement Age</th>
<th>Number of Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>With 10 Years of Service</td>
</tr>
<tr>
<td>Age 55</td>
<td>0/16</td>
</tr>
<tr>
<td>Age 58</td>
<td>0/16</td>
</tr>
<tr>
<td>Age 60</td>
<td>7/16</td>
</tr>
<tr>
<td>Age 62</td>
<td>1/16</td>
</tr>
<tr>
<td>Age 65</td>
<td>8/16</td>
</tr>
</tbody>
</table>

\(^2\) Performance-based supplemental compensation; sales incentives, commissions, and overtime are not considered bonuses for this study.
### Average Early Retirement Reduction

<table>
<thead>
<tr>
<th>Age</th>
<th>10 Years of Service</th>
<th>20 Years of Service</th>
<th>30 Years of Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>35.4%</td>
<td>29.0%</td>
<td>9.1%</td>
</tr>
<tr>
<td>58</td>
<td>21.4%</td>
<td>17.3%</td>
<td>6.1%</td>
</tr>
<tr>
<td>60</td>
<td>12.1%</td>
<td>8.0%</td>
<td>2.5%</td>
</tr>
<tr>
<td>62</td>
<td>7.1%</td>
<td>4.6%</td>
<td>1.5%</td>
</tr>
</tbody>
</table>

### Employee Contributions

<table>
<thead>
<tr>
<th>Number of Plans</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Not permitted</td>
<td>2/16</td>
</tr>
<tr>
<td>Optional (to enhance ancillary benefits)</td>
<td>1/16</td>
</tr>
<tr>
<td>Required for all</td>
<td>13/16</td>
</tr>
</tbody>
</table>

### Ontario Power Generation

OPG’s total index is \[\text{Index}\]. All base companies provide a defined benefit pension plan to new participants.

As noted previously, for base companies that offer a choice between a defined benefit plan and a defined contribution plan, we have split the retirement program value between the Defined Benefit Pension and Defined Contribution benefit areas by assuming that employees under age 45 would participate in the defined contribution plan and that employees over age 45 would participate in the defined benefit plan. Similarly, one of the base companies provides a hybrid Defined Benefit/Defined Contribution plan, with the values split between these two benefit areas. As a result, it might be misleading to focus on just the Defined Benefit Pension area. It might be more meaningful to consider the combined Retirement (Defined Benefit Pension and Employer Defined Contribution) results.

Two base companies provide a choice between a defined benefit and a defined contribution plan, and one base company provides a hybrid defined benefit/defined contribution plan. If we remove these three companies from the comparison, OPG’s employer-paid and total indexes would be \[\text{Index}\] and \[\text{Index}\] respectively.

In the defined benefit plan comparison, OPG is
Defined Contribution

For ease of reference, we have divided the types of plans into three broad categories:

- **Unmatched plans** are those where the company makes a contribution regardless of whether or how much employees contribute. This would include some money purchase plans and some profit sharing plans. The value provided by these plans is generally greater than matched plans, not only because unmatched plans tend to have higher levels of company contributions, but also because participation is automatic, whereas not all employees will fully participate in matched plans.

  The primary driver of value for unmatched plans is the level of company contribution.

- **Matched plans** are those where the company contribution is directly linked to how much employees contribute. Only the company contribution to these plans has been included in the values, since employee contributions (while necessary to get company-matching dollars) represent a very large part of the total value and differ little from an individual account that an employee could be accumulating while working for a company that does not have this type of plan.

  The primary drivers of value for matched plans are the company matching contribution rate and the level of employee contributions that are matched.

- **Stock purchase plans** are those where the company makes a matching contribution linked to how much employees contribute and all contributions are used to purchase company stock, or the company does not make a direct contribution; rather employee contributions are used to purchase company stock at a discount.

  The primary driver of value for stock purchase plans are the company matching contribution rate and the level of employee contributions that are matched, or the discount on the price of company stock.

When all types of plans are considered, the primary driver of value is the maximum potential company contribution (calculated assuming employees make the maximum matched contribution).

Base Company Practices

For base companies that offer a choice between a defined benefit plan and a defined contribution plan, the comments that follow reflect the defined contribution plan.

For base companies where contributions are related to age, service, age-plus-service points, or pay, the comments that follow are based on the following “straw-person” (although the indexes and rankings reflect a diverse population with employees with many different combinations of age, service, and pay):

- Age—40
- Service—10 years
- Pay—$69,000

For base companies where contributions are related to profits, the comments that follow reflect the most recent actual payout.
## Type of Plan

<table>
<thead>
<tr>
<th>Type of Plan</th>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>No defined contribution plan</td>
<td>13/16</td>
</tr>
<tr>
<td>Unmatched plan</td>
<td>2/16</td>
</tr>
<tr>
<td>Matched plan</td>
<td>3/16</td>
</tr>
<tr>
<td>Stock purchase plan</td>
<td>0/16</td>
</tr>
</tbody>
</table>

### Inclusion of Bonus in Pay Definition

<table>
<thead>
<tr>
<th>Inclusion of Bonus in Pay Definition</th>
<th>Number of Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bonus not included</td>
<td>0/3</td>
</tr>
<tr>
<td>Full bonus included</td>
<td>3/3</td>
</tr>
</tbody>
</table>

### Unmatched Plans

<table>
<thead>
<tr>
<th>Company Contribution</th>
<th>Number of Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 2% of pay</td>
<td>0/2</td>
</tr>
<tr>
<td>2% to 3.99% of pay</td>
<td>0/2</td>
</tr>
<tr>
<td>4% to 5.99% of pay</td>
<td>1/2</td>
</tr>
<tr>
<td>6% to 7.99% of pay</td>
<td>1/2</td>
</tr>
<tr>
<td>8% of pay or more</td>
<td>0/2</td>
</tr>
</tbody>
</table>

**Average company contribution (for those with unmatched plans)**

### Matched Plans

For base companies where the Company matching contribution is related to the level of employee contributions, the comments that follow reflect an average matching rate.

<table>
<thead>
<tr>
<th>Matching Contribution Rate</th>
<th>Number of Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than $0.25 per $1.00 of employee contribution</td>
<td>0/3</td>
</tr>
<tr>
<td>$0.25 to $0.49 per $1.00 of employee contribution</td>
<td>0/3</td>
</tr>
<tr>
<td>$0.50 to $0.74 per $1.00 of employee contribution</td>
<td>0/3</td>
</tr>
<tr>
<td>$0.75 to $0.99 per $1.00 of employee contribution</td>
<td>0/3</td>
</tr>
<tr>
<td>$1.00 or more per $1.00 of employee contribution</td>
<td>3/3</td>
</tr>
</tbody>
</table>

**Average company matching contribution rate (for those with matched plans)**

---

3 Performance-based supplemental compensation; sales incentives, commissions, and overtime are not considered bonuses for this study.
### Matched Level of Employee Contribution

<table>
<thead>
<tr>
<th>Matched Level of Employee Contribution</th>
<th>Number of Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 2% of pay</td>
<td>0/3</td>
</tr>
<tr>
<td>2% to 3.99% of pay</td>
<td>1/3</td>
</tr>
<tr>
<td>4% to 5.99% of pay</td>
<td>2/3</td>
</tr>
<tr>
<td>6% to 7.99% of pay</td>
<td>0/3</td>
</tr>
<tr>
<td>8% of pay or more</td>
<td>0/3</td>
</tr>
</tbody>
</table>

Average matched level of employee contribution (for those with matched plans)

### Maximum Potential Company Contribution

<table>
<thead>
<tr>
<th>Maximum Potential Company Contribution</th>
<th>Number of Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 2% of pay</td>
<td>0/3</td>
</tr>
<tr>
<td>2% to 3.99% of pay</td>
<td>0/3</td>
</tr>
<tr>
<td>4% to 5.99% of pay</td>
<td>1/3</td>
</tr>
<tr>
<td>6% to 7.99% of pay</td>
<td>0/3</td>
</tr>
<tr>
<td>8% of pay or more</td>
<td>2/3</td>
</tr>
</tbody>
</table>

Average maximum potential company contribution (for those with defined contribution plans)

### Ontario Power Generation

OPG does not provide defined contribution benefits; therefore, the indexes are zero. Two base companies offer a choice between a defined benefit plan and a defined contribution plan, as well as a Savings plan for all employees. One base company provides a hybrid Defined Benefit/Defined Contribution plan. The remaining ten base companies do not provide defined contribution benefits (only a defined benefit plan).

When the defined benefit plan and defined contribution plan values are combined,
Comments—Death

Competitive Position

<table>
<thead>
<tr>
<th></th>
<th>Employer-Paid Value</th>
<th>Total Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Index</td>
<td>Ranking</td>
</tr>
<tr>
<td>Preretirement Death—Group Life Only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Preretirement Death</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postretirement Death</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Death</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Preretirement Death—Group Life Only

In the Preretirement Death—Group Life Only comparison, the total value index is based on the value of all available coverage (employer-paid and optional employee-paid), while the employer-paid value index is based on the total value reduced by employee contributions. If contribution rates for optional employee-paid coverage are lower than expected claims, there may be some employer-paid value associated with the optional coverage.

The primary driver of total value is total available employee life insurance. The primary drivers of employer-paid value are the level of fully employer-paid employee life insurance and employer subsidies in any optional employee life insurance coverage. Dependent life insurance and AD&D coverage have a modest impact on the indexes and rankings.

Base Company Practices

The following tables summarize the base company practices.

Inclusion of Bonus in Pay Definition

<table>
<thead>
<tr>
<th></th>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bonus not included</td>
<td>15/16</td>
</tr>
<tr>
<td>Full bonus included</td>
<td>1/16</td>
</tr>
</tbody>
</table>

---

4 Performance-based supplemental compensation; sales incentives, commissions, and overtime are not considered bonuses for this study.
### Different Types of Coverage Offered/Provided

<table>
<thead>
<tr>
<th>Coverage</th>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee life insurance coverage</td>
<td></td>
</tr>
<tr>
<td>Employer-Paid</td>
<td>13/16</td>
</tr>
<tr>
<td>Employee-Paid</td>
<td>16/16</td>
</tr>
<tr>
<td>Spousal life insurance coverage</td>
<td></td>
</tr>
<tr>
<td>Employer-Paid</td>
<td>0/16</td>
</tr>
<tr>
<td>Employee-Paid</td>
<td>12/16</td>
</tr>
<tr>
<td>Children’s life insurance coverage</td>
<td></td>
</tr>
<tr>
<td>Employer-Paid</td>
<td>0/16</td>
</tr>
<tr>
<td>Employee-Paid</td>
<td>11/16</td>
</tr>
<tr>
<td>Employee AD&amp;D coverage</td>
<td></td>
</tr>
<tr>
<td>Employer-Paid</td>
<td>5/16</td>
</tr>
<tr>
<td>Employee-Paid</td>
<td>10/16</td>
</tr>
<tr>
<td>Family AD&amp;D coverage (employee-paid)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8/16</td>
</tr>
</tbody>
</table>

### Fully Employer-Paid Employee Life Insurance

<table>
<thead>
<tr>
<th>Amount</th>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>3/16</td>
</tr>
<tr>
<td>Flat Dollar Amount</td>
<td></td>
</tr>
<tr>
<td>Less than $25,000</td>
<td>0/1</td>
</tr>
<tr>
<td>$25,000 or more</td>
<td>1/1</td>
</tr>
<tr>
<td>Pay-Related Amount</td>
<td></td>
</tr>
<tr>
<td>Less than 1 x pay</td>
<td>1/12</td>
</tr>
<tr>
<td>1 x pay to 1.49 x pay</td>
<td>6/12</td>
</tr>
<tr>
<td>1.5 x pay to 1.99 x pay</td>
<td>0/12</td>
</tr>
<tr>
<td>2 x pay to 2.99 x pay</td>
<td>4/12</td>
</tr>
<tr>
<td>3 x pay or more</td>
<td>1/12</td>
</tr>
</tbody>
</table>

Average amount of fully employer-paid employee life insurance (for those providing coverage)
Total Available Employee Life Insurance

<table>
<thead>
<tr>
<th>Number of Base Companies</th>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5 x pay</td>
<td>6/16</td>
</tr>
<tr>
<td>5 x pay to 5.99 x pay</td>
<td>3/16</td>
</tr>
<tr>
<td>6 x pay to 6.99 x pay</td>
<td>3/16</td>
</tr>
<tr>
<td>7 x pay to 7.99 x pay</td>
<td>1/16</td>
</tr>
<tr>
<td>8 x pay to 8.99 x pay</td>
<td>1/16</td>
</tr>
<tr>
<td>9 x pay to 9.99 x pay</td>
<td>0/16</td>
</tr>
<tr>
<td>10 x pay or more</td>
<td>2/16</td>
</tr>
</tbody>
</table>

average amount of total available employee life insurance

Ontario Power Generation

All Preretirement Death

The All Preretirement Death indexes are determined by adding the value of preretirement death benefits from all sources—group life insurance, income-type benefits from separate survivor income plans, preretirement pension death benefits, and lump sum payouts from defined contribution plans.

The primary drivers of value are the level of group life insurance coverage, the other forms of death benefits provided, and the values of the associated underlying plans.

5 Where available coverage is limited to a flat dollar amount (not linked to a multiple of pay), we have converted to a multiple of pay using a $69,000 average pay figure.
Base Company Practices

The following table summarizes the base company practices.

Prevalence

<table>
<thead>
<tr>
<th></th>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Life Insurance</td>
<td>16/16</td>
</tr>
<tr>
<td>Survivor Income Plans</td>
<td>0/16</td>
</tr>
<tr>
<td>Defined Benefit Pension Plans</td>
<td>16/16</td>
</tr>
<tr>
<td>Defined Contribution Plans</td>
<td>3/16</td>
</tr>
</tbody>
</table>

Ontario Power Generation

OPG provides additional death benefit value (beyond group life) through the defined benefit plan.
Postretirement Death

The primary driver of value is the ultimate level of life insurance coverage (after any reductions that apply on and after retirement). Plans that provide ultimate benefits related to pay generally have higher values than those that provide flat-dollar benefits. In some cases, the eligibility conditions for receiving benefits may have a significant impact.

Canadian accounting rules (CICA 3461) require that the cost of postretirement welfare benefits be accounted for during active employment. As a result, providing these benefits can have a significant impact on earnings for many organizations and may suggest that this is a benefit area where a high index is not desirable.

Base Company Practices

The following tables summarize the base company practices.

Ultimate Fully Employer-Paid Coverage

<table>
<thead>
<tr>
<th>Coverage Description</th>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applicable (no coverage)</td>
<td>5/16</td>
</tr>
<tr>
<td>Flat Dollar Amount</td>
<td></td>
</tr>
<tr>
<td>Less than $5,000</td>
<td>5/9</td>
</tr>
<tr>
<td>$5,000 to $9,999</td>
<td>0/9</td>
</tr>
<tr>
<td>$10,000 to $19,999</td>
<td>3/9</td>
</tr>
<tr>
<td>$20,000 or more</td>
<td>1/9</td>
</tr>
<tr>
<td>Pay-Related Amount</td>
<td></td>
</tr>
<tr>
<td>Less than 0.25 x pay</td>
<td>1/2</td>
</tr>
<tr>
<td>0.25 x pay to 0.49 x pay</td>
<td>0/2</td>
</tr>
<tr>
<td>0.5 x pay to 0.74 x pay</td>
<td>1/2</td>
</tr>
<tr>
<td>0.75 x pay to 0.99 x pay</td>
<td>0/2</td>
</tr>
<tr>
<td>1 x pay or more</td>
<td>0/2</td>
</tr>
<tr>
<td>Total</td>
<td>9/16</td>
</tr>
</tbody>
</table>

Service Requirements (assuming retirement at age 55)

<table>
<thead>
<tr>
<th>Service Requirement</th>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applicable (no coverage)</td>
<td>5/16</td>
</tr>
<tr>
<td>No service requirement</td>
<td>2/16</td>
</tr>
<tr>
<td>1-9 years</td>
<td>2/16</td>
</tr>
<tr>
<td>10-19 years</td>
<td>6/16</td>
</tr>
<tr>
<td>20-29 years</td>
<td>0/16</td>
</tr>
<tr>
<td>30 years or more</td>
<td>1/16</td>
</tr>
</tbody>
</table>
Comments—Disability

Competitive Position

<table>
<thead>
<tr>
<th></th>
<th>Employer-Paid Value</th>
<th>Total Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Index</td>
<td>Ranking</td>
</tr>
<tr>
<td>Short-Term Disability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-Term Disability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Disability</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Short-Term Disability

The Short-Term Disability indexes reflect any disability benefit payable during the first six months of disability, regardless of source. The primary drivers of value are the duration of full salary continuation (i.e., at 100%) and the service requirements for full salary continuation.

Base Company Practices

The following table summarizes the base company practices.

<table>
<thead>
<tr>
<th></th>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% salary continuation for 6 months, regardless of service</td>
<td>2/16</td>
</tr>
<tr>
<td>100% salary continuation for up to 6 months depending on service</td>
<td></td>
</tr>
<tr>
<td>Less than 5 years of service required for 6-month, 100% salary continuation</td>
<td>0/3</td>
</tr>
<tr>
<td>5 to 9.99 years of service required for 6-month, 100% salary continuation</td>
<td>0/3</td>
</tr>
<tr>
<td>10 to 14.99 years of service required for 6-month, 100% salary continuation</td>
<td>2/3</td>
</tr>
<tr>
<td>15 to 19.99 years of service required for 6-month, 100% salary continuation</td>
<td>1/3</td>
</tr>
<tr>
<td>20 or more years of service required for 6-month, 100% salary continuation</td>
<td>0/3</td>
</tr>
<tr>
<td>100% salary continuation for less than 6 months regardless of service</td>
<td>11/16</td>
</tr>
</tbody>
</table>
Ontario Power Generation

Long-Term Disability

The Long-Term Disability (LTD) indexes reflect any disability benefits payable after the first six months of disability and before the normal retirement age. The primary drivers of total value are the level of pay replacement and the presence of any dollar limits.

Due to the nature of LTD benefit taxation in Canada, plans that are fully employee-paid provide non-taxable benefits to employees should they become disabled. The total index values reflect the total value of the benefit paid by the plan, but does not reflect a difference if the benefit is taxable or non-taxable.

Base Company Practices

The following tables summarize the base company practices.

Flexibility

<table>
<thead>
<tr>
<th></th>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional LTD plan</td>
<td>9/16</td>
</tr>
<tr>
<td>Flexible LTD plan</td>
<td>7/16</td>
</tr>
</tbody>
</table>

Inclusion of Bonus\(^6\) in Pay Definition

<table>
<thead>
<tr>
<th></th>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bonus not included</td>
<td>16/16</td>
</tr>
<tr>
<td>Full bonus included</td>
<td>0/16</td>
</tr>
</tbody>
</table>

For base companies with flexible LTD plans, the statistics in the following table relate to the average LTD option (based on actual election patterns).

---

\(^6\) Performance-based supplemental compensation; sales incentives, commissions, and overtime are not considered bonuses for this study.
### Level of Pay Replacement

<table>
<thead>
<tr>
<th>Less than 50%</th>
<th>0/16</th>
</tr>
</thead>
<tbody>
<tr>
<td>50% to 59%</td>
<td>3/16</td>
</tr>
<tr>
<td>60% to 69%</td>
<td>8/16</td>
</tr>
<tr>
<td>70% of more</td>
<td>5/16</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Maximum Monthly LTD Benefit

<table>
<thead>
<tr>
<th>No maximum benefit</th>
<th>5/16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum monthly benefit</td>
<td></td>
</tr>
<tr>
<td>Less than $5,000</td>
<td>1/16</td>
</tr>
<tr>
<td>$5,000 to $9,999</td>
<td>3/16</td>
</tr>
<tr>
<td>$10,000 to $14,999</td>
<td>3/16</td>
</tr>
<tr>
<td>$15,000 or more</td>
<td>4/16</td>
</tr>
<tr>
<td><strong>Average maximum monthly LTD benefit (for those with a maximum)</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Employee Contributions

<table>
<thead>
<tr>
<th>Not required for any LTD plan option</th>
<th>5/16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required for some LTD plan options</td>
<td>4/16</td>
</tr>
<tr>
<td>Required for all LTD plan options</td>
<td>7/16</td>
</tr>
</tbody>
</table>

---

7 For plans with a step-rate formula, we have calculated the level of pay replacement using a $69,000 average pay figure.
Comments—Health Care

Competitive Position

<table>
<thead>
<tr>
<th></th>
<th>Employer-Paid Value</th>
<th>Total Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Index</td>
<td>Ranking</td>
</tr>
<tr>
<td>Preretirement Medical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preretirement Dental</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Preretirement Health Care</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Including HCSAs and excess credits)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postretirement Health Care</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Health Care</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Preretirement Medical

The primary driver of total value is the level of coinsurance for major medical, prescription drugs, and hospital coverage. Other significant drivers of value include cost management features in the design of the plan and vision care benefits.

Base Company Practices

The following tables summarize the base company practices.

Flexibility

<table>
<thead>
<tr>
<th></th>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional medical plan</td>
<td>5/16</td>
</tr>
<tr>
<td>Flexible medical plan</td>
<td>11/16</td>
</tr>
</tbody>
</table>
### Coinsurance (Most Common Option)

<table>
<thead>
<tr>
<th>For major medical services (excluding prescription drugs)</th>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 80%</td>
<td>0/16</td>
</tr>
<tr>
<td>80% to 89%</td>
<td>4/16</td>
</tr>
<tr>
<td>90% to 99%</td>
<td>2/16</td>
</tr>
<tr>
<td>100%</td>
<td>10/16</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>8/16</strong></td>
</tr>
<tr>
<td>For prescription drugs</td>
<td></td>
</tr>
<tr>
<td>Less than 80%</td>
<td>0/16</td>
</tr>
<tr>
<td>80% to 89%</td>
<td>6/16</td>
</tr>
<tr>
<td>90% to 99%</td>
<td>4/16</td>
</tr>
<tr>
<td>100%</td>
<td>6/16</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>8/16</strong></td>
</tr>
</tbody>
</table>

### Presence of Other Cost Management Features (Any Option)

<table>
<thead>
<tr>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deductibles</td>
</tr>
<tr>
<td>For all major medical services</td>
</tr>
<tr>
<td>For all major medical services excluding prescription drugs</td>
</tr>
<tr>
<td>For prescription drugs only</td>
</tr>
<tr>
<td>Dispensing fee caps</td>
</tr>
<tr>
<td>Drug formularies</td>
</tr>
<tr>
<td>Generic reimbursement</td>
</tr>
</tbody>
</table>

### Hospital Benefits (Most Common Option)

<table>
<thead>
<tr>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-private hospital</td>
</tr>
<tr>
<td>Full coverage (100%) with no dollar maximum</td>
</tr>
<tr>
<td>Full coverage (100%) with dollar maximum</td>
</tr>
<tr>
<td>Partial coverage</td>
</tr>
<tr>
<td>Not covered</td>
</tr>
<tr>
<td>Private hospital</td>
</tr>
<tr>
<td>Full coverage (100%) with no dollar maximum</td>
</tr>
<tr>
<td>Full coverage (100%) with dollar maximum</td>
</tr>
<tr>
<td>Partial coverage</td>
</tr>
<tr>
<td>Not covered</td>
</tr>
</tbody>
</table>
Vision Care Maximum Benefits (Most Common Option)

<table>
<thead>
<tr>
<th>Maximum Benefit</th>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not covered</td>
<td>0/16</td>
</tr>
<tr>
<td>$1 to $99 every 2 years</td>
<td>0/16</td>
</tr>
<tr>
<td>$100 to $199 every 2 years</td>
<td>0/16</td>
</tr>
<tr>
<td>$200 to $299 every 2 years</td>
<td>6/16</td>
</tr>
<tr>
<td>$300 or more every 2 years</td>
<td>10/16</td>
</tr>
</tbody>
</table>

Average (for those providing coverage)

Ontario Power Generation
Preretirement Dental

The primary drivers of value are the level of coinsurance for dental services, the maximum benefits for orthodontic services, and the cost management features in the design of the plan.

Base Company Practices

The following tables summarize the base company practices.

Flexibility

<table>
<thead>
<tr>
<th></th>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional dental plan</td>
<td>8/16</td>
</tr>
<tr>
<td>Flexible dental plan</td>
<td>8/16</td>
</tr>
</tbody>
</table>

Coinsurance (Most Common Option)

<table>
<thead>
<tr>
<th></th>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>For diagnostic and preventative services (e.g., exams, cleanings, x-rays)</td>
<td></td>
</tr>
<tr>
<td>Less than 80%</td>
<td>0/16</td>
</tr>
<tr>
<td>80% to 89%</td>
<td>5/16</td>
</tr>
<tr>
<td>90% to 99%</td>
<td>4/16</td>
</tr>
<tr>
<td>100%</td>
<td>7/16</td>
</tr>
<tr>
<td>Average</td>
<td></td>
</tr>
<tr>
<td>For other basic services (e.g., fillings, extractions)</td>
<td></td>
</tr>
<tr>
<td>Less than 80%</td>
<td>0/16</td>
</tr>
<tr>
<td>80% to 89%</td>
<td>6/16</td>
</tr>
<tr>
<td>90% to 99%</td>
<td>4/16</td>
</tr>
<tr>
<td>100%</td>
<td>6/16</td>
</tr>
<tr>
<td>Average</td>
<td></td>
</tr>
<tr>
<td>For major services (e.g., crowns, bridges, dentures)</td>
<td></td>
</tr>
<tr>
<td>Not covered</td>
<td>0/16</td>
</tr>
<tr>
<td>50%</td>
<td>7/16</td>
</tr>
<tr>
<td>60%</td>
<td>4/16</td>
</tr>
<tr>
<td>80%</td>
<td>3/16</td>
</tr>
<tr>
<td>100%</td>
<td>2/16</td>
</tr>
<tr>
<td>Average</td>
<td></td>
</tr>
</tbody>
</table>
### Coverage for Orthodontic Services (Most Common Option)

<table>
<thead>
<tr>
<th>Coverage Type</th>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applicable (no coverage)</td>
<td>3/16</td>
</tr>
<tr>
<td>Orthodontic services covered for dependent children only</td>
<td>6/16</td>
</tr>
<tr>
<td>Orthodontic services covered for adults and dependent children</td>
<td>7/16</td>
</tr>
</tbody>
</table>

### Lifetime Maximum Benefits for Orthodontic Services (Most Common Option)

<table>
<thead>
<tr>
<th>Benefit Range</th>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applicable (no coverage)</td>
<td>3/16</td>
</tr>
<tr>
<td>Under $1,500</td>
<td>1/16</td>
</tr>
<tr>
<td>$1,500-$1,999</td>
<td>1/16</td>
</tr>
<tr>
<td>$2,000-$2,499</td>
<td>5/16</td>
</tr>
<tr>
<td>$2,500-$2,999</td>
<td>1/16</td>
</tr>
<tr>
<td>$3,000 or more</td>
<td>5/16</td>
</tr>
<tr>
<td>Other (Combined Maximum)</td>
<td>0/16</td>
</tr>
</tbody>
</table>

Average (for those providing coverage): 2.05

---

**Ontario Power Generation**

**All Preretirement Health Care**
Postretirement Health Care

The primary driver of value is whether or not medical and/or dental benefits continue after retirement. In some cases, the eligibility conditions for receiving benefits may have a significant impact. Differences in the plan benefits (coinsurance, deductibles, and maximum amounts) also have an impact on the values.

There can be significant cost implications of continuing medical benefits for retirees. Retiree health care costs have increased rapidly due to health care inflation; cutbacks in provincial health care plans have also had an impact in some provinces. At some organizations, costs have also increased from expanded retiree populations (due to workforces maturing or the availability of early retirement “windows”). Some court cases have indicated that it can be difficult to cut back on these retiree benefits.

Canadian accounting rules (CICA 3461) require that the cost of postretirement welfare benefits be accounted for during active employment. As a result, providing these benefits can have a significant impact on earnings for many organizations and may suggest that this is a benefit area where a high index is not desirable.

Base Company Practices

The following tables summarize the base company practices.

Coverages

<table>
<thead>
<tr>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>No coverage available</td>
</tr>
<tr>
<td>Medical coverage available; no dental coverage</td>
</tr>
<tr>
<td>Both medical and dental coverage available</td>
</tr>
</tbody>
</table>

Service Requirements (assuming retirement at age 55)

<table>
<thead>
<tr>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applicable (no coverage)</td>
</tr>
<tr>
<td>No service requirement</td>
</tr>
<tr>
<td>1-9 years</td>
</tr>
<tr>
<td>10-19 years</td>
</tr>
<tr>
<td>20-29 years</td>
</tr>
<tr>
<td>30 years or more</td>
</tr>
</tbody>
</table>
Comments—Time Off With Pay

Competitive Position

<table>
<thead>
<tr>
<th></th>
<th>Employer-Paid Value</th>
<th>Total Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Index</td>
<td>Ranking</td>
</tr>
<tr>
<td>Holidays</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vacations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Time Off With Pay</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The total and employer-paid values in this benefit area are the same.

Holidays

Holidays is defined to include statutory holidays, personal days, and floating days. Holidays does not reflect any “earned days” (where employees would work longer hours to earn additional days off).

The only driver of value in the Holidays index is the number of days off provided to employees.
Base Company Practices

The following table summarizes the base company practices.

**Number of Days Off**

<table>
<thead>
<tr>
<th>Number of Days Off</th>
<th>Number of Base Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>4/16</td>
</tr>
<tr>
<td>12</td>
<td>2/16</td>
</tr>
<tr>
<td>13</td>
<td>1/16</td>
</tr>
<tr>
<td>14</td>
<td>2/16</td>
</tr>
<tr>
<td>15</td>
<td>0/16</td>
</tr>
<tr>
<td>16</td>
<td>0/16</td>
</tr>
<tr>
<td>17</td>
<td>3/16</td>
</tr>
<tr>
<td>18</td>
<td>1/16</td>
</tr>
<tr>
<td>19 to 22</td>
<td>0/16</td>
</tr>
<tr>
<td>23</td>
<td>1/16</td>
</tr>
<tr>
<td>24 to 28</td>
<td>0/16</td>
</tr>
<tr>
<td>29</td>
<td>1/16</td>
</tr>
<tr>
<td>30</td>
<td>0/16</td>
</tr>
<tr>
<td>31</td>
<td>1/16</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>1/16</strong></td>
</tr>
</tbody>
</table>

**Ontario Power Generation**

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Vacations

The primary drivers of value are the timing of the introduction of the third and fourth week of vacation and the maximum length of vacation provided to employees. Companies that introduce the third and fourth week of vacation earlier in an employee’s career generally rank higher. Companies that offer a fifth and/or sixth week of vacation, even if only for long-service employees, also generally rank higher.

For base companies that have a different vacation schedule for management/senior management employees, we have reflected the differences by dividing our model population into non-management, management, and senior management employees based on pay levels, and valuing the appropriate vacation schedule for the appropriate group of employees.

For base companies that allow vacation buying and selling within a flexible benefits program, we generally assume that employees neither buy nor sell vacation. The only exception might be where a company has scaled back its vacation schedule and given flexible credits to employees to “buy-back” the vacation days. In these cases we might assume that employees buy back the vacation days.

Base Company Practices

The following table summarizes the base company practices.

<table>
<thead>
<tr>
<th>Weeks of Vacation</th>
<th>Number of Base Companies Offering Week of Vacation</th>
<th>Average Service Required for Week of Vacation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Third</td>
<td>16/16</td>
<td>1.1 years</td>
</tr>
<tr>
<td>Fourth</td>
<td>16/16</td>
<td>6.8 years</td>
</tr>
<tr>
<td>Fifth</td>
<td>15/16</td>
<td>17.3 years</td>
</tr>
<tr>
<td>Sixth</td>
<td>13/16</td>
<td>25.7 years</td>
</tr>
<tr>
<td>Seventh</td>
<td>3/16</td>
<td>30.0 years</td>
</tr>
</tbody>
</table>

Ontario Power Generation

[Redacted]
Specifications
Specifications

This section summarizes the plan specifications in greater detail than appeared in the earlier Notes. These specifications remain brief in order to facilitate comparisons among the organizations.
<table>
<thead>
<tr>
<th>Organization</th>
<th>Yr</th>
<th>Type of Plan</th>
<th>Compensation</th>
<th>Integration with Government Pension</th>
<th>Eligibility for Participation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario Power</td>
<td>13</td>
<td>Highest 3-year average</td>
<td>Base, Bonus, up to 5% of pay</td>
<td>Step rate breakpoint at 3-year average YMPE</td>
<td>3 to 6 months (Mandatory)</td>
</tr>
<tr>
<td>Basic Formula</td>
<td>Minimum Formula</td>
<td>Past Service Variation</td>
<td>Automatic Inflation Protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>-----------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1.500% highest average pay up to 3-year average YMPE + 2.000% highest average pay over 3-year average YMPE) x participation</td>
<td>None</td>
<td>Benefit for service prior to 1/1/66: 2% highest average pay x participation</td>
<td>100% CPI (maximum 8.0%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization</td>
<td>Yr</td>
<td>Subsidized Form</td>
<td>Early Retirement Eligibility</td>
<td>Early Retirement Reduction</td>
<td>Eligibility for Supplement</td>
</tr>
<tr>
<td>----------------</td>
<td>----</td>
<td>-----------------</td>
<td>-----------------------------</td>
<td>---------------------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>Ontario Power</td>
<td>13</td>
<td>Single: 5 year certain and life, Married: 66.67% spouse's annuity</td>
<td>Age 55 &amp; 2 years participation</td>
<td>Actuarial reduction from age 65 If &lt; 15 years of service; otherwise 2%/year from age 65; 3%/year from age 60 (None if 82 points or 35 years) (84 points for MGMT)</td>
<td>Same as early retirement</td>
</tr>
<tr>
<td>Eligibility</td>
<td>Benefit</td>
<td>Broad Based Supplemental Benefits</td>
<td>Employee Contributions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------------------------------------------</td>
<td>-------------------------------------------------------</td>
<td>-------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eligible for LTD benefits</td>
<td>Accrued benefit to date of disability</td>
<td>For all individuals impacted by government limits</td>
<td>5.00% of pay up to YMPE + 7.00% of pay over YMPE (7% of pay - Management)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 years</td>
<td>Service continues to accrue while disabled</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and not eligible for LTD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

--- Deferred Disability Benefits ---
## Defined Benefit Pension: Other Retirement Provisions

<table>
<thead>
<tr>
<th>Organization</th>
<th>Yr</th>
<th>Subsidized Form</th>
<th>Early Retirement Eligibility</th>
<th>Early Retirement Reduction</th>
<th>Eligibility for Supplement</th>
<th>Supplement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario Power</td>
<td>13</td>
<td>Single: 5 year certain and life&lt;br&gt;Married: 66.67% spouse’s annuity</td>
<td>Age 55 &amp; 2 years participation</td>
<td>Actuarial reduction from age 65&lt;br&gt;If &lt; 15 years of service; otherwise 2%/year from age 65; 3%/year from age 60 (None if 82 points or 35 years) (84 points for MGMT)</td>
<td>Same as early retirement</td>
<td>0.5% highest average pay up to 5-year average YMPE x participation (Maximum 35 years) Payable to age 65</td>
</tr>
<tr>
<td>Eligibility</td>
<td>Benefit</td>
<td>Broad Based Supplemental Benefits</td>
<td>Employee Contributions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------------</td>
<td>------------------------------------------------------</td>
<td>-----------------------------------</td>
<td>------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eligible for LTD</td>
<td>Accrued benefit to date of disability</td>
<td>For all individuals impacted by government limits</td>
<td>5.00% of pay up to YMPE + 7.00% of pay over YMPE (7% of pay - Management)</td>
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<tr>
<td>10 years</td>
<td>Service continues to accrue while disabled</td>
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<tr>
<td>and not eligible for LTD benefits</td>
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<td>Organization</td>
<td>Yr</td>
<td>Type of Plan</td>
<td>Eligibility</td>
<td>Matched %</td>
<td>Total % Allowed</td>
<td>$ Maximum</td>
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<td>Ontario Power</td>
<td>13</td>
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</tr>
<tr>
<td>Ontario Power</td>
<td>13 Immediate</td>
<td>Base</td>
<td>2.00 x pay; No maximum</td>
<td>Continued without employee contribution</td>
<td></td>
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Re-Filed: 2017-02-10, EB-2016-0152
Exhibit L, Tab 6.6, Schedule 1 Staff-157
Attachment 2, Page 160 of 200
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<th>Eligibility</th>
<th>Compensation</th>
<th>Contributory Amount</th>
<th>Treatment on Disability</th>
<th>Monthly Employee Contributions per $1,000</th>
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<tbody>
<tr>
<td>Immediate</td>
<td>Base</td>
<td>1.00 x pay; No maximum</td>
<td>Continued without employee contribution</td>
<td>$0.220</td>
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<td>Yr</td>
<td>Eligibility</td>
<td>Compensation</td>
<td>Employer-Paid Amount</td>
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<tr>
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<td>13</td>
<td>Immediate</td>
<td>Base</td>
<td>2.00 x pay; No maximum</td>
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Exhibit L, Tab 6.6, Schedule 1 Staff-157
Attachment 2, Page 162 of 200
<table>
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<th>Treatment on Disability</th>
<th>Monthly Employee Contributions per $1,000</th>
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</thead>
<tbody>
<tr>
<td>Immediate</td>
<td>Base</td>
<td>1.00 x pay; No maximum</td>
<td>Continued without employee contribution</td>
<td>$0.220</td>
</tr>
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<td>Contributory AD&amp;D</td>
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Re-Filed: 2017-02-10, EB-2016-0152
Exhibit L, Tab 6.6, Schedule 1 Staff-157
Attachment 2, Page 164 of 200
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<tr>
<th>Employer-Paid Dependent Coverage</th>
<th>Contributory Dependent Coverage</th>
<th>Monthly Employee Contributions per $1,000 for Dependents</th>
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Re-Filed: 2017-02-10, EB-2016-0152
Exhibit L, Tab 6.6, Schedule 1 Staff-157
Attachment 2, Page 165 of 200
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<th>Contributory AD&amp;D</th>
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<td>Monthly Employee Contributions per $1,000 for Dependents</td>
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<td>Eligibility</td>
<td>Benefit Amount</td>
<td>Duration</td>
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<tr>
<td>10 years of service</td>
<td>66.67% of accrued Pre-1987 benefit plus greater of 66.67% of accrued</td>
<td>Spouse: Life</td>
<td></td>
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<td></td>
<td>Post-1986 benefit and Commuted value of Post-1986 benefit</td>
<td>Orphan: Age 18; Life (disabled); 7 yrs</td>
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<tr>
<td></td>
<td>Commuted value of Post-1986 benefit</td>
<td>post-high school (student)</td>
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<td></td>
<td></td>
<td>Lump sum only</td>
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<tr>
<td>Ontario Power</td>
<td>Age 55</td>
<td>0.50 x pay; No maximum</td>
<td>10 years after retirement</td>
<td>One-step</td>
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Postretirement Death

---------------------------------------- Continuation of Employer-Paid Active Coverage ----------------------------------------

Ontario Power
13

Age 55
0.50 x pay; No maximum
10 years after retirement
One-step
0.25 x pay

Re-Filed: 2017-02-10, EB-2016-0152
Exhibit L, Tab 6.6, Schedule 1 Staff-157
Attachment 2, Page 170 of 200
<table>
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<tr>
<th>Organization</th>
<th>Yr Type of Plan</th>
<th>Eligibility</th>
<th>Benefit Percent</th>
<th>C/QPP Offset</th>
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Re-Filed: 2017-02-10, EB-2016-0152
Exhibit L, Tab 6.6, Schedule 1 Staff-157
Attachment 2, Page 172 of 200
<table>
<thead>
<tr>
<th>Benefit Begins</th>
<th>Benefit Duration</th>
<th>Employee Contributions</th>
</tr>
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<tbody>
<tr>
<td>1st day</td>
<td>6 months</td>
<td>None</td>
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<td>Yr Type of Plan</td>
<td>Enrollment</td>
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Re-Filed: 2017-02-10, EB-2016-0152
Exhibit L, Tab 6.6, Schedule 1 Staff-157
Attachment 2, Page 174 of 200
<table>
<thead>
<tr>
<th>Maximum/Minimum</th>
<th>Inflation Protection</th>
<th>Benefit Begins</th>
<th>Benefit Duration</th>
<th>Monthly Employee Contributions</th>
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<tbody>
<tr>
<td>Unlimited</td>
<td>100% CPI (Maximum 8%) (Ontario CPI)</td>
<td>6 months</td>
<td>To age 65</td>
<td>None</td>
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<td>Yr Type of Plan</td>
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<td>Eligibility</td>
<td>Compensation</td>
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**Exhibit L, Tab 6.6, Schedule 1 Staff-157**
Attachment 2, Page 176 of 200
<table>
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<th>Monthly Employee Contributions</th>
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<tr>
<td>(Maximum 8%)</td>
<td>(Ontario CPI)</td>
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<td>Yr Eligibility</td>
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<td>Private</td>
<td>Coinsurance</td>
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<td>100%</td>
<td>100%</td>
<td>100%</td>
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Re-Filed: 2017-02-10, EB-2016-0152
Exhibit L, Tab 6.6, Schedule 1 Staff-157
Attachment 2, Page 178 of 200
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<tr>
<th>Eligible Expenses</th>
<th>Lifetime Maximum</th>
<th>Election Pattern</th>
<th>Monthly Employee Contributions</th>
<th>Additional Information</th>
<th>BC Premium Reimbursement</th>
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<tbody>
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<td>Emergency and referral</td>
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<td>None</td>
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<td>Yr Eligibility</td>
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<td>Private</td>
<td>Coinsurance</td>
<td>Deductible</td>
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<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>None</td>
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<tr>
<td>Eligible Expenses</td>
<td>Lifetime Maximum</td>
<td>Election Pattern</td>
<td>Monthly Employee Contributions</td>
<td>Additional Information</td>
<td>BC Premium Reimbursement</td>
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<td>-------------------------------</td>
<td>------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Emergency and referral</td>
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<tr>
<td>Exams: 1 exam(s)/1 year</td>
<td>customary/3 years/year (Reimbursed at 50%)</td>
<td>/year (Reimbursed at 50%)</td>
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<tr>
<td>Profession</td>
<td>Combined maximum $700/year (Reimbursed at 50%)</td>
<td>$2,000/year</td>
<td>Combined maximum $700/year (Reimbursed at 50%)</td>
<td>Reasonable and Customary</td>
<td>$5,000/year</td>
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<tr>
<td>Exams: 1 exam(s)/1 year</td>
<td>customary/3 years/year (Reimbursed at 50%)</td>
<td>/year (Reimbursed at 50%)</td>
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<td>Naturopath</td>
<td>Osteopath</td>
<td>Physiotherapist</td>
<td>Podiatrist</td>
<td>Private Duty Nurse</td>
<td>Psychologist</td>
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<tr>
<td>Combined maximum $700/year (Reimbursed at 50%)</td>
<td>Combined maximum $700/year (Reimbursed at 50%)</td>
<td>$2,000/year</td>
<td>Combined maximum $700/year (Reimbursed at 50%)</td>
<td>Reasonable and Customary</td>
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<td>Monthly Employee Contributions Addtl Information</td>
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<tr>
<td>Ontario Power</td>
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<td>--</td>
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<td>Current provincial</td>
<td>100% exams, 100% cleaning, 100% x-rays, 100% fillings, 85% endodontics, 85% periodontics, 85% inlays, 85% crowns, 85% dentures, 85% bridgework</td>
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<td>Recall Exams</td>
<td>Maximum</td>
<td>Eligible Groups</td>
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<tr>
<td>9 months</td>
<td>Unlimited</td>
<td>Adults and dependent children</td>
<td>75%</td>
<td>$4,000</td>
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<td>Current provincial</td>
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<tr>
<td>9 months</td>
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<td>Adults and dependent children</td>
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<td>Organization</td>
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<td>Vision &amp; Hearing</td>
<td>Continuation on Death</td>
<td>Monthly Retiree Contributions</td>
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<td>Ontario Power</td>
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<td>Same as active</td>
<td>Active vision &amp; hearing</td>
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<tr>
<td>Dental</td>
<td>Continuation on Death</td>
<td>Monthly Retiree Contributions</td>
<td>Provincial Premium Reimbursement</td>
<td>Eligibility for Postretirement Medical and Dental</td>
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</table>
| Same as active | Continued to spouse for lifetime | None | -- | Health care: Age 55 & 10 years or 25 years 
Dental: Age 55 & 10 years or 25 years |
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<th>Organization</th>
<th>Yr</th>
<th>Medical</th>
<th>Vision &amp; Hearing</th>
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<td>Dental</td>
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**Vacation Description**

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**Holidays**

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**Special Provisions**

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<th>22</th>
<th>23</th>
<th>24</th>
<th>25</th>
<th>26</th>
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<th>28</th>
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<th>30</th>
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<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Plus additional 1 day’s pay x service over 25 years (maximum 10 days’ pay) + 3.0 floating days
<table>
<thead>
<tr>
<th>Organization</th>
<th>Year</th>
<th>Flexible Program</th>
<th>Annual Employer-Provided Flexible Credits</th>
<th>Health Account</th>
<th>Unused Flexible Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario Power</td>
<td>13</td>
<td>--</td>
<td>No flexible credits provided</td>
<td>--</td>
<td>None</td>
</tr>
<tr>
<td>Flexible Work Schedules</td>
<td>Continuation of Medical/Dental During LTD</td>
<td>Health Care Benefits for PT EEs</td>
<td>Maternity Sub Plans</td>
<td>Critical Illness</td>
<td>TFSA</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------------------</td>
<td>---------------------------------</td>
<td>---------------------</td>
<td>-----------------</td>
<td>------</td>
</tr>
<tr>
<td>Flextime, Job-sharing, Part-time</td>
<td>Full coverage for entire period of disability at no cost to employee</td>
<td>Working 27.0 hours per week</td>
<td>First 2 weeks, 93% of pay, then next 15 weeks, Top-up to 93% of pay</td>
<td>None</td>
<td>No</td>
</tr>
</tbody>
</table>
Board Staff Interrogatory #158

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref. Exh F4-3-2, Chart 1 and Attachment 1

Chart 1 presents the forecasted pension and OPEB cash amounts included in the test period revenue requirement. OPG indicates that the amounts are derived from the actuarial valuation performed by AON Hewitt and included in Attachment 1 of this exhibit. Please provide a table that reconciles the revenue requirement amounts in Chart 1 to the “Estimated Employer Pension Contributions / Benefit Payments” line in Schedules 1-6 of the AON Hewitt valuation.

Response

The referenced lines in Schedules 1-6 of the AON Hewitt valuation at Ex. F4-3-2, Attachment 1 provide estimated employer pension contributions/benefit payments for OPG as a whole. Ex. F4-3-2, Chart 1 provides the portion of these amounts that are attributed to the nuclear facilities, in proportion to the respective benefit costs as noted at p. 12, lines 2-5 of that exhibit. Table 1 of Attachment 1 to this response reconciles the total OPG amounts in Schedules 1-6 to the nuclear amounts for each of the years 2017-2021.
# Table 1

Reconciliation of Pension Contributions and OPEB Benefit Payments ($M)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PENSION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Registered Pension Plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Estimated Total Contributions¹</td>
<td>211.8</td>
<td>216.7</td>
<td>221.7</td>
<td>193.3</td>
<td>199.1</td>
</tr>
<tr>
<td>4</td>
<td>Less: Amounts Attributed to Non-Nuclear Operations</td>
<td>(40.7)</td>
<td>(41.2)</td>
<td>(41.4)</td>
<td>(36.1)</td>
<td>(37.0)</td>
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<tr>
<td>5</td>
<td>Estimated Nuclear Pension Contributions²</td>
<td>171.1</td>
<td>175.5</td>
<td>180.3</td>
<td>157.2</td>
<td>162.1</td>
</tr>
<tr>
<td>6</td>
<td>OPEB</td>
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</tr>
<tr>
<td>7</td>
<td>Other Post-Retirement Benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Estimated Total Benefit Payments¹</td>
<td>80.1</td>
<td>85.3</td>
<td>90.9</td>
<td>97.4</td>
<td>103.3</td>
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<tr>
<td>9</td>
<td>Less: Amounts Attributed to Non-Nuclear Operations</td>
<td>(15.4)</td>
<td>(16.2)</td>
<td>(17.0)</td>
<td>(18.2)</td>
<td>(19.2)</td>
</tr>
<tr>
<td>10</td>
<td>Estimated Nuclear Benefit Payments</td>
<td>64.7</td>
<td>69.1</td>
<td>73.9</td>
<td>79.2</td>
<td>84.1</td>
</tr>
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<td>11</td>
<td>Long-Term Disability</td>
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<tr>
<td>12</td>
<td>Estimated Total Benefit Payments¹</td>
<td>26.5</td>
<td>25.5</td>
<td>24.3</td>
<td>23.3</td>
<td>21.4</td>
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<tr>
<td>13</td>
<td>Less: Amounts Attributed to Non-Nuclear Operations</td>
<td>(5.1)</td>
<td>(4.8)</td>
<td>(4.5)</td>
<td>(4.3)</td>
<td>(4.0)</td>
</tr>
<tr>
<td>14</td>
<td>Estimated Nuclear Benefit Payments</td>
<td>21.4</td>
<td>20.7</td>
<td>19.8</td>
<td>19.0</td>
<td>17.4</td>
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<tr>
<td>15</td>
<td>Supplementary Pension Plan</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Estimated Total Benefit Payments¹</td>
<td>18.5</td>
<td>18.8</td>
<td>19.2</td>
<td>19.6</td>
<td>20.0</td>
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<tr>
<td>17</td>
<td>Less: Amounts Attributed to Non-Nuclear Operations</td>
<td>(3.6)</td>
<td>(3.6)</td>
<td>(3.6)</td>
<td>(3.7)</td>
<td>(3.7)</td>
</tr>
<tr>
<td>18</td>
<td>Estimated Nuclear Benefit Payments</td>
<td>14.9</td>
<td>15.2</td>
<td>15.6</td>
<td>15.9</td>
<td>16.3</td>
</tr>
<tr>
<td>19</td>
<td>Total OPEB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Estimated Total Benefit Payments</td>
<td>125.1</td>
<td>129.6</td>
<td>134.4</td>
<td>140.3</td>
<td>144.7</td>
</tr>
<tr>
<td>21</td>
<td>Less: Amounts Attributed to Non-Nuclear Operations</td>
<td>(24.2)</td>
<td>(24.7)</td>
<td>(25.2)</td>
<td>(26.2)</td>
<td>(26.9)</td>
</tr>
<tr>
<td>22</td>
<td>Total Estimated Nuclear OPEB Benefit Payments²</td>
<td>100.9</td>
<td>104.9</td>
<td>109.2</td>
<td>114.1</td>
<td>117.8</td>
</tr>
</tbody>
</table>

Notes
1. Ex. F4-3-2 Attachment 1, Schedules 2-6
2. Ex. F4-3-2 Chart 1
Board Staff Interrogatory #159

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref. Exh F4-3-2, page 7
Ref: EB-2013-0321 Oral Hearing Tr Vol 13 page 18

Up until the OEB decision in EB-2013-0321, OPG had been recovering its pension and OPEB costs in rates on an accrual basis. In the oral hearing of the previous proceeding, OPG confirmed that any excess recovery is not set aside into any fund.

Please describe what OPG has done with any recoveries in excess of cash contributions/benefit payments.

Response

As discussed at EB-2013-0321 Tr. Vol. 13, pp. 16-19, OPG does not track revenue inflows received based on authorized payment amounts by underlying revenue requirement elements and does not assign portions of revenue to specific cash expenditures. Instead, once payment amounts are established, OPG manages its cash flow on an overall basis. Generally speaking, cash inflows are used to pay for operating costs and capital expenditures, to fund/pay long-term obligations such as pension and Other Post-Employment Benefits (OPEB), to make principal and interest payments on debt obligations, and to maintain an appropriate cash balance. Therefore, any monies collected through payment amounts in relation to any revenue requirement item, including pension and OPEB costs, effectively form part of a pool of cash inflow used to pay for the above noted items. Where this pool of cash inflow is not sufficient to pay for the above noted items, OPG would incur debt.

OPG provided detailed submissions on September 22, 2016 in EB-2015-0040 on the regulatory treatment of pension and OPEB costs. The submissions address the issue of timing differences between recovery of pension and OPEB accrual costs and the payment/funding of the associated obligations.
Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref. Exh F4-3-1, page 8

OPG indicates that the current collective agreements with the PWU and Society are due to expire on March 31, 2017 and December 31, 2018, respectively.

The above contracts expire within the test period. Accordingly, what assumptions been built into the test period actuarial valuations to factor in estimates related to the impact of any anticipated changes in the level of pension and OPEB benefits from the upcoming bargaining (assuming that further pension and OPEB reforms are planned through this round of bargaining)? Please provide a table that summarizes the expected impact over the test period.

Response
Board Staff Interrogatory #161

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref. Exh F4-3-2, Attachment 1, page 6
The actuary describes the methodology and other considerations used in determining the expected long-term rate of return on plan assets of 6.00%.

a) Please provide a calculation for the average actual rate of return on plan assets over the last 10 years (please also include a table that summarizes the 10 year data used to perform this calculation). If the period contains an outlier year, please remove the impact of the outlier from the calculation (i.e. normalize).

b) Based on the above calculation, compare this historical average to the rate used in the actuarial valuation. What would be the impact on the test period revenue requirement had the expected long-term rate of return been based on the 10-year historical average?

Response

a) OPG does not maintain investment return calculations for the OPG Pension Fund and relies on return information provided by the third party service provider consistent with industry practice. As calculated and reported by the third party service provider, the 10-year annualized return net of investment management fees for the OPG Pension Fund was 6.84% as at December 31, 2015. The annualized return was determined as a geometric average, by taking into consideration the compounding effect of the rate of return on the asset portfolio over the 10-year period (i.e. the growth on the gains the portfolio has already earned). A geometric average, not a simple average, is the standard calculation method for returns per the Global Investment Performance Standards (GIPS) set by the CFA Institute.

For reference, Chart 1 below provides a summary of returns net of investment management fees for the 10-year period to December 31, 2015. These annual returns do not remove “outliers,” as the annualized return calculation is performed based on actual market returns. There is no standard definition of what constitutes an outlier, as the concept of “outliers” is not used in industry practice for reporting returns. As a result, any interpretation of what constitutes an “outlier” in either a bearish or bullish market is inherently subjective and therefore OPG has no basis for identifying “outliers”.

Witness Panel: Finance, D&V Accounts, Nuclear Liabilities, Cost of Capital
Chart 1

<table>
<thead>
<tr>
<th>As of Date</th>
<th>Annual Return*</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/31/2015</td>
<td>9.42%</td>
</tr>
<tr>
<td>12/31/2014</td>
<td>15.89%</td>
</tr>
<tr>
<td>12/31/2013</td>
<td>8.95%</td>
</tr>
<tr>
<td>12/31/2012</td>
<td>9.15%</td>
</tr>
<tr>
<td>12/31/2011</td>
<td>6.57%</td>
</tr>
<tr>
<td>12/31/2010</td>
<td>11.94%</td>
</tr>
<tr>
<td>12/31/2009</td>
<td>14.76%</td>
</tr>
<tr>
<td>12/31/2008</td>
<td>-17.63%</td>
</tr>
<tr>
<td>12/31/2007</td>
<td>1.72%</td>
</tr>
<tr>
<td>12/31/2006</td>
<td>12.05%</td>
</tr>
</tbody>
</table>

*net of investment management fees

b) The evidence regarding the expected long-term rate of return assumption at Ex. F4-3-2 Attachment 1, p. 6 cited in the question is provided in the context of actuarial assumptions used to determine OPG’s accrual costs for the registered pension plan. As such, OPG is providing a response in relation to the accrual costs. As discussed in Ex. F4-3-2, sections 2.0 and 3.0, OPG has included pension and OPEB costs in the nuclear revenue requirements on a cash basis in view of the OEB’s continuing consultation on the regulatory treatment of pension and OPEB costs (EB-2015-0040), with the differences between pension and OPEB accrual costs and cash amounts continuing to be recorded in the Pension & OPEB Cash to Accrual Differential Deferral Account.

OPG’s independent actuary, Aon Hewitt, estimated the impact on the total OPG forecast pension accrual costs for each of the years 2017-2021 of hypothetically setting the long-term expected rate of return assumption based on the 10-year annualized return up to December 31, 2015 instead of the assumed long-term rate of return of 6.0%, holding all other assumptions constant. The change was assumed to take place as at December 31, 2016, with the cumulative effect reflected for each of the five subsequent years. The resulting impacts were attributed to the nuclear operations in the same proportion as the forecast amounts at Ex. F4-3-2 Chart 2. This yielded estimated decreases in the forecast pension accrual costs for the nuclear facilities of $73M in 2017, $83M in 2018, $91M in 2019, $99M in 2020 and $107M in 2021.

OPG notes that setting the long-term expected rate of return assumption based on 10-year historical returns at a point in time would not be acceptable under US GAAP or generally accepted actuarial practice, and is not an approach OPG would apply. The

---

1 To arrive at a hypothetical value comparable to 6.0% reflected in the pre-filed evidence, in consultation with Aon Hewitt, the 10-year annualized return of 6.84% was reduced to approximately 6.70% to account for non-investment fees payable by the OPG Pension Fund. The non-investment fees were deducted in calculating the 6.0% value but were not deducted in the calculation of 6.84%.
approach would not be acceptable because it does not consider the impact of expected future market conditions and/or changes in the pension fund asset mix on return expectations. As such, this approach would not constitute the best estimate of the pension fund’s future experience. OPG’s external auditor, Ernst & Young LLP, and Aon Hewitt agree with this assessment.

As noted at Ex. F4-3-2, p. 15, lines 20-22, the expected long-term rate of return on the pension plan assets used for the projections in the pre-filed evidence was calculated by Aon Hewitt. The calculation was based on the pension fund asset mix and capital market expectations of future risk and return for each assets class within the fund portfolio. This is the same methodology used to establish the expected long-term rate of return assumption for calculating OPG’s actual pension costs reflected in the company’s audited financial statements, as well as the approved balances in the Pension and OPEB Cost Variance Account (see EB-2014-0370 Ex. H1-1-2, Attachment 2, p. 7 and EB-2012-0002 Ex. H1-1-2, Attachment 3, p. 7). The same methodology was also used to determine forecast pension and OPEB costs presented in EB-2013-0321 (see EB-2013-0321 Ex. N1-1-1 Attachment 1, p. 4).
Board Staff Interrogatory #162

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref. Exh F4-3-2, Attachment 1, page 6

The discount rates used in the actuarial valuation have been set with reference to those representative of AA-corporate bond yields in Canada having a similar duration to the liabilities of the plans. Please provide the quoted source for each rate used.

Response

As in EB-2013-0321, the source of the referenced discount rates is Mercer (Canada) Limited ("Mercer"), an independent actuarial firm. As noted at Ex. F4-3-2, p. 15, lines 9-11, the discount rates were developed by Mercer using the same approach as in EB-2013-0321 (see EB-2013-0321 Ex. F4-3-1, section 6.3.3.2).

Attachment 1 provides the memorandum from Mercer to OPG which was the source of the December 31, 2015 discount rates used by AON Hewitt to develop OPG’s pension and OPEB costs for 2016 to 2021, as detailed in Ex. F4-3-2, Attachment 1. Consistent with past practice, the rates were rounded to the nearest 10 basis points.
MEMO

TO: Ontario Power Generation
DATE: 12 January 2016
FROM: Scott Clausen, Mercer
SUBJECT: Pension and Benefits Accounting Discount Rates as at December 31, 2015
COPY: Guillaume Richard, Mercer

As requested, we are providing information on the discount rates for US GAAP disclosure purposes that would be applicable as at December 31, 2015 for OPG’s pension plans (registered and supplemental pension plans combined), post retirement plans, and post employment plans. This information is similar to that provided earlier this year on accounting discount rates as at June 30, 2015 and November 30, 2015, updated to reflect changes in market interest rates to December 31, 2015.

On the basis of the data and methods used (see below) the discount rates are as follows (June 30, 2014, October 31, 2014, December 31, 2014, June 30, 2015 and November 30, 2015 discount rates are included for comparison purposes):

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pension plans</td>
<td>4.25%</td>
<td>4.20%</td>
<td>4.00%</td>
<td>4.09%</td>
<td>4.27%</td>
<td>4.12%²</td>
</tr>
<tr>
<td>Post retirement plan</td>
<td>4.34%</td>
<td>4.28%</td>
<td>4.07%</td>
<td>4.18%</td>
<td>4.36%</td>
<td>4.20%³</td>
</tr>
<tr>
<td>Post employment plan</td>
<td>3.49%</td>
<td>3.49%</td>
<td>3.32%</td>
<td>3.23%</td>
<td>3.45%</td>
<td>3.35%⁴</td>
</tr>
</tbody>
</table>

OPG may wish to round these rates in accordance with past practice.

We have used the Mercer Model to determine the accounting discount rates based on financial market conditions at December 31, 2015 and expected benefit payments from the plans. The resulting derived discount rates are consistent with changes in market yields on Canadian AA Corporate bonds.

1 Benefit payments for post employment plan based on updated cash flows provided on January 12, 2016 following new valuation of the post employment plan for December 31, 2015 disclosure.
2 The discounted present value of the pension cash flows is approximately $15.0 billion.
3 The discounted present value of the post-retirement plan cash flows is approximately $2.7 billion.
4 The discounted present value of the post-employment cash flows is approximately $252 million.
The following chart shows the discount rates that would have applied to the OPG pension and benefits plans at each month end since June 30, 2015 (based on the benefit payment projections provided).

**Mercer Model Discount Rates**  
**Illustrative Rates - June 30, 2015 to December 31, 2015**

<table>
<thead>
<tr>
<th>Month</th>
<th>Pension</th>
<th>OPRB</th>
<th>LTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-Jun-15</td>
<td>4.09%</td>
<td>4.18%</td>
<td>3.22%</td>
</tr>
<tr>
<td>31-Jul-15</td>
<td>3.93%</td>
<td>4.01%</td>
<td>3.09%</td>
</tr>
<tr>
<td>31-Aug-15</td>
<td>4.11%</td>
<td>4.20%</td>
<td>3.24%</td>
</tr>
<tr>
<td>30-Sep-15</td>
<td>4.17%</td>
<td>4.26%</td>
<td>3.33%</td>
</tr>
<tr>
<td>31-Oct-15</td>
<td>4.37%</td>
<td>4.47%</td>
<td>3.49%</td>
</tr>
<tr>
<td>30-Nov-15</td>
<td>4.27%</td>
<td>4.36%</td>
<td>3.44%</td>
</tr>
<tr>
<td>31-Dec-15</td>
<td>4.12%</td>
<td>4.20%</td>
<td>3.35%</td>
</tr>
</tbody>
</table>

Benefit payment projections for each plan were provided by Aon Hewitt and used without adjustment. In particular, we are relying on the benefit payment projections based on a valuation of the pension and OPRB plans at January 1, 2014 and a valuation of the LTD plan at December 31, 2015. In our calculations, we have assumed that the benefit payment projections provided by Aon reflect accrued benefits only (i.e. that they do not take into account future service).

If you have any questions regarding the above information, please do not hesitate to call.
Board Staff Interrogatory #163

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref. Exh F4-3-2, Attachment 1, page 6

Similar to the table provided on page 49 of the December 31, 2015 Management Discussion and Analysis, please perform a sensitivity analysis on the pension and OPEB test year revenue requirement for the following management assumptions:

a) Inflation rate - show the impact of an increase / decrease of 0.25%
b) Discount rate – show the impact of an increase / decrease of 0.25%
c) Expected long-term rate of return - show the impact of an increase / decrease of 0.25%
d) Salary Increases return - show the impact of an increase / decrease of 0.25%
e) Health care cost trend rate - show the impact of an increase / decrease of 1.00%

Response

Page 49 of the December 31, 2015 Management’s Discussion and Analysis (Ex. A2-1-1 Attachment 3, p. 55) and Ex. F4-3-2 Attachment 1, page 6 cited in the question refer to actuarial assumptions used to determine OPG’s pension and OPEB accrual costs. As such, OPG is providing a response in relation to the accrual costs. As discussed in Ex. F4-3-2, sections 2.0 and 3.0, OPG has included pension and OPEB costs in the nuclear revenue requirements on a cash basis in view of the OEB’s continuing consultation on the regulatory treatment of pension and OPEB costs (EB-2015-0040), with the differences between pension and OPEB accrual costs and cash amounts continuing to be recorded in the Pension & OPEB Cash to Accrual Differential Deferral Account.

OPG’s independent actuary, Aon Hewitt, has estimated the impact on the total OPG forecast pension and OPEB accrual costs for each of the years 2017-2021, which underpin the nuclear portion of these costs shown at Ex. F4-3-2 Chart 2, of a change in each of the assumptions requested in the question, holding all other assumptions constant. The change was assumed to take place as at December 31, 2016, with the cumulative effect reflected for each of the five
subsequent years. The resulting impacts were attributed to the nuclear operations in the same proportion as the forecast amounts in the pre-filed evidence. These sensitivities, like the sensitivities in OPG’s Management’s Discussion and Analysis, are not additive because the impacts of changes in actuarial assumptions are interrelated. The impact of a change of a different magnitude for a given assumption is not necessarily proportional to those provided.

The estimated increases (decreases) in the forecast pension and OPEB accrual costs for the nuclear facilities resulting from the above calculations are shown in Chart 1.
### Chart 1

**Sensitivities of Forecast Nuclear Pension and OPEB Accrual Costs to Changes in Assumptions**

<table>
<thead>
<tr>
<th>(millions of dollars)</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Registered Pension Plan</strong></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Expected long-term rate of return</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.25% increase</td>
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<td>(37)</td>
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<td>Discount rate</td>
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<td>0.25% increase</td>
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<td>(9)</td>
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<td>10</td>
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<td>8</td>
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<td><strong>Inflation</strong></td>
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<tr>
<td>0.25% increase</td>
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<td>1</td>
<td>1</td>
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<td>1</td>
</tr>
<tr>
<td>0.25% decrease</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
</tr>
<tr>
<td><strong>Salary increases</strong></td>
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<tr>
<td>0.25% increase</td>
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<td>1</td>
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<tr>
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<td>71</td>
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<td>1% decrease</td>
<td>(42)</td>
<td>(41)</td>
<td>(41)</td>
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</table>

1 Supplementary pension plan information is included with OPEB information in Ex. F4-3-2
Board Staff Interrogatory #164

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Reference:
Ref: Report on the Sustainability of Electricity Sector Pension Plans to the Minister of Finance (March 18, 2014)
Ref: Government of Ontario News Release (July 6, 2016)

In 2014, the Special Advisor to the Minister of Finance filed a report on electricity sector pension plans. The report stated that both Hydro One and “OPG are involved in the technical working group. They should consider if joining a new pooled asset management entity for public sector SEPPs will provide them with anticipated advantages.”

On July 6, 2016, the Government of Ontario announced the creation of the Investment Management Corporation of Ontario (IMCO), which will provide investment management and advisory services to participating organizations in Ontario’s Broader Public Sector to improve the management of broader public sector investment funds, including public sector pensions.

What is the status of OPG’s review with respect to joining a new pooled asset management entity?

Response

OPG participated in the government’s technical working group throughout the group’s evaluation and decision-making period. OPG is not joining the new asset management corporation as OPG is already managing billions of dollars in assets between the OPG Pension Plan and the Ontario Nuclear Funds for nuclear liability obligations. That volume of assets provides significant efficiencies and low-fee implementation options for the OPG portfolios. The potential for such efficiencies were highlighted in the Special Advisor’s “Report on the Sustainability of Electricity Sector Pension Plans to the Minister of Finance”, on page 11:

Although these Nuclear Funds are not related to the OPG pension plan and thus not the subject of this Report, if they were pooled with the OPG pension assets, the total market value of investments under administration would be approximately $23 billion (based on estimates as of December 31, 2012). This represents a potential opportunity for greater efficiency of asset management.

Witness Panel: Finance, D&V Accounts, Nuclear Liabilities, Cost of Capital
1. OPG has been coordinating the investment program of the Pension Plan and the Ontario Nuclear Funds to take advantage of those efficiencies on an ongoing basis.
**AMPCO Interrogatory #121**

**Issue Number: 6.6**

**Issue:** Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

**Interrogatory**

**Reference:**
Ref: A1-5-1 Page 1

a) For each of the Executive positions (level 2) in the Corporate Organizational Chart, please map the number of total nuclear FTEs under each position.

**Response**

a) The table below presents the number of FTEs associated with OPG’s Nuclear Regulated Facilities over the test period by organization as depicted in Ex.A1-5-1, p.1.

### Nuclear Regulated Facilities FTE by Organization

<table>
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<tr>
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<tr>
<td></td>
<td></td>
<td>(a)</td>
<td>(b)</td>
<td>(c)</td>
<td>(d)</td>
<td>(e)</td>
</tr>
<tr>
<td>1</td>
<td>President &amp; Chief Executive Office</td>
<td>2.6</td>
<td>2.6</td>
<td>2.6</td>
<td>2.6</td>
<td>2.6</td>
</tr>
<tr>
<td>2</td>
<td>Business &amp; Administrative Services</td>
<td>802.6</td>
<td>783.9</td>
<td>774.5</td>
<td>759.3</td>
<td>759.5</td>
</tr>
<tr>
<td>3</td>
<td>Finance, Strategy, Risk &amp; CFO</td>
<td>241.9</td>
<td>234.6</td>
<td>224.6</td>
<td>220.1</td>
<td>220.4</td>
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<tr>
<td>4</td>
<td>People/Culture &amp; Communications</td>
<td>528.6</td>
<td>518.7</td>
<td>516.0</td>
<td>514.9</td>
<td>511.9</td>
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<tr>
<td>5</td>
<td>Renewable Generation &amp; Power Marketing</td>
<td>40.3</td>
<td>40.7</td>
<td>39.9</td>
<td>40.4</td>
<td>40.1</td>
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<tr>
<td>6</td>
<td>Assurance &amp; Chief Audit Executive</td>
<td>51.2</td>
<td>51.1</td>
<td>51.1</td>
<td>51.1</td>
<td>50.6</td>
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<tr>
<td>7</td>
<td>Nuclear President &amp; CNO</td>
<td>7,058.4</td>
<td>7,057.7</td>
<td>6,984.9</td>
<td>6,770.9</td>
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<td>Legal/Ethics &amp; Compliance</td>
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<td>65.5</td>
<td>64.5</td>
<td>64.1</td>
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<td>9</td>
<td>Corporate Secretary &amp; Executive Operations</td>
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<td>6.5</td>
<td>6.5</td>
<td>6.5</td>
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<tr>
<td>10</td>
<td>Nuclear Regulated Facilities Total</td>
<td>8,801.2</td>
<td>8,761.4</td>
<td>8,664.7</td>
<td>8,429.9</td>
<td>8,293.2</td>
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AMPCO Interrogatory #122

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: F4-3-1

a) Please provide a chart that plots both year end staffing levels and corresponding year end about costs for the years 2013 to 2021.

b) Please provide the wage increase assumptions in the application for each remaining year in the test period when the current PWU and SEP collective agreements have expired.

c) Please discuss if OPG negotiated any cost and productivity offsets to the wage increases in the PWU or SEP collective agreements.

d) Please discuss if either the current PWU or SEP collective agreements include the use of thresholds to establish amounts or types of work that can be contracted.

e) Please discuss any provisions in the PWU or SEP collective agreements regarding contracting out.

f) Please discuss if a No Layoff Clause is included in the PWU or SEP collective agreements.

g) Please discuss how the DRP or Pickering Extended Operations impact any aspects of the collective agreements.

Response

a) Please refer to Ex. F4-3-1, p. 6, Figure 3.

b) As discussed at Ex. F4-3-1, p.15, lines 18-21 and line 23, wage increases were offset by cost and productivity savings to reflect an overall net neutral costing result. The cost and

Witness Panel: Corporate Groups, Compensation
productivity offsets were predominately realized in labour staffing options negotiated in
the collective agreement, providing greater flexibility in the use of various types of non-
regular resources. Please refer to L-06.6-SEC-71, Attachment 1 and L-06.6-1 Staff-144,
Attachment 3 for copies of the PWU and SEP memorandum of settlement, respectively,
showing amendments to each collective agreement resulting from bargaining.

d) Please see L06.6-1 Staff-144 for a copy of the current PWU and SEP collective
agreements.

Both the PWU and SEP collective agreements include provisions (thresholds or
envelopes) to allow for amounts and types of work to be contracted out.

Article 12 of the PWU collective agreement outlines the Purchase Services provisions for
contracting out work. There is a “below” threshold section that sets out an agreed to list
of predefined situations whereby OPG can contract work out without agreement from the
PWU or a decision from an arbitrator. A new threshold was negotiated in 2012 for the
term of that collective agreement and has been renewed for the current term. This
threshold provides that distinct work programs or work packages that are 250 hours or
less annually are deemed below threshold.

Article 67 of the SEP collective agreement outlines the Purchase Services Provisions for
contracting out work. However, this has been suspended in the current collective
agreement and the parties have negotiated an expedited process for contracting work out
in Letter of Understanding #193 (LOU #193). LOU #193 establishes envelopes whereby
OPG can contract out work up to the dollar amounts contained in the envelopes.
Furthermore, LOU #193 provides exemptions from the established envelopes for work
that is either under warranty from a manufacturer, at arm’s length or is proprietary in
nature, or work that is obtained from a business that will have Society represented
employees performing the work. Lastly, LOU #193 outlines how major, multi-year
projects, such as Darlington Refurbishment Project, are to be dealt with outside of the
Purchased Services envelop process.

e) Both the PWU and SEP collective agreements include provisions for contracting out
work.

Article 12 of the PWU collective agreement outlines the Purchase Services provisions for
contracting out work. Generally, OPG will use regular staff to perform work of an ongoing
nature. This is accomplished by using a joint approach through a managed process to
assess work that is better contracted out. Work is either deemed “above” or “below”
threshold, with the later being a less onerous process on OPG and the work can be
started immediately. The above threshold process is more rigorous and requires upfront
discussion and agreement prior to the work being contracted out. The provision contains
a dispute resolution clause to ensure this managed process does not experience
unnecessary delays in completing the work.
Article 67 of the SEP collective agreement outlines the Purchase Services Provisions for contracting out work. It is similar to the terms outlined in Article 12 of the PWU collective agreement above, in that OPG will use regular staff for work of an ongoing nature, and that the process is reflective of joint decision making between OPG and SEP.

Article 67 of the SEP collective agreement also includes a dispute resolution process to ensure that the managed process does not experience unnecessary delays in getting the work done.

As mentioned in response to d) above, Article 67 has been suspended in the current collective agreement and the parties have negotiated an expedited process contained within LOU #193 for contracting work out. Furthermore, LOU #193 provides exemptions from the established envelopes for specific work, and outlines how major, multi-year projects, such as Darlington Refurbishment Project, are to be dealt with outside of the Purchased Services envelop process.

f) Both the PWU and SEP collective agreements contain a no involuntary layoff clause for the term of the agreements.

g) The Darlington Refurbishment Project (DRP) and Pickering Extended Operations (PEO) impact certain provisions of the PWU and SEP collective agreements, mainly from a staffing perspective. Each of the PWU and SEP collective agreements contains posting, redeployment, contracting out, and staff reduction provisions.

During the last round of PWU negotiations, an agreement was reached to create a new classification of employee called “Term Employees” and a more flexible means to transfer staff between the Pickering and Darlington locations. Term Employees do not have the same burdens associated with adding regular employee headcount. This allows OPG to more effectively redeploy staff prior to PEO or the flexibility to backfill using Term Employees.

In addition, OPG and the PWU have negotiated a Purchase Services Agreement (PSA) for non-trades work supporting the DRP.

Under the terms of the SEP collective agreement, the parties have a Purchase Services Agreement (PSA) in place covering the DRP outside of the LOU #193 process establishing envelopes for contracting out work. The parties also agreed to a side letter as part of the recent memorandum of settlement from collective bargaining to discuss a “career hall” and staffing plans to work together towards effective staffing solutions given the future closure of Pickering station.

Witness Panel: Corporate Groups, Compensation
AMPCO Interrogatory #123

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: F4-3-1 Page 3

a) For the years 2017 to 2021, please provide the percentage of nuclear revenue requirement that is attributable to compensation costs including overtime.

Response

On average, approximately 40% of the proposed 2017-2021 nuclear revenue requirements is attributable to total compensation costs including overtime. This estimate was determined on the basis of compensation costs reflected in OM&A expenses, as OPG does not track the portion of rate base specifically attributable to capitalized compensation costs.
AMPCO Interrogatory #124

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: F4-3-1 Page 3

Preamble: The evidence indicates at the end of 2015, OPG had 9,247 regular employees. Of this approximately 7,294 employees worked directly in or supported nuclear facilities.

a) Please provide the total number of OPG employees including regular and non-regular employees at the end of 2015.

Response

a) The total number of OPG employees including regular and non-regular employees at the end of 2015 was 10,223.
AMPCO Interrogatory #125

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: F4-3-1 Page 4

a) Please provide Figure 2 based on staff supporting regulated facilities including both regular and non-regular staff.

b) Are the types of positions shown in Figure 2 similar for the years 2016 to 2021 or would OPG make any adjustments to the types of positions over the test period.

c) Based on the response to part (b), please provide a table that shows the number of FTEs by “type of position” for the years 2016 to 2021 split between regular and non-regular staff.

Response

a) Figure 1 captures the estimated number of OPG regular and non-regular staff who support the Nuclear regulated facilities by type of position as of December 31, 2015, and includes both direct and allocated headcount.
b) The types of positions shown in Ex. F4-3-1, Figure 2 would be similar for the years 2016 to 2021. Some work program and project needs may dictate different types of positions being required from year to year; however, the overall mix of staff, as depicted by representation in Ex. F4-3-1, Figure 2, remains stable between 2016 and 2021.

Please see L-06.6-19 SEP-14, Attachment 1 for a depiction of FTE by representation, including the split between regular and non-regular staff, for the years 2016 to 2021.
AMPCO Interrogatory #126

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:

a) Please provide a Table that shows the number of nuclear employees eligible for retirement for the years 2013 to 2021 and the number of actual retirements for the years 2013 to 2016.

Response

Table 1 below shows the number of nuclear regular employee actual retirements and eligible for retirement for 2013-2015 and annual total eligible to retire for 2016 - 2021. The count of nuclear regular employees eligible to retire is based on those having an "Earliest Unreduced Retirement Date" within that year. These counts reflect employees reporting to the nuclear organization.

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<td>248</td>
<td>330</td>
<td>n/a</td>
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<td>n/a</td>
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<td>Eligible to Retire(1)</td>
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<td>133</td>
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<td>245</td>
<td>253</td>
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</table>

(1) This total is not cumulative

The number of actual retirements year to date to September 30, 2016 was 188.
AMPCO Interrogatory #127

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: EB-2013-0321 Exhibit A4 Tab 1 Schedule 1 Page 6

Preamble: The Chart on Page 6 shows the hiring and staff levels for OPG as a whole including Darlington Refurbishment and New Build.

a) Please reproduce the Table for the years 2007 to 2016 (YTD) for nuclear only.

b) Please provide the new hires for New Build for the years 2013 to 2021.

Response

a) The chart below shows total headcount and hires for Nuclear regular employees for the period 2007 to year to date September 30, 2016. The increase in hires year to date September 30, 2016 is due to backfilling for attrition and meeting the needs for the Darlington Refurbishment project. These counts include regular employees reporting to the Nuclear organization (i.e. direct headcount only).

Witness Panel: Corporate Groups, Compensation
b) There are no new hires projected for the years 2013 to 2021 associated with New Build.
AMPCO Interrogatory #128

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: F4-3-1 Page 5

a) Please provide details on OPG’s internal staff redeployment strategy for the years 2017 to 2021.

Response

OPG has implemented a strategic resourcing framework that centrally manages all resourcing requests for the various lines of business in Nuclear for all positions. The goal is to minimize the magnitude of future staff reductions resulting from the closure of Pickering. Prior to posting positions, available resources across the fleet are reviewed. Redeployment provisions are contained in each of the collective agreements: for the PWU see Article 11 of the current collective agreement, and for the Society see Article 64 of the current collective agreement. Please refer to L06.6-1 Staff-144 for the PWU and Society collective agreements.

More specific to PWU represented positions in Nuclear, OPG negotiated a midterm for the end of commercial operations at Pickering. This midterm provides OPG with enhanced flexibility regarding the redeployment of staff at or supporting Pickering to other positions in Nuclear and the option of using Term employees (see also L06.6-2 AMPCO-122 part (g)). The goal of the midterm is balancing the need of minimizing disruption and cost associated with the shutdown of Pickering and ensuring continued safe operation across the fleet.
AMPCO Interrogatory #129

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: F4-3-1 Page 5

Preamble: OPG indicates that by managing staff reductions through retirements and putting in place vacancy controls, OPG was able to reduce its regular headcount by nearly 2,700 positions between 2011 and 2015…”

a) Please explain OPG’s vacancy controls.

b) Please confirm the date the vacancy controls became effective.

c) Please provide the number of nuclear vacancies in June and December for the years 2013 to 2015 and June and Year to Date for 2016.

d) Please provide the forecast number of nuclear vacancies for the years 2017 to 2021 built into the application.

Response

a) As described in EB-2013-0321, Ex. A4-1-1, p. 5, additional vacancy controls were put in place to support the reduction of staff levels through attrition and associated redeployment activities. These included establishing a gated process for hiring to ensure that company wide internal redeployment was considered before any external hiring was undertaken. The gated process included requiring justification before any positions could be filled externally. This gated hiring process was in place during the Business Transformation initiative between 2011 and 2015.

Currently, OPG’s primary vacancy controls are embedded in the hiring approval process. Standard approval processes require concurrence from both Finance Controllership and HR Business Partners staff before line management approves a request to create a new position and / or fill a position, with CEO approval required to create new Senior Executive and Director level positions.
Concurrence by Finance and the HR Business Partner is in place to ensure budget funding is available and to obtain guidance regarding resourcing options and alternatives (i.e., regular hire, temporary hire, temporary assignment, etc.). This control is an on-going well established practice.

CEO level approvals for Senior Executive and Director level vacancies was put in place in 2014, to control staffing levels for these senior positions.

In recognition of the hiring activity required to support the Darlington Refurbishment Project and Pickering operations as described in Ex. F4-3, p. 6, a Resource Planning and Control Team was established to review and approve all staffing requests for the Nuclear business. This includes vacancies associated with regular, temporary and contract positions. This team, and the associated approvals, are closely integrated with OPG’s standard approval processes regarding vacancies.

b) Please see part (a) above.

c) The number of vacancies for the month of June and the month of December for OPG’s nuclear organization are shown in Table 1 below for 2013 through 2015. These numbers reflect the number of jobs advertised for full time regular positions that were posted internally and externally for that month. Internal job postings target existing employees to fill vacant positions, whereas external job postings target external labour markets to fill vacant positions.

<table>
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<tr>
<th>Month / Year</th>
<th>Internal</th>
<th>External</th>
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</thead>
<tbody>
<tr>
<td>Jun 2013</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Dec 2013</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Jun 2014</td>
<td>25</td>
<td>1</td>
</tr>
<tr>
<td>Dec 2014</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Jun 2015</td>
<td>259</td>
<td>6</td>
</tr>
<tr>
<td>Dec 2015</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Jun 2016</td>
<td>25</td>
<td>24</td>
</tr>
</tbody>
</table>

The number of vacancies in any given month can vary substantially, as indicated by the large number of internal vacancies shown for Jun 2015 in Table 1. In Jun 2015, a number of vacancies were bundled together and included hiring for OPG’s Nuclear Operators In Training program, Supervising Nuclear Operators, and Senior Engineering positions.

The number of year to date vacancies for regular positions in OPG’s nuclear organization for 2016 includes: 767 jobs that were posted internally and 484 jobs that were posted externally. These year to date vacancies reflect the number of positions that were posted for the first nine months of 2016.
d) OPG does not plan for positions it does not expect to fill, and therefore the rate
application reflects only resource levels considered necessary to execute planned work
programs.
**AMPCO Interrogatory #130**

**Issue Number: 6.6**

**Issue:** Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

**Interrogatory**

**Reference:**

Ref: F4-3-1 Page 6

a) Of the increase in over 600 FTEs in 2016, please provide a breakdown of the major areas in the company these FTEs have been allocated.

**Response**

Please refer to OPG’s response to L-6.6-1 Staff-143(b).
AMPCO Interrogatory #131

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: F4-3-1 Page 7

Preamble: Figure 4 shows temporary FTEs.

a) Please define temporary.
b) Please explain how temporary FTES compare to non-regular FTEs?

Response

a) Temporary FTEs are equivalent to non-regular FTEs. Please refer to L6.6-1 Staff-136(b) for the definition of non-regular FTEs.
b) Temporary FTEs are equivalent to non-regular FTEs.
AMPCO Interrogatory #132

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: F4-3-1 Page 7

Preamble: The evidence indicates a new category of employees called “Term Employees” exists.

a) Please provide the forecast number of Term Employees for the years 2016 to 2021 split between Darlington and Pickering.

b) Please provide the budget for the years 2016 to 2021 for Term Employees.

c) Are Term Employee numbers included in the Non-Regular staffing numbers and costs?

d) What specific benefits are Term Employees entitled to?

Response

a) Term employees have not been forecasted in OPG’s 2016-2018 Business Plan, as these types of employees will be hired based on OPG assessing staffing requirements on an ongoing basis. As stated in L-06.6-1 Staff-143, currently term employees represent less than 1% of the nuclear organization headcount.

b) See response above in part (a).

c) OPG reports Term employees in the Non-Regular categories of employees. However, no Term employees are included in this application because none have been forecasted for 2016-2021 as discussed in part (a) and none were hired prior to 2016.

d) Term employees accrue sick leave similar to PWU temporary employees at the rate of 0.5 days per month, are entitled to statutory holidays similar to regular employees per the collective agreement, have specific quotas of unpaid time off from work, and receive severance of 2 weeks per year of service. Term employees do not receive health and
1. dental benefits during employment, pensions, other post-retirement benefits, or long-
2. term disability benefits from OPG. Please also see L-06.6-15 SEC-71.
AMPCO Interrogatory #133

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: F4-3-1 Page 11

Preamble: The evidence indicates that salary compression exists across OPG with approximately 250 managers currently earning less than the staff they supervise, making it difficult to attract qualified represented staff into Management positions.

a) Please provide the reasons why staff are making more than their supervisors?

b) Please provide the total number of OPG staff in the years 2013 to 2016 earning more than $50,000 a year in overtime.

Response

a) As noted in Ex. F4-3-1, p. 11, “Between 2011 and 2015, OPG’s Management employees received no annual base salary increase. This has resulted in OPG’s Management compensation benchmarking at or below the broader labour market for most positions, as shown in section 5.0.” At the same time, salaries of represented employees have increased according to the terms of their collective agreements. Ex. F4-3-1, Figure 5 (PWU) and Figure 7 (Society) show the negotiated wage increases for each group. In addition, represented employees progress along the steps of the applicable salary grid pursuant to the terms of the collective agreements. This divergence in salary increases between the two groups since 2010 has led to the situation where some employees are making more than their supervisors. OPG notes that in determining the approximately 250 managers making less than the employees that they supervise, the compression analysis compared base salaries only; variable payments to employees such as overtime for represented staff, performance incentives for represented and management staff, and other compensation were not considered.

b) The total number of employees making more than $50,000 per year in overtime is shown below in Table 1.
Table 1: Total Number of Employees Earning more than $50,000/year in Overtime

<table>
<thead>
<tr>
<th>Year</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees earning more than $50,000/year</td>
<td>805</td>
<td>230</td>
<td>222</td>
<td>91¹</td>
</tr>
</tbody>
</table>

1. Total number of employees through September 2016, which represents over ¾ of the year.
**AMPCO Interrogatory #134**

**Issue Number: 6.6**

**Issue:** Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

**Interrogatory**

**Reference:**
Ref: F4-3-1 Page 12

**Response**

a) Please provide the savings amount and how it was determined based on the number of management headcount reductions in the categories of executive, senior management, and management.

**Table 1: Management Headcount Reductions by Position Type**

<table>
<thead>
<tr>
<th>Position Type</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>Change (2013 to 2015)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Executive (Bands A to E)</td>
<td>90</td>
<td>85</td>
<td>79</td>
<td>(11)</td>
</tr>
<tr>
<td>Executives (Bands F to G)</td>
<td>463</td>
<td>454</td>
<td>459</td>
<td>(4)</td>
</tr>
<tr>
<td>Managers &amp; Professionals (Bands H to I)</td>
<td>397</td>
<td>364</td>
<td>362</td>
<td>(35)</td>
</tr>
<tr>
<td>Clerical &amp; Managerial Assistants (Bands J to L)</td>
<td>155</td>
<td>150</td>
<td>127</td>
<td>(28)</td>
</tr>
<tr>
<td><strong>Management Group Total</strong></td>
<td>1,105</td>
<td>1,053</td>
<td>1,027</td>
<td>(78)</td>
</tr>
</tbody>
</table>

Witness Panel: Corporate Groups, Compensation
**AMPCO Interrogatory #135**

**Issue Number: 6.6**

**Issue:** Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

**Interrogatory**

**Reference:**
Ref: F4-3-1 Page 13

- a) Please provide the range of premiums paid for overtime.
- b) Please explain the reasons for the higher overtime amounts in 2013 and 2015.
- c) Please provide the budgeted overtime for the years 2013 to 2016 in terms of $ and hours.
- d) Please explain any variances greater than 10%, comparing overtime budget to actuals for the years 2013 to 2016.
- e) Please provide the forecast of overtime hours for the years 2017 to 2021.
- f) Please provide the percentage of overtime paid at double time for the years 2013 to 2015 and the assumptions for 2016 to 2021.
- g) Please provide the percentage of overtime paid at more than double time for the years 2013 to 2015 and the assumptions for 2016 to 2021.
- h) Please provide the budget and actual overtime amounts for the DRP to date.
- i) Please provide the forecast overtime budget for the DRP for the years 2017 to 2021.
- j) For the PWU skilled trades, please discuss the types of work shifts, the hours in a work week and the number of hours worked before an employee is eligible for overtime. Please discuss when and how different overtime rates are applied.
- k) For the PWU clerical, semi-skilled trades and general trades, please discuss the type of work shifts, the hours in a work week and number of hours worked before an employee is eligible for overtime. Please discuss when and how different overtime rates are applied.
- l) Please provide contractor overtime amounts (budgeted and actual) for the years 2010 to 2016 and forecast for 2017 to 2021.

Witness Panel: Corporate Groups, Compensation
Darlington Refurbishment Program
Nuclear Operations and Projects
m) Please provide any recent changes to OPG’s work shifts, overtime policies and management of overtime in order to minimize overtime of its employees and contractors.

Response

a) Payments for overtime range from 1.5 times normal pay to 2.5 times normal pay with most overtime being paid 2.0 times normal pay.

b) Please see L-06.6-1 Staff-145.

c) & d):

<table>
<thead>
<tr>
<th></th>
<th>Total Nuclear</th>
<th>Actual ($M) (a)</th>
<th>Budget ($M) (b)</th>
<th>Variance ($M) (c) = (a)-(b)</th>
<th>Variance (d) = (c)/(b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>159.2</td>
<td>127.0</td>
<td>32.2</td>
<td>25.3%</td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>117.6</td>
<td>109.3</td>
<td>8.2</td>
<td>7.5%</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>132.1</td>
<td>122.3</td>
<td>9.7</td>
<td>7.9%</td>
<td></td>
</tr>
<tr>
<td>2016 YTD</td>
<td>102.3</td>
<td>86.6</td>
<td>15.7</td>
<td>18.2%</td>
<td></td>
</tr>
</tbody>
</table>

Overtime is budgeted on dollar basis only.

The following are the major variance drivers in years where overtime variance is greater than 10% of budget:

i. In 2013 the overtime variance of 25.3% from budget was largely due to:
   • Use of overtime to complete work programs due to regular labour resources being under complement.
   • Completing outage work primarily due to forced extension to Darlington's two planned outages.

ii. As of September 2016, year-to-date overtime variance of 18.2% is largely due to use of overtime to complete work programs due to regular labour resources being under complement.

e) Overtime is not forecasted on an hourly basis.
f) The percentages of overtime paid for OPG at 2.0 times normal pay were approximately: 71% in 2015, 70% in 2014, and 74% in 2013. As OPG does not project overtime cost based on the pay differential, the yearly information requested for 2016-2021 is not available, but OPG does not expect the percentage to be materially different over the IR period given its relative stability over the last three years.

g) In 2015, there were 9 hours of overtime paid at 2.5 times, which is a negligible percentage of overtime paid. There was no overtime paid at more than 2.0 times normal pay in 2013 and 2014. As OPG does not project overtime cost based on the pay differential, the yearly information requested is not available, but OPG expects the percentage to continue to be negligible for 2016-2021 given the figures for 2013-2015.

h) The total life to date actual overtime costs for the DRP is $13.6M as at September, 2016. This cost represents 5 years and 9 months of data. DRP planning assumptions allow for 2% planned overtime. Furthermore, Project and Functional Managers are expected to manage their total labour costs (labour and overtime) within the total labour budget. To date, labour has been managed within total labour budgets.

i) The forecast overtime budget for the DRP for the years 2017 to 2021 is provided in the following table in millions.

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overtime $</td>
<td>4.8</td>
<td>4.8</td>
<td>5.0</td>
<td>5.0</td>
<td>5.7</td>
</tr>
</tbody>
</table>

j) The majority of PWU skilled trades employees work 40 hours per week consisting of either 8, 10, or 12 hour balanced shifts. There are others who work 37.5 hours per week consisting of 8 hours per day Monday to Thursday and 5.5 hours on Friday. Until such time that an employee works more than their normal daily or weekly scheduled hours of work, overtime provisions are not triggered.

Overtime provisions are contained in Part G, Item 4 of the PWU collective agreement (See L-06.6-1 Staff-144, Attachment 1).

k) PWU clerical generally work 35 hours per week consisting of 7 hour days Monday to Friday. There are a small number of PWU clerical who work 40 hours per week. Semi-skilled trades and general trades employees generally work 40 hours per week. Until such time that an employee works more than their normal daily or weekly scheduled hours of work, overtime provisions are not triggered.

Overtime provisions are contained in Part D, Item 4 of the PWU collective agreement (See L-06.6-1 Staff-144).

l) Contractor overtime information is not available. OPG does not plan for nor track contractor overtime.
m) OPG has progressively implemented changes with respect to the management of overtime as outlined in the 2015 follow up to the Auditor General’s Report of 2013. In January, 2015, OPG put in place enhanced process controls with regards to managing overtime and discretionary labour costs. These enhanced controls detail overtime limits, approval authority levels for overtime hours for employees on a quarterly and annual basis and implements weekly reports for managers outlining overtime levels for their staff.
**AMPCO Interrogatory #136**

**Issue Number: 6.6**

**Issue:** Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

**Interrogatory**

**Reference:**
Ref: F4-3-1 Page 14

**Response**
There have been no significant changes to OPG’s non-pension benefit plans since EB-2013-0321. Minor benefit changes were negotiated with the PWU and Society in 2015 and are described in the respective memorandum of settlement. Please refer to L-06.6-15 SEC-71, Attachment 1, and L06.6-1 Staff-144, Attachment 3, for a copy of the memorandum of settlement for PWU and Society, respectively.
AMPCO Interrogatory #137

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: F4-3-1 Page 20

a) Please confirm how Society represented employees in the General Industry segment compare to market.

Response

a) As stated in Ex. F4-3-1, p. 20, lines 30-31, OPG is above market for Society positions in the General Industry segment. Total Direct Compensation for Society positions in the General Industry segment is 27% above target market as shown in Ex. F4-3-1, Attachment 2, p. 11.
AMPCO Interrogatory #138

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Reference:
Ref: F4-3-1 Page 22

a) Please explain why OPG and Bruce Power no longer share a common salary structure for PWU represented positions.

Response

OPG and Bruce Power are separate and distinct companies, and as such, each company engages in collective bargaining with the PWU independently.

As with many situations where different employers deal with the same union, over time the companies have employed different bargaining strategies, depending on such factors as each company’s respective ownership structure, bargaining objectives or mandates, business needs and operating realities; all of which result in different bargaining outcomes.
AMPCO Interrogatory #139

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: F4-3-1 Attachment 1

a) Please provide Attachment 1 on the basis of Executive, Senior Management, Management, Non-Union, Union and show the allocation between Regular and Non-Regular staff.

Response

a) The categories of Executive, Senior Management and Management requested in the interrogatory are not used or otherwise defined within OPG. Please refer to L-06.6-19 SEP-14, Attachment 1. This attachment depicts FTE, Compensation and Benefit Information for OPG’s Nuclear Facilities, for each of regular staff and non-regular staff.

OPG’s union and non-union workforce are also depicted. OPG’s union workforce includes the PWU, Society and ESPCA and its non-unionized workforce is captured as Management Group in L-06.6-19 SEP-14, Attachment 1.
AMPCO Interrogatory #140

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: F2-1-1 Table 3

a) Please provide Table 3 on the basis of Executive, Senior Management, Management, Union, Non-Union and show the allocation between Regular and Non-Regular staff including a complete breakdown of the categories of non-regular staff.

b) Please provide an electronic version of Table 3.

Response

a) The categories requested in the interrogatory are not used or otherwise defined within OPG. However, similar categories are presented in Ex. F4-3-1 Attachment 1 (“Appendix 2K”) and Table 3 has been provided on a consistent basis with Appendix 2K:

   i. Management includes Executive, Senior Management and Management and is equivalent to Non-Union FTEs

   ii. Society, PWU and EPSCA are all Union staff
Table 3
Nuclear Staff Summary - Regular and Non-Regular (FTEs)

<table>
<thead>
<tr>
<th>Group</th>
<th>2013 Actual (a)</th>
<th>2014 Actual (b)</th>
<th>2015 Actual (c)</th>
<th>2016 Budget (d)</th>
<th>2017 Plan (e)</th>
<th>2018 Plan (f)</th>
<th>2019 Plan (g)</th>
<th>2020 Plan (h)</th>
<th>2021 Plan (i)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NUCLEAR OPERATIONS:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Regular Staff</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td>481.8</td>
<td>443.8</td>
<td>415.7</td>
<td>459.6</td>
<td>459.5</td>
<td>458.3</td>
<td>459.9</td>
<td>456.3</td>
<td>446.4</td>
</tr>
<tr>
<td>Society</td>
<td>1,810.6</td>
<td>1,712.9</td>
<td>1,665.1</td>
<td>1,827.3</td>
<td>1,789.3</td>
<td>1,773.2</td>
<td>1,738.6</td>
<td>1,695.5</td>
<td>1,675.3</td>
</tr>
<tr>
<td>PWU</td>
<td>3,578.4</td>
<td>3,470.1</td>
<td>3,349.5</td>
<td>3,501.6</td>
<td>3,462.0</td>
<td>3,434.7</td>
<td>3,403.5</td>
<td>3,352.3</td>
<td>3,272.9</td>
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<tr>
<td><strong>Non-Regular Staff</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Management</td>
<td>15.7</td>
<td>15.0</td>
<td>11.9</td>
<td>3.0</td>
<td>2.0</td>
<td>1.9</td>
<td>1.6</td>
<td>3.0</td>
<td>0.8</td>
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<td>Society</td>
<td>21.4</td>
<td>36.5</td>
<td>55.4</td>
<td>55.8</td>
<td>50.8</td>
<td>57.6</td>
<td>44.1</td>
<td>33.2</td>
<td>17.5</td>
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<tr>
<td>PWU</td>
<td>404.2</td>
<td>468.5</td>
<td>534.9</td>
<td>520.8</td>
<td>492.4</td>
<td>517.1</td>
<td>519.9</td>
<td>427.5</td>
<td>339.0</td>
</tr>
<tr>
<td>EPSCA</td>
<td>55.7</td>
<td>58.1</td>
<td>67.7</td>
<td>87.1</td>
<td>89.2</td>
<td>78.1</td>
<td>66.6</td>
<td>63.1</td>
<td>63.1</td>
</tr>
<tr>
<td><strong>Subtotal Nuclear Operations</strong></td>
<td>5,870.7</td>
<td>5,626.7</td>
<td>5,430.4</td>
<td>5,788.6</td>
<td>5,710.8</td>
<td>5,666.2</td>
<td>5,602.1</td>
<td>5,504.1</td>
<td>5,394.7</td>
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<tr>
<td><strong>DARLINGTON REFURBISHMENT:</strong></td>
<td></td>
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<td></td>
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<tr>
<td><strong>Regular Staff</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Management</td>
<td>77.4</td>
<td>90.8</td>
<td>92.5</td>
<td>113.4</td>
<td>147.4</td>
<td>145.8</td>
<td>147.8</td>
<td>139.9</td>
<td>139.1</td>
</tr>
<tr>
<td>Society</td>
<td>172.4</td>
<td>169.5</td>
<td>167.3</td>
<td>204.1</td>
<td>275.9</td>
<td>278.3</td>
<td>275.2</td>
<td>257.7</td>
<td>252.1</td>
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<tr>
<td>PWU</td>
<td>32.2</td>
<td>46.9</td>
<td>69.9</td>
<td>110.1</td>
<td>163.8</td>
<td>175.8</td>
<td>197.6</td>
<td>192.0</td>
<td>206.6</td>
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<tr>
<td><strong>Non-Regular Staff</strong></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Management</td>
<td>3.4</td>
<td>3.5</td>
<td>4.8</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Society</td>
<td>3.4</td>
<td>3.4</td>
<td>6.0</td>
<td>4.1</td>
<td>4.0</td>
<td>9.0</td>
<td>9.0</td>
<td>9.0</td>
<td>11.0</td>
</tr>
<tr>
<td>PWU</td>
<td>13.2</td>
<td>16.8</td>
<td>23.2</td>
<td>36.9</td>
<td>47.7</td>
<td>41.2</td>
<td>55.4</td>
<td>46.7</td>
<td>69.1</td>
</tr>
<tr>
<td>EPSCA</td>
<td>4.5</td>
<td>11.6</td>
<td>26.8</td>
<td>32.5</td>
<td>101.5</td>
<td>102.0</td>
<td>73.0</td>
<td>102.0</td>
<td>150.0</td>
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<tr>
<td><strong>Non-Regular Staff</strong></td>
<td></td>
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</tr>
<tr>
<td>Management</td>
<td>24.6</td>
<td>35.3</td>
<td>60.7</td>
<td>73.5</td>
<td>152.2</td>
<td>152.2</td>
<td>137.4</td>
<td>157.7</td>
<td>230.1</td>
</tr>
<tr>
<td><strong>Subtotal Darlington Refurbishment</strong></td>
<td>306.6</td>
<td>342.5</td>
<td>390.4</td>
<td>501.4</td>
<td>740.4</td>
<td>752.1</td>
<td>757.9</td>
<td>747.2</td>
<td>827.9</td>
</tr>
</tbody>
</table>

**Total Nuclear**

|                      | 6,674.2 | 6,547.3 | 6,490.8 | 6,956.4 | 7,065.6 | 7,064.9 | 6,992.2 | 6,778.1 | 6,643.0 |

b) Refer to Attachment 1 for an electronic version of Table 3

Witness Panel: Nuclear Operations and Projects
Numbers may not add due to rounding.
Privileged and confidential. Prepared in contemplation of litigation.

<table>
<thead>
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<td>(f)</td>
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<td>5,870.7</td>
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<td>Subtotal Nuclear Operations</td>
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<td>6,030.9</td>
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<td>282.0</td>
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<td>587.2</td>
<td>599.9</td>
<td>620.5</td>
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<td>Non-Regular Staff</td>
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<td>73.5</td>
<td>153.2</td>
<td>152.2</td>
<td>137.4</td>
<td>157.7</td>
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</tr>
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<td>Subtotal Nuclear Generation Development</td>
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<td>390.4</td>
<td>501.1</td>
<td>740.4</td>
<td>752.1</td>
<td>757.9</td>
<td>747.2</td>
<td>827.9</td>
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<tr>
<td>7</td>
<td>Total Nuclear</td>
<td>6,674.2</td>
<td>6,547.3</td>
<td>6,490.8</td>
<td>6,956.4</td>
<td>7,065.6</td>
<td>7,064.9</td>
<td>6,992.2</td>
<td>6,778.1</td>
<td>6,643.0</td>
</tr>
</tbody>
</table>

1 Nuclear Operations and Darlington Refurbishment FTEs are aligned to where costs related to the FTEs are incurred.
2 The 2013 Actual FTEs shown are adjusted from those provided in EB-2013-0321, Ex. J7.3, Attachment 1. The adjustment increases the number of FTEs by excluding the impact of banked overtime (overtime taken as time off rather than pay) and shows the 2013 Actual FTEs on a consistent basis with the remaining years in the table.
**AMPCO Interrogatory #141**

**Issue Number: 6.6**

**Issue:** Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

**Interrogatory**

**Reference:**
Ref: F2-1-1 Table 3

a) Please complete the following table:

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<tr>
<td>Nuclear Operations</td>
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<tr>
<td>Regular Staff</td>
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<td>Sub-Total</td>
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<tr>
<td>Regular Staff</td>
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<td>Sub-Total</td>
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</tbody>
</table>

**Response**

Please see Chart 1 below which sets out cost of labour for Nuclear Operations and Darlington Refurbishment.

Chart 1 excludes any cost of labour for allocated corporate costs, to be consistent with Ex. F2-1-1 Table 3 (as referenced in this interrogatory), which excludes allocated corporate cost FTEs.
<table>
<thead>
<tr>
<th>Group</th>
<th>2013 Actual ($M)</th>
<th>2014 Actual ($M)</th>
<th>2015 Actual ($M)</th>
<th>2016 Budget ($M)</th>
<th>2017 Plan ($M)</th>
<th>2018 Plan ($M)</th>
<th>2019 Plan ($M)</th>
<th>2020 Plan ($M)</th>
<th>2021 Plan ($M)</th>
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<tbody>
<tr>
<td>Nuclear Operations</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular Staff</td>
<td>1147.6</td>
<td>1055.8</td>
<td>1031.1</td>
<td>1075.7</td>
<td>1111.9</td>
<td>1094.5</td>
<td>1110.1</td>
<td>1104.2</td>
<td>1082.1</td>
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<td>Non-Regular Staff</td>
<td>54.7</td>
<td>62.5</td>
<td>88.4</td>
<td>86.3</td>
<td>76.5</td>
<td>80.8</td>
<td>81.4</td>
<td>67.2</td>
<td>53.8</td>
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<td>Sub-Total</td>
<td>1202.3</td>
<td>1118.3</td>
<td>1119.5</td>
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<td>1188.4</td>
<td>1175.3</td>
<td>1191.5</td>
<td>1171.4</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Regular Staff</td>
<td>38.9</td>
<td>33.3</td>
<td>53.0</td>
<td>76.8</td>
<td>110.8</td>
<td>111.6</td>
<td>118.8</td>
<td>115.4</td>
<td>119.8</td>
</tr>
<tr>
<td>Non-Regular Staff</td>
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<td>3.8</td>
<td>9.7</td>
<td>9.6</td>
<td>22.2</td>
<td>21.8</td>
<td>19.8</td>
<td>23.5</td>
<td>35.2</td>
</tr>
<tr>
<td>Sub-Total</td>
<td>40.3</td>
<td>37.1</td>
<td>62.7</td>
<td>86.4</td>
<td>133.0</td>
<td>133.4</td>
<td>138.6</td>
<td>138.9</td>
<td>155.0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1242.6</td>
<td>1155.4</td>
<td>1182.2</td>
<td>1248.4</td>
<td>1321.4</td>
<td>1308.7</td>
<td>1330.1</td>
<td>1310.3</td>
<td>1290.9</td>
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</table>
AMPCO Interrogatory #142

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: F4-3-1 Attachment 2

a) Page 3: 78% of OPG incumbents are in roles covered by this benchmark review. How does this % compare to previous OPG benchmarking studies?

b) Page 3: Please provide the number of total OPG incumbents and total # OPG incumbents benchmarked to the job family. Slide 9

c) Page 8: Please explain why benefits (current benefits & pension & OPEB) and overtime costs are not shown as compensation elements?

d) Page 9: Please map each job family to the Utility Segment, Nuclear Authorized Segment and General Industry.

e) Page 3, 9: Please map the number of PWU, SEP and Management incumbents to each job family on Page 9.

f) Page 11: Please confirm current benefits & pension & OPEB and overtime costs were not included in the compensation analysis.

g) Page 27: OPG’s pension and benefits % of salary is above the 50th percentile of the market for the PWU, Society and Management Groups. Please provide the revenue requirement impact if the pension and benefits % of salary was at Market P50 for PWU, Society and Management.

Response

a) The AON Hewitt National Utility Survey submitted in EB-2013-0321 captured 54.3% of OPG’s employee population at that time (see EB-2013-0321, Ex. F5-4-1, p.7), compared to the 78% OPG incumbents covered by the Willis Towers Watson benchmarking study in Ex. F4-3-1, Attachment 2.

b) The number of OPG incumbents included in the benchmark by representation and segment is provided in Ex. F4-3-1, Attachment 2, on pp.14 to 24. Only jobs matched in
the survey were assigned to a job family. OPG does not have the total number of incumbents by job family.

c) Please refer to L-06.6-1 Staff-148.

d) Please see response to part (b) above.

e) Please see response to part (b) above.

f) Confirmed.

g) Please refer to L-06.6-15 SEC-83.
AMPCO Interrogatory #143

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
a) Chapter 4, Page 630: Please provide the outcome of any relocation policy changes incorporated in the SEP collective agreement.
b) Chapter 4, Page 631: Please provide an update on OPG’s enhanced contractor payment controls to avoid the risk of overpayment.
c) Chapter 4, Page 631: Please explain how shift schedules are structured to minimize overtime.
d) Chapter 4, Page 631: Please confirm that employees who are regular daytime employees are no longer getting overtime as a result of being placed on schedules different from their normal working hours.
e) Chapter 4, Page 631: Please discuss if OPG has imposed overtime limits on any additional staff in 2015 and 2016 and provide the corresponding overtime reductions.
f) Chapter 4, Page 631: Are the imposed overtime limits for I&M technicians still in place?
g) Chapter 4, Page 632: Please provide the outcome of any changes to sick leave provisions incorporated into the SEP collective agreement.
h) Chapter 7, Page 725): The Standing Committee on Public Accounts made eight additional recommendations to the Auditor General’s 2013 OPG Human Resources Audit. Please provide the status of all outstanding recommendation.

Response

a) No changes were made to the relocation provisions contained in the SEP collective agreement. However, OPG has established a Relocation Benefits Steering Committee to ensure that relocation benefits are consistently administered in accordance with the PWU and SEP collective agreements, as well as policies regarding unrepresented staff.
b) As of August, 2015, OPG has implemented the following initiatives to support the design of an enhanced contractor payment control framework:

- A program of vendor audits of ESMSA and OSS vendors;
- Reasonableness checks of time reported (in Oncore system) to attendance (in (Mitrefitch system), for certain time and materials contract;
- A benchmark study by KPMG to assess the design of contractor time payment controls which found controls to be designed in line with industry practices.

In mid-2016, OPG fully implemented a Contractor Time and Payment Control Framework that provides reasonable assurance that Vendor costs are in line with work completed as defined in the Vendor contracts. The framework contains both payment system controls and payment monitoring.

c) Shift schedules are built and set in advance on an annual cycle. This helps to plan work and assign resources. Collective agreement provisions exist to allow for employees to be moved between various schedules to assign resources where workload requires, without incurring overtime costs. Overtime provisions are not triggered until such time that an employee has worked more than his/her normal daily or weekly scheduled hours of work on a regular shift schedule.

d) Confirmed. Please see Ex. L-6.6-1 Staff-145.

e) Please see Ex. L-6.6-2 AMPCO-135, part (m).

f) Yes, imposed overtime limits are still in place for I&M Technicians.

g) Please refer to Ex. L-6.6-1 Staff-144, Attachment 3, p. 7-9 for changes to the sick leave provisions in the recent SEP collective agreement. There are no changes in benefit entitlement, rather the changes to the sick leave plan are administrative and intended to provide clarity on: (i) the process for the restoration of sick leave credits for old sick leave plan members; and (ii) dates for the accumulation of sick leave credit for new sick leave plan members.


For the status of recommendation #3, please refer to Ex. L-06.6-1 Staff-156, which presents an updated actuarial valuation of OPG’s pension plan filed with the Financial Services Commission of Ontario on September 30, 2016.
With respect to recommendation #5, a new five-year agreement (with options to extend
for 3 additional 1 year terms) was executed between OPG and New Horizon System
Solutions in October, 2015. The agreement came into effect on February 1, 2016.
Negotiations achieved targeted cost savings and other additional benefits, including
guaranteed price reductions over the contract term.
AMPCO Interrogatory #144

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:

a) Chapter 3, Page 176, Figure 11: Sick Leave Plans at OPG are compared to the Ontario Public Service. Please provide any updates to OPG’s data.

b) Please discuss if OPG internally compares its Benefit Plans to the Ontario Public Service Plan.

Response

a) There is no update to the Sick Leave Plans at OPG information presented in the 2013 Annual Report of the Office of the Auditor General of Ontario (2013 AG Report), Figure 11, p. 176. Please see L-06.6-2 AMPCO-143, part (g). Please refer to Table 1 below for an update to OPG’s data as found at p. 176 of the 2013 AG Report:

Table 1: Update to OPG Data as at 2013 AG Report, p. 176

<table>
<thead>
<tr>
<th>Data Point</th>
<th>As of December 31, 2012</th>
<th>Update</th>
</tr>
</thead>
<tbody>
<tr>
<td># EEs on old sick leave plan</td>
<td>Approximately 5200 (or 50% of EEs)</td>
<td>Approximately 3300 (or 40% of EEs) as of Sep 30, 2016</td>
</tr>
<tr>
<td>Ave # of sick leave credits restored and accumulated per EE who is on the old sick leave plan</td>
<td>162 credits @ 100% and 191 @ 75%</td>
<td>179 credits @ 100% and 194 @ 75% as of Sep 30, 2016</td>
</tr>
<tr>
<td>Ave # sick days per EE (incl. short term and MMAs between 2003 and 2012)</td>
<td>9.2 days (2003) vs. 10.5 days (2012)</td>
<td>2015 Total Days Lost per employee: 10.97 Sep YTD 2016 Total Days Lost per employee: 10.47</td>
</tr>
</tbody>
</table>

Witness Panel: Corporate Groups, Compensation
<table>
<thead>
<tr>
<th>Compared to other sectors</th>
<th>Costs: $27.5M</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPG was lower than 12.9 days (public sector); more than 8.2 days (private sector) and more than 7.3 days (utility sector).</td>
<td>OPG Annualized Total Sick Leave Days per employee (2016 Sept YTD) was lower than 10.8 days (public sector); more than 6.3 days (private sector) and more than 7.9 days (utility sector).</td>
</tr>
</tbody>
</table>

b) While OPG does not routinely compare its Benefit Plans to the Ontario Public Service Plan (OPS) internally, OPG has in the past undertaken high level comparisons of certain provisions of its Benefit Plans with that of the OPS.
AMPCO Interrogatory #145

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:

a) Please provide a summary OPG’s key Human Resource metrics and discuss performance trends over the past five years and forecast for the test period.

Response

Key OPG Human Resource metrics for regular employees is comprised of the following measures:

- actual and business plan headcount
- external hires
- actual and forecast attrition
- overband staff
- sick leave
- safety

The results for these metrics are included in Tables 1-4 and Graphs 1-3 below, respectively, for the 2011-2015 period. Headcount and attrition are the only OPG Human Resources metrics reported on a forward looking basis.

<table>
<thead>
<tr>
<th>Table 1: OPG Regular Employee Headcount - Actual</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td>Total OPG</td>
</tr>
<tr>
<td>Change</td>
</tr>
<tr>
<td>% Change</td>
</tr>
</tbody>
</table>

Table 2 shows business plan for OPG regular headcount from 2016 to 2021. As shown in Table 2 below.
Table 2: OPG Regular Employee Headcount – Business Plan

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Total OPG</td>
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<td>Change</td>
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<tr>
<td>% Change</td>
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</tbody>
</table>

Table 3 shows total OPG external hires for regular employees from 2011-2015. The lower hiring in 2012, 2013 and 2014 is due to Business Transformation activities. Increased hiring in 2015 and 2016 is as a result of replacing employees who have attrited from OPG and to meet the needs of the Darlington Refurbishment project.

Table 3: OPG External Hires - Regular Employees

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
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<tbody>
<tr>
<td>Hires</td>
<td>207</td>
<td>77</td>
<td>83</td>
<td>177</td>
<td>291</td>
</tr>
<tr>
<td>Change</td>
<td>-130</td>
<td>6</td>
<td>94</td>
<td>114</td>
<td></td>
</tr>
<tr>
<td>% Change</td>
<td>-63%</td>
<td>8%</td>
<td>113%</td>
<td>64%</td>
<td></td>
</tr>
</tbody>
</table>

Table 4 shows total OPG actual attrition for regular employees from 2011-2015. As shown in this table, the attrition rate for 2011-2015 (total year-end attrition as a percentage of prior year-end headcount) is in the range of 5% to 7%.

Table 4: OPG Actual Attrition - Regular Employees

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
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<tbody>
<tr>
<td>Attrition</td>
<td>542</td>
<td>613</td>
<td>646</td>
<td>765</td>
<td>687</td>
</tr>
<tr>
<td>Attrition Rate</td>
<td>5%</td>
<td>5%</td>
<td>6%</td>
<td>7%</td>
<td>7%</td>
</tr>
</tbody>
</table>

Table 5 shows total OPG forecast attrition for regular employees for 2016-2021. The forecast attrition is based on December 31, 2015 assumptions, and may vary in future when actual attrition is incorporated and assumptions change. Other attrition refers to attrition excluding retirements.

Table 5: OPG Forecast Attrition - Regular Employees

<table>
<thead>
<tr>
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<td>Retirement</td>
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<tr>
<td>Other attrition</td>
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</tr>
<tr>
<td>Total OPG forecast attrition</td>
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</tr>
</tbody>
</table>
Graph 1 shows OPG overband staff for regular employees from 2011-2015. As shown, these figures decline over time due to attrition.

**Graph 1**

![Society & PWU Overband Statistics](image)

Graph 2 shows OPG Short Term Days Lost per employee for 2011-2015.

Short term sick leave days taken by employees have been a focus area in the management of sick leaves and productivity impacts. OPG increased its focus on compliance to its absence management programs starting in late 2014, and introduced the new enhanced Attendance Support program in late 2015. OPG also launched its Total Health strategy in 2014 and later its Mental Health initiative, with a vision to improve the health culture and overall health of its workforce. The increased focus on healthy behaviours and supportive services and training, along with focused supervisory attention on absence management is beginning to curb the use of short term sick leave across the corporation.
Graph 3 shows OPG All Injury Rate (AIR) Lost per employee for 2011-2015. OPG AIR performance of 0.39 in 2015 is the second best ever since OPG’s inception in 1999, with the best OPG AIR performance of 0.36 achieved in 2014.

OPG continues to uphold its core value of safety in its operations. OPG’s robust policies and Health and Safety management system continue to provide industry leading safety outcomes which are consistently within the industry top quartile safety performance.

While safety performance has consistently remained within the industry top quartile, OPG continues to strive towards its goal of “zero injuries”. While continuing to identify health and safety trends resulting in injuries, OPG is working to improve its safety culture and move beyond a “compliance-oriented” culture to a “values-based” safety culture to further improve safety behaviours and achieve the next break-through levels of safety excellence.
Graph 3

OPG All Injury Rate (AIR)

Injuries per 200,000 hours worked

Year

2011 2012 2013 2014 2015

0.56 0.63 0.61 0.36 0.39

Injuries per 200,000 hours worked

Year

2011 2012 2013 2014 2015

0.56 0.63 0.61 0.36 0.39

Witness Panel: Corporate Groups, Compensation
CME Interrogatory #5

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:

Ref: Exhibit A1, Tab 3

On September 6, 2016, the province of Ontario announced that it is implementing a new framework for broader public sector executive compensation, including capping salary and performance related payments. That framework regulation came into force on September 6, 2016, and applies to all designated employers under the Broader Public Sector Executive Compensation Act, 2014. The framework capped salary and performance related payments for designated executives at no more than 50 percentile of appropriate comparators and prohibit signing bonuses, retention bonuses, cash housing allowances and pay in lieu of perquisites. CME further understands that this framework applies to OPG. Please provide the following information with respect to this compensation framework:

(a) Please confirm that OPG agrees that the framework regulation that came into force on September 6, 2016, applies to OPG;

(b) Does OPG believe that this new framework for broader public sector executive compensation has any impact on this application? If so, please set out all of the elements of the application which are affected; and

(c) Did the incentive regulation framework as proposed by OPG contemplate increases in executive compensation at the time that the application was filed? If so, please provide the anticipated increases in executive compensation over the proposed IR term and explain how that is consistent with the new framework.

Response

a) Confirmed.

b) No. OPG believes that the new framework will not change the executive compensation costs included in its application.

Witness Panel: Corporate Groups, Compensation
Witness Panel: Corporate Groups, Compensation
**PWU Interrogatory #11**

**Issue Number: 6.6**

**Issue:** Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

**Interrogatory**

**Reference:**
- Ref (a): Exhibit F4-3-1, Pages 6-7 of 23
- Ref (b): 2014 Nuclear Staffing Benchmark Analysis, Exhibit F2-1-1, Attachment 2, Page 31 of 39 (OPG Functional Variance from 2014 Benchmark tables)

1. In 2015, Nuclear attrition was at its highest level in years, with over 300 retirements. This represents a 20 per cent increase in the number of retirements in Nuclear compared to 2014. Over two thirds of the 2015 retirements were in critical operations, maintenance, engineering and technical roles and will need to be replaced.

2. Ref (b): 2014 Nuclear Staffing Benchmark Analysis, Exhibit F2-1-1, Attachment 2, Page 31 of 39 (OPG Functional Variance from 2014 Benchmark tables)

3. a) Operations, maintenance, and technical engineering positions were identified by the 2014 Nuclear Staffing Benchmark Analysis as positions in which OPG fell below the benchmark staffing levels. How is OPG addressing the staffing deficiencies in the wake of increasing deficiencies?

4. b) Technical engineering staffing was deficient by nearly 100 FTEs in 2014. How many technical engineering FTEs are there in 2016 compared to 2014?

5. c) Is OPG’s intention to target the benchmark staffing levels or to replace retired workers to return to 2014 staffing levels?

**Response**

6. a) Please see Ex. L-06.6-1 Staff-138 part (b) and Ex. L-06.6-2 AMPCO-128. OPG has implemented a strategic resourcing framework in Nuclear that centrally manages resourcing requests from the various lines of business to ensure positions that are required to be posted are done after the consideration of redeploying existing staff. There is certainly a balance between adding additional headcount to ensure the safe continued operations of Pickering, while at the same time minimizing the number of layoffs that will be required when Pickering reaches the end of commercial operations.

7. b) Technical engineering staffing numbers in 2016 were 72 FTEs versus 81 FTEs in 2014. The reduction is primarily due to the completion of the Probabilistic Safety Assessment Project.
c) OPG does not target benchmarking levels for individual job classifications, nor does it replace all retired workers with the aim of returning to 2014 staffing levels. While OPG will look at differences between benchmarked numbers and actual values for individual job classifications as an input to assess whether adjustments are required, in many cases there are differences in work assignment, volumes of work and organizational structure that preclude the need for adjustments. For example, at OPG, Modification Engineers perform many of the technical analyses done by Technical Engineers at benchmarked plants. In the case of Technical Engineering, an assessment of the work program indicates that current staffing levels are sufficient to meet requirements at this time. Similarly, OPG considers these same work program requirements when deciding whether to replace retiring workers.
PWU Interrogatory #12

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref (a): Exhibit F4-3-1, Attachment 2, Page 8 of 37:

Market data for the US nuclear peer group used for the Nuclear Authorized segment were converted to CAD, consistent with Willis Towers Watson's practice, using an average annual exchange rate to February 2016 of $1 USD - $1.29676 CAD to moderate fluctuations.

a) Please provide the start date of data range used to determine the average annual exchange rate. Please provide rationale for that date.

Response

a) The average annual exchange rate was determined by using the average exchange rate from February 1, 2015 to January 31, 2016. An annual average rate is used to moderate exchange rate fluctuations for the purposes of year over year constant currency comparisons and is consistent with typical market practice and Willis Towers Watson's standard methodologies. As the report was prepared in March, the ending date reflects the most recent month available and encompasses the study period (OPG and market data are effective April 1, 2015).
PWU Interrogatory #13

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref (a): Exhibit F4-3-1, Pages 6-7 of 23:

In 2016, staffing levels for OPG’s Nuclear facilities are expected to increase by over 600 FTEs due largely to the Darlington Refurbishment Project (“DRP”) and, to a lesser extent, the workforce renewal required to sustain Pickering operations. In 2015, Nuclear attrition was at its highest level in years, with over 300 retirements. This represents a 20 per cent increase in the number of retirements in Nuclear compared to 2014. Over two thirds of the 2015 retirements were in critical operations, maintenance, engineering and technical roles and will need to be replaced. As shown in Figure 4, staffing levels peak in 2017 and then decline by over 500 FTEs by 2021.

a) Would attrition lead to a continuing declining trend in FTEs if FTEs associated with the DRP and the Pickering Operations Extension were excluded?

b) Will the refurbishment of Units 1, 3, and 4 require similar FTE increases?

c) Is attrition the primary cause of declining FTEs from 2017 to 2021?

Response

a) No, attrition would not lead to a continuing declining trend in FTEs if FTEs associated with the DRP and the Pickering Operations Extension were excluded. The declining FTE trend shown between 2017 and 2021 is not based on attrition. The declining FTE trend is based on work program and project demand for staff resources and includes efficiency initiatives. Please see L-06.6-1 Staff-143.

b) Please see Ex. L-4.3-2 AMPCO-31.

c) No, attrition is not the primary cause of declining FTEs from 2017 to 2021. Please see L-06.6-1 Staff-143, part (d) for causes of declining FTEs from 2017-2021.

Witness Panel: Corporate Groups, Compensation
**PWU Interrogatory #14**

**Issue Number: 6.6**

**Issue:** Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

**Interrogatory**

**Reference:**
Ref (a): Exhibit F4-3-1, Page 18:

This assessment included reviewing OPG’s Base Salaries, Total Direct Compensation, as well as Pensions and Benefits. Total Direct Compensation reflects the cash compensation paid to employees, excluding overtime. It includes Base Salaries and pay at risk incentives.

Ref (b): Exhibit F4-3-1, Page 19, Figure 11:

![Figure 11](image_url)

*a) Overtime is excluded in the Towers Watson compensation study. Please confirm overtime was excluded from AON Hewitt’s 2013 compensation survey presented for comparison in this chart?*

*b) The Towers Watson study indicates that the largest (69%) portion of OPG employees are in the Utility segment. What portions of OPG employees are in the Nuclear and General Industry segments, respectively?*

Witness Panel: Corporate Groups, Compensation
Response

a) Yes, overtime was excluded in AON Hewitt’s 2013 compensation survey and is not reflected in the overview of the results presented in Ex. F4-3-1, p. 19, Figure 11.

b) As indicated in Ex. F4-3-1, Attachment 2, p. 5, 4% of OPG employees are in the Nuclear Authorized segment and 27% are in the General Industry segment.
**PWU Interrogatory #15**

**Issue Number: 6.6**

**Issue:** Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

**Interrogatory**

**Reference:**
Ref (a): Exhibit F4-3-1, Page 8 of 23:

OGP, with the direct involvement and support of the Government, negotiated agreements with both the PWU and Society in 2015 that will keep wage escalation below inflation. Both agreements provide for a one per cent escalation increase each year and cover a three year period, running from April 1, 2015 to March 31, 2017 for the PWU and from January 1, 2016 to December 31, 2018 for the Society.

a) PWU and Society wage escalation is at a level below inflation. Please quantify the impact on the test period revenue requirement had wage escalation been set at inflation.

**Response**

Please note that there is an error in Ex.F4-3-1, p. 8, line 11 – the PWU collective agreement expires on March 31, 2018, not March 31, 2017. OPG will be filing a correction to its evidence.

Had the wage escalation in the current PWU and Society agreements been set at an assumed inflation rate of 2%, the estimated nuclear revenue requirement increases over the collective agreement terms would be approximately $31M in 2017 and approximately $20M in 2018, for impacts on wages and resulting changes in pension costs. Information beyond the current collective agreement terms is not provided, as the collective agreements beyond this time may change based on future bargaining.

These estimates were determined on the basis of compensation costs reflected in OM&A expenses, as OPG does not track the portion of rate base specifically attributable to capitalized compensation costs.
PWU Interrogatory #16

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref (a): Exhibit F4-3-1, Page 16 of 23, Figure 10:

Figure 106

<table>
<thead>
<tr>
<th>Employee Pension Contributions</th>
<th>% of Pensionable Earnings Contributed by Employees (% below / above YMPE)</th>
<th>Contribution Ratio (Employee/Employer)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MG / PWU / Society</td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>7 / 7 / 7</td>
<td>24% / 76%</td>
</tr>
<tr>
<td>2015</td>
<td>7 / 7 / 7</td>
<td>24% / 76%</td>
</tr>
<tr>
<td>2016</td>
<td>7.3 / 8.25 / 7</td>
<td>24% / 76%</td>
</tr>
<tr>
<td>2017</td>
<td>7.6 / 9.5 / 8</td>
<td>35% / 65%</td>
</tr>
</tbody>
</table>

a) Figure 10 shows the increasing ratio of employee pension contributions to employer contributions. Please quantify the impact on the 2017 revenue requirement had the ratio remained at 24% / 76% instead of 35% / 65%.

b) When measured in dollar terms, what is the percentage change in employee pension contributions on annual basis from 2014 through 2017, and over the period as a whole?

Response

a) If the contribution ratio remained unchanged, the impact to the 2017 revenue requirement for the nuclear facilities is estimated to be an increase of approximately [Redacted].

b) The year-over-year increases in total employee contributions (measured in dollar terms) from 2014 to 2017 are 4% in 2015, 9% in 2016 and 18% in 2017 for unionized and non-unionized employees combined. The cumulative increase from 2014 to 2017 is 34%. These figures include the impact of changes in the number of employees over time.

Witness Panel: Corporate Groups, Compensation
SEC Interrogatory #3

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:

Please provide copies of each of OPG’s 2013 to 2017 corporate scorecards.

Response

OPG provided its 2013 corporate scorecard in EB-2013-0321, L-01.2-15 SEC-017. OPG notes that the Threshold and Maximum dates for the Atikokan Project – Storage Silo Erection in the 2013 corporate scorecard are incorrect. The dates should be Nov 7, 2013, and Sept 7, 2013, respectively. An updated version of the 2013 corporate scorecard is attached to this response as Attachment 1.

OPG’s corporate scorecards for 2014-2016 are attached to this response as Attachments 2-4, respectively.
# Corporate 2013 Balanced Scorecard

(Revised Feb 19, 2013)

<table>
<thead>
<tr>
<th>Weight</th>
<th>Key Performance Indicators</th>
<th>Threshold</th>
<th>Target</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td><strong>Safety, Environment, Reliability and Code of Conduct</strong>&lt;br&gt;Deliver front-line/core services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• <strong>AIR</strong>: All Injury rate (Target = CEA Top Quartile)</td>
<td>1.57</td>
<td>0.89</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>• Safety focus areas:&lt;br&gt;○ Improvement in the area of Work Protection Code&lt;br&gt;○ Continued focus on Situational Awareness&lt;br&gt;○ No significant events that impact OPG’s reputation</td>
<td></td>
<td></td>
<td>As determined by CEO</td>
</tr>
<tr>
<td>30%</td>
<td><strong>Financial Performance</strong> - Reduce costs &amp; improve OPG financial health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7%</td>
<td>EBITDA ($M) (-10%, +15%)</td>
<td>948</td>
<td><strong>1,053</strong></td>
<td>1,211</td>
</tr>
<tr>
<td>5%</td>
<td>Headcount – Ongoing Operations (+173, -252)</td>
<td>10,550</td>
<td><strong>10,377</strong></td>
<td>10,125</td>
</tr>
<tr>
<td>15%</td>
<td>Operating OM&amp;A expenditures ($M) (+5%, -10%)</td>
<td>2,735</td>
<td><strong>2,605</strong></td>
<td>2,344</td>
</tr>
<tr>
<td>3%</td>
<td>Support Services Operating OM&amp;A expenditures ($M) (+5%, -10%)</td>
<td>643.7</td>
<td>613</td>
<td>551.7</td>
</tr>
<tr>
<td>35%</td>
<td><strong>Fleet Operating Performance</strong> - Control costs while delivering front-line/core services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25%</td>
<td>Nuclear: TW.h</td>
<td>45.99</td>
<td>47.99</td>
<td>48.99</td>
</tr>
<tr>
<td>2.5%</td>
<td>Thermal: Start Guarantee rate</td>
<td>85%</td>
<td>94%</td>
<td>97%</td>
</tr>
<tr>
<td>7.5%</td>
<td>Hydro: Availability (%)</td>
<td>89.5%</td>
<td>91.6%</td>
<td>93.5%</td>
</tr>
<tr>
<td>25%</td>
<td><strong>Project Performance</strong> - Support Ontario’s Long Term Energy plan and deliver front-line/core services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8%</td>
<td>• OPG Business Transformation Strategy</td>
<td></td>
<td></td>
<td>Meet project milestones and measures specific to each project – See Attached</td>
</tr>
<tr>
<td>4%</td>
<td>• Niagara Tunnel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4%</td>
<td>• Lower Mattagami</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2%</td>
<td>• Atikokan conversion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7%</td>
<td>• Nuclear Refurbishment</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

These measures form the basis on which our overall corporate performance will be assessed but the scores against these measures and overall Corporate score are not absolute. The Board and President reserve the right to determine the Corporate Score. In exercising their discretion, the Board and President may choose to make adjustments to the Corporate Score or individual scorecard items.
### 2013 Corporate Balanced Scorecard - Project Performance Measures

#### Business Transformation

**A. Fully Implement the Centre Led Organization (30%)**

<table>
<thead>
<tr>
<th>Threshold</th>
<th>Target</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both results are at or better than Threshold</td>
<td>Both results are at or better than Target</td>
<td>Both results are at or better than Maximum</td>
</tr>
</tbody>
</table>

1. ELT acceptance of the Deployment Impact Assessment (15%)
   - May 31
   - April 30
   - March 31 plus CEO assessment of cross-BU collaboration

2. ELT acceptance of Deployment Readiness Assessment (15%)
   - June 30
   - May 31
   - April 30 plus CEO assessment of cross-BU collaboration

**B. Transforming the way we work (50%):**

1. Key transformational initiatives meet the key milestones indicating progress on transformation. (30%)
   - 20 of 30 milestones met as scheduled
   - 25 of 30 milestones met as scheduled
   - All 30 milestones met as scheduled
   * Key transformational initiatives identified by Builders’ input of 1 or 2 key BT initiatives for each BU

2. Business Transformation is embedded in our business practice and culture.
   a) Business planning appropriately reflects BT initiatives and goals (10%)
   b) Transition plan in place to reduce oversight and integration aspects of BT and move key support functions of BT team back to functions and support BU’s as business as usual (i.e. change mgmt, HR support) (10%)

**C. Effectively managing attrition (20%)**

<table>
<thead>
<tr>
<th>Threshold</th>
<th>Target</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,550</td>
<td>10,375</td>
<td>10,125</td>
</tr>
</tbody>
</table>

**Niagara Tunnel**

<table>
<thead>
<tr>
<th>Threshold</th>
<th>Target</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both results are at or better than Threshold</td>
<td>Both results are at or better than Target</td>
<td>Both results are at or better than Maximum</td>
</tr>
</tbody>
</table>

A. Forecasted In-Service Date
   - June 30, 2013
   - May 15, 2013
   - March 31, 2013

B. Forecasted Final Cost
   - $1.55B
   - $1.5B
   - $1.45B

**Lower Mattagami**

<table>
<thead>
<tr>
<th>Threshold</th>
<th>Target</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>All 4 results are at or better than Threshold</td>
<td>All 4 results are at or better than Target</td>
<td>All 4 results are at or better than Maximum</td>
</tr>
</tbody>
</table>

A. Little Long – G3 Unit in-service
   - Projected 1-Mar-2014
   - 31-Dec-2013
   - 1-Nov-2013

B. Smoky Falls - Volume (m3) of concrete placed at year-end (LTD)
   - 120,000
   - 125,000
   - 130,000

C. Harmon – Turbine installed
   - 31-Dec-2013
   - 15-Oct-2013
   - 15-Aug-2013

D. Powerhouse Concrete Pour Complete
   - Scrollcase walls complete
   - 31-Dec-2013
   - Scrollcase walls & soffit complete
   - 31-Dec-2013
   - Scrollcase walls & soffit complete
   - 1-Dec-2013

---

*Note 1:*

Both results are at or better than Threshold

*Note 2:*

Both results are at or better than Target

*Note 3:*

Both results are at or better than Maximum
### 2012 Corporate Balanced Scorecard – Project Performance Measures (continued)

(Revised March 6, 2013)

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Threshold</th>
<th>Target</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atikokan Conversion to Biomass Schedule on track (I/S Q1 2014)</td>
<td>All 4 results are at or better than Threshold&lt;sup&gt;Note 1&lt;/sup&gt;</td>
<td>All 4 results are at or better than Target&lt;sup&gt;Note 1&lt;/sup&gt;</td>
<td>All 4 results are at or better than Maximum&lt;sup&gt;Note 1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Surge Bin Completion</td>
<td>12-Dec-2013</td>
<td>12-Nov-2013</td>
<td>12-Oct-2013</td>
</tr>
<tr>
<td>Storage Silo Erection</td>
<td>7-Nov-2013&lt;sup&gt;Note 2&lt;/sup&gt;</td>
<td>7-Oct-2013</td>
<td>7-Sep-2013&lt;sup&gt;Note 4&lt;/sup&gt;</td>
</tr>
<tr>
<td>On track to perform First Fire on Gas</td>
<td>Projected 31-Jan 2014&lt;sup&gt;Note 2&lt;/sup&gt;</td>
<td>15-Dec-2013</td>
<td>1-Nov-2013</td>
</tr>
<tr>
<td>Project Estimated Costs on track</td>
<td>Projected $169.5M&lt;sup&gt;Note 2&lt;/sup&gt;</td>
<td>$164.4M</td>
<td>$159.3M</td>
</tr>
</tbody>
</table>

### Darlington Refurbishment

<table>
<thead>
<tr>
<th>Task Description</th>
<th>Threshold</th>
<th>Target</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Progression of Strategic Contracts (Fuel Handling, Steam Generator, and Turbine Generators) - adherence to schedule (SPI)</td>
<td>0.90</td>
<td>1.00</td>
<td>1.05</td>
</tr>
<tr>
<td>B. Containment Filtered Venting System (BCS approved and contract for detailed design awarded)</td>
<td>Sep 30</td>
<td>Aug 31</td>
<td>July 31</td>
</tr>
<tr>
<td>C. Submission of Global Assessment Report and Integrated Implementation Plan to CNSC</td>
<td>Dec 31</td>
<td>Dec 2</td>
<td>Nov 15</td>
</tr>
<tr>
<td>D. Start of Mock-up Construction (date)</td>
<td>July 30</td>
<td>July 15</td>
<td>June 15</td>
</tr>
<tr>
<td>E. Scope Definition—All Approve Darlington Scope Requests &lt;= Health of Scope 20&lt;sup&gt;Note 3&lt;/sup&gt;</td>
<td>Dec 31</td>
<td>Dec 2</td>
<td>Nov 15</td>
</tr>
</tbody>
</table>

### Notes:

1. For these projects with multiple components, the entire project takes the score of the lowest performing component
   - If any of the tasks are below Threshold, the project does not meet Threshold
   - All tasks must be at or better than target to achieve target. If any task is below target, the project takes the score of the lowest performing task.
   - All tasks must be at or better than maximum to achieve maximum. If any task is below maximum, the project takes the score of the lowest performing task.

2. Threshold achievement for Niagara and Atikokan will be based on the October month end EPC contractor forecasts

3. Includes formwork, rebar and concrete pour, but does not include shoring removal.

4. Exceptions (approved by the EVP Nuclear Projects) are allowed for the following: Scope resulting from planned inspections or analysis scheduled during or after 2013, i.e. scope resulting from scheduled inspections in the 2015 VBO outage. Any new scope approved by: The Darlington Refurbishment Scope Review Board during or after 2013. Any new scope resulting from the CNSC’s review and approval of the EA or ISR. “Approved” Darlington Scope Requests require approval by the Darlington Refurbishment Scope Review Board.
   - The following are the Health of Scope definitions (note the lower the score, the scope is better defined):
     - 90 Scope will not be executed in Nuclear Refurbishment, DSR will be removed pending PSRB approval
60 Pure engineering or procedures with no likely field work (i.e. provide CNSC with reports, update procedures, etc)
50 Assessment is required to build a report for analysis
40 Analyze the completed report to determine actions / path forward
30 Actions to implement selected, may be a component strategy across many systems
20 Work is known at the system or project level but not component
10 Work is known at the component / MEL level
5 DSR is adequately known such that it is ready for Work Order to be input on all Units
4 All Work Orders input for DSR on all applicable Units or all work completed for DSR

5. Atikokan Silo Erection Threshold and Maximum dates changed from 2012 to 2013 to correct for Typo.
# Corporate 2014 OPG Balanced Scorecard (Final July 2014)

<table>
<thead>
<tr>
<th>Weight</th>
<th>Key Performance Indicators</th>
<th>Threshold</th>
<th>Business Plan</th>
<th>Stretch Target</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>10%</strong></td>
<td><strong>Safety, Environment, Reliability and Code of Conduct</strong>&lt;br&gt;Deliver front-line/core services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>10%</strong></td>
<td><strong>AIR: All Injury rate</strong></td>
<td>1.69</td>
<td>0.89</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>• Safety focus areas:</td>
<td>Overall Score will be determined by CEO, incorporating assessment of AIR</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>○ Improvement in the area of Work Protection Code</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>○ Continued focus on Situational Awareness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>○ Nuclear and HT, public, employee, and operational safety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• No significant events that impact OPG’s reputation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>50%</strong></td>
<td><strong>Operating Performance</strong> - Reduce costs &amp; improve OPG financial health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>15%</strong></td>
<td>EBT, excl. nuclear waste management segment ($M)</td>
<td>300</td>
<td>500</td>
<td>700</td>
</tr>
<tr>
<td><strong>10%</strong></td>
<td>Operating OM&amp;A Expenses – Total OPG ($M)</td>
<td>2,600</td>
<td>2,475</td>
<td>2,325</td>
</tr>
<tr>
<td><strong>5%</strong></td>
<td>Non-Electricity Generation Margin ($M)</td>
<td>325</td>
<td>350</td>
<td>400</td>
</tr>
<tr>
<td><strong>15%</strong></td>
<td>Production – Total OPG adjusted for Hydro SBG (TWh)</td>
<td>80.6</td>
<td>82.4</td>
<td>84.2</td>
</tr>
<tr>
<td><strong>5%</strong></td>
<td>Business Transformation: 2014 headcount from ongoing operations (excluding Refurbishment).</td>
<td>9,900</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>40%</strong></td>
<td><strong>Long Term Energy Plan and Capital Project Performance</strong> - Support Ontario’s Long Term Energy plan and deliver front-line/core services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>25%</strong></td>
<td><strong>Nuclear Refurbishment Progress (15%)</strong></td>
<td>Deliverables 1-4 in Table A (attached)</td>
<td>Deliverables 1-13 in Table A (attached)</td>
<td>Deliverables 1-16 in Table A (attached)</td>
</tr>
<tr>
<td></td>
<td>Pickering License hold point removed (210K hr) (10%)</td>
<td>Prior to unit 6 exceeding 210,000 full power hours of operation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>10%</strong></td>
<td><strong>Lower Mattagami</strong> (Units in-service)</td>
<td>1 Unit Harmon G3</td>
<td>2 Units Threshold plus Smoky Falls - 1 Unit</td>
<td>3 Units BP Plus - Smoky Falls 2nd unit in-service before November 15th or Kipling G3 in service before December 15th</td>
</tr>
<tr>
<td><strong>5%</strong></td>
<td><strong>Atikokan – Commercial Operation</strong></td>
<td>Achieved by year-end 2014</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

These measures form the basis on which our overall corporate performance will be assessed but the scores against these measures and overall Corporate score are not absolute. The Board and President reserve the right to determine the Corporate Score. In exercising their discretion, the Board and President may choose to make adjustments to the Corporate Score or individual scorecard items.
1. Refurbishment (15%)

<table>
<thead>
<tr>
<th>Refurbishment Progress</th>
<th>Threshold: Deliverables 1-4</th>
<th>Business Plan: Deliverables 1-13</th>
<th>Stretch Target: Deliverables 1-16</th>
<th>Assessment Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Table A</td>
<td>Table A</td>
<td>Table A</td>
<td>Refer to Table A for list of deliverables. Note: All deliverables pulled ahead from 2015 to be executed within the original deliverable budget.</td>
</tr>
</tbody>
</table>

### Table A: Darlington Refurbishment Progress

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Re-tube &amp; Feeder Replacement Mock-up - Available for Use</td>
</tr>
<tr>
<td>2</td>
<td>Fuel Handling - Dummy Fuel Bundles and Flow Reduction Orifice Bundles Mock-up Units Delivered</td>
</tr>
<tr>
<td>3</td>
<td>D20 Storage Facility - Caisson Installation Complete</td>
</tr>
<tr>
<td>4</td>
<td>Vehicle Screening Facility - Available for Service</td>
</tr>
<tr>
<td>5</td>
<td>Holt Road Interchange - Site Preparation Complete</td>
</tr>
<tr>
<td>6</td>
<td>Re-tube &amp; Feeder Replacement - Mock-up Toolset Delivered</td>
</tr>
<tr>
<td>7</td>
<td>Global Assessment Report &amp; Integrated Implementation Plan Approved by CNSC</td>
</tr>
<tr>
<td>8</td>
<td>Water &amp; Sewer System - Available for Service</td>
</tr>
<tr>
<td>9</td>
<td>Electrical Power Distribution System - 44kV Distribution Station DS5 Installation Complete</td>
</tr>
<tr>
<td>10</td>
<td>3rd Emergency Power Generator - Buried Services Relocation Complete</td>
</tr>
<tr>
<td>11</td>
<td>Re-tube &amp; Feeder Replacement Island Annex - Buried Services Relocation Complete</td>
</tr>
<tr>
<td>12</td>
<td>Refurb Project Office - Structural Steel Erected</td>
</tr>
<tr>
<td>13</td>
<td>Operations Support Building Refurbishment - New Cladding/Windows Installed</td>
</tr>
<tr>
<td>14</td>
<td>Re-tube &amp; Feeder Replacement Unit 2 Toolset - Single Fuel Channel &amp; Spacer Removal Tools and D2O Vacuum Drying Systems Delivered</td>
</tr>
<tr>
<td>15</td>
<td>Auxiliary Heating System - Boilers Delivered</td>
</tr>
<tr>
<td>16</td>
<td>D20 Storage Facility - Excavation Complete</td>
</tr>
</tbody>
</table>
# Corporate 2015 Balanced Scorecard

## (Revised Feb 16, 2015)

<table>
<thead>
<tr>
<th>Weight</th>
<th>Key Performance Indicators</th>
<th>Threshold</th>
<th>Business Plan</th>
<th>Stretch Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>Safety, Environment, Reliability and Code of Conduct</td>
<td>AIR: All Injury rate</td>
<td>1.20</td>
<td>0.69</td>
</tr>
<tr>
<td></td>
<td>Deliver front-line/core services</td>
<td>Safety focus areas:</td>
<td>Overall Score will be determined by CEO, incorporating assessment of AIR</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Improvement in the area of Work Protection performance with emphasis on reducing human errors</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Fostering a stronger employee health culture with a focus on enhanced support and mental health training.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>o No significant events that impact OPG’s reputation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50%</td>
<td>Operating Performance - Reduce costs &amp; improve OPG financial health</td>
<td>EBT - excl. nuclear waste management segment ($M)</td>
<td>400</td>
<td>600</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operating OM&amp;A Expenses – Total OPG ($M)</td>
<td>2,580</td>
<td>2,455</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Production – Total OPG adjusted for SBG (TWh)</td>
<td>78.3</td>
<td>80.5</td>
</tr>
<tr>
<td>40%</td>
<td>Long Term Energy Plan and Capital Project Performance - Support Ontario’s Long Term Energy plan and deliver front-line/core services</td>
<td>Headcount from ongoing operations (excluding Refurbishment)</td>
<td>9,491</td>
<td>9,264</td>
</tr>
<tr>
<td></td>
<td>Darlington Refurbishment - Campus Plan</td>
<td>D₂O Storage Facility - Dyke Construction Complete</td>
<td>31-Dec</td>
<td>30-Nov</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Universal Carriers Delivered Before Year End</td>
<td>Universal Carriers Delivered and SARF In-Service Before Year End</td>
<td>Universal Carrier Commissioned on SARF Before Year End</td>
</tr>
<tr>
<td></td>
<td>Darlington Refurbishment - Campus Plan - 3rd Emergency Power Generator - Building complete and Generator in-place</td>
<td>31-Dec</td>
<td>30-Nov</td>
<td>31-Oct</td>
</tr>
<tr>
<td>10%</td>
<td>OPG Board Approval of Refurbishment Budget (RQE)</td>
<td>Before Year End</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refurbishment Project Cost ($M) - Cumulative to the end of 2015</td>
<td>$2,784</td>
<td>$2,732</td>
<td>$2,628</td>
</tr>
<tr>
<td></td>
<td>Darlington Fuel Handling Reliability - Ready for on Reactor Trial</td>
<td>Universal Carriers Delivered Before Year End</td>
<td>Universal Carriers Delivered and SARF In-Service Before Year End</td>
<td>Universal Carrier Commissioned on SARF Before Year End</td>
</tr>
<tr>
<td></td>
<td>Darlington Relicensing (License Term)</td>
<td>5 Years</td>
<td>13 Years</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Darlington VBO (Duration - Days)</td>
<td>47.5 Days</td>
<td>43.5 Days</td>
<td>39.5 Days</td>
</tr>
</tbody>
</table>

These measures form the basis on which our overall corporate performance will be assessed, but the scores against these measures and overall Corporate score are not absolute. The Board and President reserve the right to determine the Corporate Score. In exercising their discretion, the Board and President may choose to make adjustments to the Corporate Score or individual scorecard items.
# Corporate 2016 Balanced Scorecard

## Corporate 2016 Balanced Scorecard - Proposed Metrics

*Revised Feb 17, 2016*

<table>
<thead>
<tr>
<th>Weight</th>
<th>Key Performance Indicators</th>
<th>Threshold</th>
<th>Business Plan</th>
<th>Stretch Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>Safety, Environment, Reliability and Code of Conduct - Deliver front-line/core services</td>
<td>AIR: All Injury Rate</td>
<td>0.50</td>
<td>0.38</td>
</tr>
</tbody>
</table>

- Safety focus areas:
  - Improvement in the area of Work Protection performance with emphasis on reducing human errors
  - Continued Focus on Situational Awareness and Routine Tasks.
  - Fostering a stronger employee health culture with a focus on enhanced support and mental health training.
- No significant events that impact OPG’s reputation

| 50% | Financial & Operating Performance – Deliver customer value, Reduce costs & improve OPG financial health | EBT, excl. nuclear waste management segment ($M) | 510 | 710 | 910 |
|     |                                                                                                      | Operating OM&A Expenses – Total OPG ($M) | 2,625 | 2,500 | 2,375 |
|     |                                                                                                      | Production – Total OPG adjusted for SBG (TWh) | 79.8 | 82.1 | 84.5 |

| 40% | Long Term Energy Plan and Capital Project Performance - Support Ontario’s Long Term Energy plan and deliver front-line/core services | Refurbishment Project Cost – 2016 Actual Expenditures ($M) as a percentage of approved 2016 budget | 100% | 97.5% | 95% |
|     |                                                                                                      | Darlington Refurbishment Execution Schedule for Unit 2 - Defueling – Number of channels defueled on December 31, 2016 | 212 | 254 | 311 |
|     |                                                                                                      | Refurbishment Campus Plan - 3rd Emergency Power Generator engine set and Containment Filtered Venting System both in-service and D2O Heavy Water Storage Facility Ready to Receive Unit 2 PHT Water. | 31-Dec | 30-Nov | 02-Nov |
| 5% | Peter Sutherland Sr. Generating Station - Powerhouse Phase 1 Concrete Complete | Refurbishment of PGS Reservoir - Completion of liner installation | 26-Nov-16 | 26-Sep-16 | 15-Aug-16 |
| 5% |                                                                                                      |                                                                 | 15-Jan-17 | 15-Nov-16 | 30-Sep-16 |

100%

These measures form the basis on which our overall Corporate performance will be assessed, but the scores against these measures and overall Corporate Score are not absolute. The Board and President reserve the right to determine the Corporate Score. In exercising their discretion, the Board and President may choose to make adjustments to the Corporate Score or individual scorecard items.
SEC Interrogatory #65

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
[EB-2013-0321]

With respect to the KPMG Assessment of Organizational and Structural Opportunities at OPG report (December 6, 2012):

a. Please provide an update on OPG’s implementation of any recommendations set out in the report.

b. Please quantify the savings achieved since 2014 regarding any recommendations that were implemented.

Response

a) Of the five incremental opportunities identified in the KPMG Assessment of Organizational and Structural Opportunities (see EB-2013-0321, Ex. K3.2, p. 14), three opportunities were not considered for implementation because they were in opposition to the government’s policy position on offshoring (see EB-2013-0321, Tr. Vol. 3, p. 17, lines 1-4). However, with respect to the remaining two opportunities, in the functional areas of Nuclear and Supply Chain, OPG has expanded its use of purchase service agreements to outsource a number of facility management activities (e.g. janitorial services), and has implemented strategic sourcing initiatives.

b) OPG cannot quantify the savings. Although OPG has implemented activities that address the incremental opportunities identified in the KPMG Assessment of Organizational and Structural Opportunities report (EB-2013-0321, K3.2, page 14) the cost savings associated with these incremental opportunities have been incorporated through OPG’s annual business planning and budgeting process and have not been tracked separately.
SEC Interrogatory #69

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference: [F4/3/1]

With respect to the Ontario Public Sector Salary Disclosure List:

a. For each of 2014 and 2015, what percentages of OPG’s employees were on the Ontario Public Sector Salary Disclosure List?

b. Please discuss OPG’s expectation regarding the trend of employees to be both on the list, and are on the list with salaries at or above $200,000 in 2016 and throughout the test period.

Response

(a) Approximately 60% for both 2014 and 2015.

(b) OPG expects that the percentage of OPG employees on the Ontario Public Sector Salary Disclosure list will remain stable at around 60% over the IR period. While there will be wage increases that would tend to raise this percentage, ongoing controls on overtime should have a countervailing effect. In recent years, the percentage of OPG employees earning $200,000 or more has ranged between 3 and 4 per cent. OPG expects this range to remain stable over the IR period for the reasons discussed regarding the percentage of employees on the Ontario Public Sector Salary Disclosure list.

Witness Panel: Corporate Groups, Compensation
SEC Interrogatory #70

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Reference:
[F4/3/1, p.8]

OPG’s current collective agreements with the PWU and the Society expire on March 31st 2017 (PWU) and December 31st 2018 (Society). Please provide the assumptions OPG is making for the purposes of the proposed test period budget, regarding the outcome of any further collective agreements for the period after their respective expiry dates and the end of the test period (December 31st 2021).

Response

Please note that there is an error in Ex.F4-3-1, p. 8, line 11 – the PWU collective agreement expires on March 31, 2018, not March 31, 2017. OPG will be filing a correction to its evidence.

OPG notes that any changes to wages, pension, benefits and working conditions are subject to the collective bargaining process.
SEC Interrogatory #71

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
[F4/3/1, p.8]

Please detail all changes that were made to the current collective agreement from the one filed in EB-2013-0321, as a result of the last round of bargaining between the PWU and the Society.

Response

Attachment 1 to this response is the memorandum of settlement for PWU, which details changes from the latest round of negotiations with the PWU.

Please refer to L06.6-1 Staff-144, Attachment 2 for a copy of the memorandum of settlement for Society, detailing changes from the last round of negotiations with Society.
Memorandum of Settlement

Between

Ontario Power Generation Inc.

-and-

Power Workers’ Union
CUPE Local 1000

Subject to ratification the parties herein agree the following constitutes a full settlement of all matters.

The parties will also agree this Ontario Power Generation Inc. Agreement shall include the terms of the April 1, 2012 – March 31, 2015 Ontario Power Generation Inc. Agreement provided, however, all the matters set out in the attached statement of Agreement are incorporated.

For the Union

For the Company

04/12/15
Date

It is jointly agreed that the Collective Agreement covering the period of April 1, 2012 – March 31, 2015 will be amended as follows. All changes will be effective April 1, 2015 unless otherwise dated. The parties herein agree that the terms of the Collective Agreement shall be from April 1, 2015 to March 31, 2018
NOT TO BE REPRODUCED IN THE COLLECTIVE AGREEMENT – The Parties also agree to ensure that references to job documents are correct throughout the Collective Agreement and will be completed during the drafting of the renewal Collective Agreement.

PREAMBLE TO ARTICLES

COLLECTIVE AGREEMENT
BETWEEN

ONTARIO POWER GENERATION INC.
(Hereinafter referred to as “The Company”)

and

POWER WORKERS’ UNION (PWU), CANADIAN UNION OF PUBLIC EMPLOYEES, Local 1000 - CLC, hereinafter referred to as the "Union" which executes this Agreement by B. Walker, B. Carnduff, M. Skopecleanos, A. Clunis, S. Walker, A. Sham, M. Quinn, and T. Borg.

WHEREAS the Union has requested the Company to enter into a Collective Agreement and the Company has consented thereto:

NOW THIS AGREEMENT WITNESSETH

that there shall be seven parts, namely, Part A - General Items, Part B - Maintenance Trades, Part C - Electrical Operators, Part D Clerical/Technical, Part E – Construction Technical, Part F - Thermal Generating Stations, and Part G – Nuclear Generating Stations. It is also witnessed that the Company and the Union agree each with the other as follows:

Articles

Article 2 – Grievance Procedure / Discipline and Discharge

(See ATTACHMENT #1 Re: Appointment and Tenure of the Chief Arbitrator under the OPG/PWU Collective Agreement and Grievance Procedure)
ARTICLE 3
ARBITERATION

3.0 THE REGULAR ARBITRATION PROCESS

The regular arbitration process will continue on the basis of the practice currently adhered to by the parties, but any disputes relating to such practice or any requests for changes in the practice may be referred to the Chief Arbitrator for a ruling.

3.1 This procedure shall not apply to Union allegations of unfair treatment. or Union concerns regarding the adequacy of job documents and/or the rating, for jobs covered by the Clerical Technical Job Evaluation Plan which shall be processed in accordance with the challenge procedures contained in the Union Clerical Technical Job Evaluation Manual.

3.2 Where a difference arises between the parties relating to the interpretation, application, or administration of this Agreement, including any question as to whether a matter is arbitrable, or where an allegation is made that this Agreement has been violated, either of the parties may, after exhausting any grievance procedure established by this Agreement, refer the grievance to arbitration pursuant to Article 2.4.

The Arbitrator shall hear and determine the difference or allegation and shall issue a decision and the decision shall be final and binding upon the parties and upon any employee affected by it. However, in no event shall the Arbitrator have the power to change, alter, modify or amend any provision of this Agreement.

3.3 Principles of Expedited Arbitration

(a) Arbitrators shall normally decide multiple cases each day of hearing. Cases shall be heard on an expedited basis after the parties have exchanged their written briefs. Oral evidence may be called only where the arbitrator deems necessary and only with leave of the arbitrator. Mediation prior to arbitration is normally an integral part of this arbitration process.

(b) The decisions are precedent setting and shall be accompanied by reasons on any non-factual issues.

(c) The parties may use the services of counsel.

3.3.1 Chief Arbitrator

The Chief Arbitrator will have exclusive, final and binding authority over all issues relating to the scheduling of cases, including decisions as to who hears which case and when it is heard and shall have the power to relieve against time limits, including those in the grievance process and the referral to arbitration in respect of all cases.
Powers of the Chief Arbitrator

(a) The Chief Arbitrator will have the power to:

(i) appoint arbitrators;
(ii) assign grievances for resolution;
(iii) schedule hearing dates in consultation with the parties.
(iv) determine the hours within which arbitrations are conducted.
(v) assist in reducing the cost and delay and increasing the efficiency of the regular arbitration process.
(vi) appoint a Deputy Chief Arbitrator and delegate such powers to that Deputy as the Chief Arbitrator may deem fit. The Deputy shall succeed the Chief Arbitrator should the Chief Arbitrator be no longer willing or capable of carrying out the duties of the Chief Arbitrator”.

3.3.2 All Arbitrators

Where a difference arises between the parties relating to the interpretation, application, or administration of this Agreement, including any question as to whether a matter is arbitrable, or where an allegation is made that this Agreement has been violated, either of the parties may, after exhausting any grievance procedure established by this Agreement, refer the grievance to arbitration pursuant to Article 2.4.

The Arbitrator shall hear and determine the difference or allegation and shall issue a decision and the decision shall be final and binding upon the parties and upon any employee affected by it. However, in no event shall the Arbitrator have the power to change, alter, modify or amend any provision of this Agreement.

All arbitrators are to determine their own procedure, may admit evidence that would not be admissible in court and may rely on such evidence to render a decision. All arbitrators will have the power and authority to determine the real issues in dispute between the parties in any particular case and to relieve against time limits in the grievance process. All arbitrators’ decisions will be final and binding. All arbitrators shall have the power to make interim relief orders.

(See also ATTACHMENT #1 Re: Appointment and Tenure of the Chief Arbitrator under the OPG/PWU Collective Agreement and Grievance Procedure)

Article 5 – Union Security

**NOT TO BE REPRODUCED IN THE COLLECTIVE AGREEMENT** – Management will revise offer templates to include a copy to the receiving Chief Steward.
Article 5A.2 – Security Guards – Withdrawal of Services

- Add new paragraph to Article 5A.2 to incorporate language from the midterm NUC-R-1038 (OPG Nuclear Response Force) paragraph #2 as follows:

“A minimum number of NRF qualified NSOs are required to work during a legal strike to satisfy the company’s minimum complement requirements. Prior to the commencement of a legal strike, management and the PWU will jointly contact NRF qualified NSOs to advise them of the work schedules and the terms and conditions they will work to during a legal strike.”

Article 11 – Surplus Staff Procedure

- Amend as preamble as follows:

ARTICLE 11

SURPLUS STAFF PROCEDURE

No employee will be involuntarily laid off during the term of the Collective Agreement. Article 11 with the exception of Article 11.0 will be suspended for the term of the Collective Agreement.

During the term of the Collective Agreement there will be no involuntary lay-offs. Any surplus of staff will be handled through either worksite / location re-deployment in accordance with Article 11.0, or the offer of severance under the applicable VSP mid-term agreements.

Any Thermal plant closure will be dealt with under the existing mid-term for Thermal plant closures.

During the term of this agreement if a surplus cannot be accommodated through re-deployment, or a VSP under the applicable mid-term agreements, or the Thermal Plant Closure Mid-Term where applicable, the treatment of employees who are adversely affected by such an event will be subject for discussion between the parties. These discussions will occur in the context of a commitment by the Company to employment security. If an agreement cannot be reached all unresolved issues may be referred to the Chief Arbitrator for resolution.

The suspension of Article 11 will expire on March 31, 2018 and will not be automatically renewed in any subsequent Collective Agreement.

Article 12 – Purchased Services Agreement

- Amend language as follows:

12.2.6 Establishment of Thresholds

The establishment of the threshold is designed to remove from the process on a case by case basis certain issues relating to purchased services. The threshold will operate in such a way as to allow flexibility in local decision making. Any decisions regarding what is below the threshold will be non-precedent setting.
If there is a dispute with the union on whether the proposed purchased service is permitted by the Attachment 1 threshold and there is no consensus, and if it makes sense in the circumstances the dispute will be resolved before the purchased service occurs. Lack of agreement on obtaining an advance resolution will not preclude the work from being performed, neither will it preclude the matter from being resolved under the 12.2.7 process.

The guidelines to determine whether a purchased service is below the threshold are as follows:

- subject matter lacking in substance; or
- any consequences are relatively insignificant; or
- where the nature or consequences of the work which represents a purchased service is remote from work currently performed by the PWU on a continuing basis. For purposes of clarity, this does not mean geographically remote; or
- emergencies; or
- any work performed under a manufacturer’s warranty, except where the manufacturer authorized the Company to do the work; or
- Work being done for OPG by Hydro One, AMEC NSS, Kinectrics and NHSS at the point each company is spun off from OPG and work of the same nature done by these companies in the future, so long as the Union continues to represent the employees of these companies; or
- where a distinct work program or work package at a worksite identified in a PSA request(s) is 250 hours or less annually. The addition of the 250 hour threshold will expire on March 31, 2018 and will not be automatically renewed in any subsequent Collective Agreement.

- Remove references in 12.4.3 to the following midterms:
  - PW-2
  - PW-46-1
  - PW-12

**NOT TO BE REPRODUCED IN THE COLLECTIVE AGREEMENT**

1. Agreement to Caretaker Letter for Lambton and Nanticoke (ATTACHMENT #2)
2. Agreement to Project Technician EPC Agreement (ATTACHMENT #3)

**Article 13 - Employment Security Plan**

- Suspend Article 13 for the duration of the Collective Agreement.

**Article 14 – Employment Security And Work Assignment**

- Suspend Article 14 for the duration of the Collective Agreement.

**Article 16 – Duration of the Agreement**

- Amend language as follows:

This agreement shall come into effect as of the 1st day of April 2015, and shall remain in effect until the 31st day of March 2018, and thereafter from year to year unless terminated by written notice given by one of the parties to the other within a period of not more than two months, but not less than one month prior to the anniversary date.
In the event that either party desires to amend the Agreement but not to terminate the same, either party may, by notice in writing not more than 90 days and not less than 30 days before the anniversary date, serve notice of the proposed amendments and both parties shall thereupon commence to negotiate in good faith with a view to arriving at an agreement on the proposed amendments and all provisions of the Agreement, other than those proposed to be amended, shall continue in full force and effect.

**NOT TO BE REPRODUCED IN THE COLLECTIVE AGREEMENT** – Default provisions in the event that the Hydro One IPO does not occur (ATTACHMENT #4).

### Part A

**Part A, Item 13.0 – Health Insurance Plans**

- Eliminate Paper Claim Submissions Window.
- Paramedical Services – **Effective April 1, 2017, $775 per person per calendar year. In the event that the Hydro One IPO does not occur by December 31, 2015, the effective date amended to January 1, 2016.**
- Out of Country Coverage – OPG will provide out of country travel insurance to regular PWU employees at existing benefit coverage levels for the term of the collective agreement.

OPG’s obligation in respect of retirees shall remain limited to $35 per retiree per year.

**Part A, Item 14 – Pension and Insurance**

- Amend language to reflect pension contribution increases as follows:
  - Employee pension contributions, effective April 1, 2015, - 1.0% below YMPE / 1.0% above YMPE
  - Employee pension contributions, effective April 1, 2016, - 1.0% below YMPE / 1.0% above YMPE
  - Employee pension contributions, effective April 1, 2017, - 0.5% below YMPE / 1.0% above YMPE

- Amend language to reflect pension benefits changes as follows:

  Effective March 31, 2025 for future service benefit accruals for current employees and new hires:
  
  i. Adjust the number of years for final average earnings to 5 years from 3 years
  
  ii. Early retirement rule of 85 (from rule of 82)

*The above changes will be incorporated into the 2015-2018 Collective Agreement, pension brochure and will require pension amendments*
Explanatory Note on Pension Changes:

Rule of 85

- The 85-point rule would become effective for future service beginning March 31, 2025
- Members with 82 or more points on March 31, 2025 would retain eligibility for an unreduced pension for all service
- For all other members with service prior to March 31, 2025, pension benefits earned for service prior to March 31, 2025 would remain subject to the 82-point rule for an unreduced pension
  - For members in this category retiring on or after their 82-point date but before their 85-point date, pension benefits for service from March 31, 2025 will be subject to the following early retirement reductions:
    - For members with 20 or more years of pre-March 31, 2025 service, the early retirement reduction would be 3% per year from the 85-point date
    - For members with less than 20 years of pre-March 31, 2025 service, the regular early retirement reductions would apply, including extending those reductions below age 55 for this purpose

Final Average Earnings

- Pension benefits earned for future service beginning March 31, 2025 would be based on a high five-year average instead of a high three-year average; the high three-year average would continue to apply to pension benefits earned for service prior to March 31, 2025.

Part A, Item 16.2.5

- Amend title as follows:

Health Insurance Plan (Excluding Summer Students Regardless of Wage Schedule Paid From

Part A, Item 19 – Travelling Time Outside Normal Working Hours

*Incremental travel time will also apply to all other provisions as well.

19.0 TRAVELLING TIME OUTSIDE NORMAL WORKING HOURS

When a supervisor directs an employees to travel between one work centre and another work centre, they shall be entitled in any calendar day to payment for travelling travel time that is incremental to the time it takes for their normal commute to their regular work headquarters at the appropriate premium rate in accordance with conditions governing overtime up to a maximum of the number of hours which constitute a normal work day subject to the following:

1. Overtime will be paid when employees are required to drive a Company vehicle outside normal working hours unless being used exclusively for their own personal transportation.

2. When travelling by public transportation, travelling time shall be considered to include waiting periods beyond the employee’s control up to a maximum of five hours; both
preceding, during and subsequent to the travelling period, but excluding meal periods (one hour each) occurring during the waiting period.

3. When a berth or overnight accommodation is allowed and available, compensation shall not be made between 2300 hours and 0800 hours, nor shall the time spent for noon and evening meals (one hour each) be subject to compensation.

4. Travel time outside of normal working hours associated with selection interviews, attendance at training courses of five days or more, or attendance at conventions (where it is part of the employee’s normal function) will be compensated at straight time up to a maximum of a normal day’s basic pay for each day involved.

5. Normally, selection interviews are conducted during employees’ normal working hours. Where it is unavoidable and interviews are scheduled outside an employee’s normal working hours, payment will be made, at straight time, for each hour spent in interviewing or travelling up to a maximum of a normal day’s basic pay for each day involved.

56. No compensation for travelling time outside the normal working hours shall be made in the following circumstances:

(a) When a change of residence headquarters and related transfer is involved, the employee will normally travel during normal working hours without any loss of base pay. If the employee is required to travel on a regular day off, payment for travelling time will be made at straight time up to a maximum of the number of hours, which constitute a normal work day.

(b) On periodic return to residence headquarters resulting from a permanent transfer, as outlined in Section 24.0.

(c) For a new employee reporting to some administrative centre or station for instruction or training before reporting for work at his/her new location.

67. Where the Company normally provides transportation facilities between residence headquarters and work headquarters for normal daily hours an employee required to work extension overtime will be provided free transportation to the residence headquarters.

NOTE
Equivalent time off without pay may be granted on the basis of an hour off for each hour spent travelling provided the workload permits.

Part A, Item 39 – Escalator Clause

Suspend for the duration of the collective agreement.
Part A, Item 43.0 – Wage Structure

Effective April 1, 2015 – 1% general wage increase to all PWU employees
Effective April 1, 2016 – 1% general wage increase to all PWU employees
Effective April 1, 2017 – 1% general wage increase to all PWU employees

Part A, New Item

Lump-Sum Payments

PWU employees contributing to the Pension Plan as of April 1, 2015 will receive the following:

--Lump sum payment of 1% of salary as of April 1, 2015 (adjusted if less than 12 months until employee no longer makes pension contributions)

--Lump sum payment of 2% of salary as of April 1, 2016 (adjusted if less than 12 months until employee no longer makes pension contributions) provided the individual is still an employee of OPG as of April 1, 2016 and contributing to the Pension Plan

Share Performance Bonus Plan

PWU employees contributing to the Pension Plan as of April 1, 2015 will participate in a Share Performance Plan related to the Hydro One IPO, as follows:

--Share awards will be made on April 1st of each year starting April 1, 2017 and continuing up to and including April 1, 2031 (i.e., maximum of 15 share awards) provided the individual is still an active employee of OPG as of the award date and has less than 35 years of pensionable service, with the number of shares awarded to each individual each year calculated as 2.75% of Salary as of April 1, 2015/Initial Share Price:

-- Value of share award at each award date will equal number of shares awarded x Hydro One share price at date of award

-- Share award will be made in Hydro One shares with the employee having the option to take 50% of award in cash to pay the taxes since the value of the share award is a taxable event. As per current tax rules, the employee may direct the payment of shares into an RRSP, providing the employee has room within their contribution limits.

Example – if an employee has a salary on April 1, 2015 of $88,000, and the initial share price is $20.00, the employee will get a share award of 121 shares (2.75% x $88,000/$20.00) each year. If the share price is $30.00 at the time of the award, the share award value will be 121 shares x $30.00 per share or $3,630.
Part A, New Item

NOT TO BE REPRODUCED IN THE COLLECTIVE AGREEMENT – In July Management will provide an annual report to the PWU office showing all employees that received relief pay for 50% or more of the previous vacation year as set out in Part A, Item 42.

Part B

Part B, Item 8

- Amend as follows:

8.0 **WATER-WORKERS** Operation of the Niagara Queen

8.1 **Water-Worker III (Band-III) Boat Captain**

Diver, Scuba diver and Captain of the Niagara Queen are Band 3 duties and attract a supervisory premium in accordance with Article 8.8.2 of a Water-Worker III.

If a Band I or Band II employee is required to dive during a normal working day (Monday to Friday 0000 to 2400 hours) shall receive a minimum of eight hours at the appropriate Band III relief rate. For diving operations beginning before and ending after midnight (2400 hours), the minimum will be payable only for the day diving began.

All diving performed between sunset and sunrise shall be paid at the premium rate irrespective of regular scheduled hours.

In addition to the foregoing, the Company will insure the life of an employee required to dive, in the amount of $10,000 during diving operations.

During normal scheduled hours, if an employee is called upon to perform the duties of Boat Captain of the Niagara Queen, he/she shall be paid a minimum of four hours at the Band 3 supervisory rate, or actual hours worked, whichever is the greater.

8.2 **Water-Worker II (Band-II) Engine Room Watchkeeper and Deckhand**

Diver Tender, Engineman, **Engine Room Watchkeeper and** Deckhand of the Niagara Queen and operation of a boat 7.92 m (26 feet) in length or more are Band 2 duties of a Water-Worker.

Water-Worker II's shall not be required to act as safety scuba divers during diving operations.

Water-Worker II's will be given a suitable course designed by Health and Safety Division in the diagnosis and treatment of diseases peculiar to the diving trade.

All Band 1 employees performing relief as Engine Room Watchkeeper and Deckhand-Water Worker II's shall be paid the appropriate Band 2 relief rate for a fully scheduled day.
Part C

Part C, Item 1.1.2 Time Balance

Subject to a transition period, amend language as follows:

1.1.2 Time Balance

1. The master work schedule shall have the time balance adjusted for each operator to zero on April June 30 and October December 31. Statutory holidays occurring and vacation allowances taken during the respective periods shall be included when computing time balances.

Part C, Item 1.3.6 Floating Statutory Holiday

- Subject to a transition period, amend language as follows:

1.3.6 Floating Statutory Holiday

A floating holiday may be interchanged with a supernumerary day or with a day where step-up relief can be provided. Floating holidays may be taken in the 12 month period from May January 1st to April December 30th.

Part C, Item 5.0 – Vacations

- Subject to a transition period, amend language as follows:

5.0 VACATIONS

Vacations for operators will be governed by the following:

1. The 12-month period in which vacation is actually taken shall be from May January 1st to April 30th December 31st of the following year rather than the calendar year.

Part G

Part G, Item 22.1

- Add Shift Radiation Protection and Safety Tech to the title.

Part G, New Item

“The following terms shall be applied to incumbents in the Commercial Inspection and Maintenance Diver and Commercial Inspection and Maintenance Diver FLMa classifications:

1. Incumbents will be considered day workers, working 40 hours per week, consisting of either:
(a) Five (5) days of eight (8) hours (not before 7 am and not later than 6 pm) Monday to Friday inclusive; or

(b) Four (4) days of ten (10) hours (not before 6 am and not later than 6 pm) Monday to Friday inclusive.

(c) In the event that shift work is required, the provisions in Part G, Item 2.1.2 will apply. However, no employee will be scheduled to work more than 3 months per calendar year on shift.

2. The company will insure the life of an employee required to dive in the amount of $10,000 during diving operations.”

**Part G, New Item**

- Incorporate the language from the SPFPC Memorandum that was to be reproduced in the collective agreement (paragraphs 10.4 to 10.15). This applies to Darlington Security Only. (ATTACHMENT #5)

**MIDTERMS**

**GEN-PW-1001-7**

- Amend midterm to reflect the structure of OPG (ATTACHMENT #6).

**NUC-PW-1001-6**

- Extend expiry date for the term of the collective agreement (ATTACHMENT #7).

**PW-38 and PW-47-1 (PEY)**

- Revise both midterms as attached (ATTACHMENT #8 and #9).

**Commercial Inspection Maintenance Divers Midterm**

- Delete midterm NUC-R-1027.

**Radiation Protection II – Appendix ‘A’**

- New midterm (ATTACHMENT #10).

**Pickering End of Commercial Operations (PECO)**

- New midterm (ATTACHMENT #11).
February 10, 2015

Mr. Bob Walker
Vice President, Sector 1

Mr. Brad Carnduff
Vice President, Sector 2

Power Workers' Union
244 Eglinton Avenue East
Toronto, Ontario M4P 1K2

Dear Bob and Brad:

Re: Application of Wage Schedules to Students

This memo will serve to clarify any confusion there has been on the pay-treatment for students. The collective agreement at Part A, Item 43 determines the pay treatment for students generally. Aside from this general reference, wage schedule 35/15 attached has been developed for the specific purpose of determining pay treatment for students who are employed for developmental opportunities which directly contribute to the completion of their post secondary education. These development opportunities can occur in various ways; part of a structured internship, a co-op program or other forms of work terms. So long as the student is employed to perform work which is directly related to their field of study and completion of their post secondary education, these will be deemed development opportunities and their pay treatment will be determined under schedule 35/15.

The application of the pay treatment defined in Part A, Item 43 applies to any other students who are hired to perform work that isn't directly related to their field of study. By way of an example an English Major who is employed in a clerical or administrative role would be paid in accordance with Part A, Item 43. By contrast, a Chemistry Major employed as a Chemical Technician would be paid under schedule 35/15.

Yours truly,

Jason Fitzsimmons

cc:
Brad Walker – OPG
Keri Borg – PWU
Christa Deeth- PWU
# Student Wage Rates – Schedule 35 Band 1

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<thead>
<tr>
<th>Academic Year/Months Completed</th>
<th>Step</th>
<th>April 1, 2015 Hourly Rate</th>
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<td>$</td>
</tr>
<tr>
<td>Second Year Completed</td>
<td>2</td>
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<td>3</td>
<td>$</td>
</tr>
<tr>
<td>Community College/Polytechnical Co-op Programs (Occ. Code 00118001)</td>
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<td>$</td>
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<tr>
<td>12 Months Completed</td>
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<tr>
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<td>$</td>
</tr>
<tr>
<td>University (Occ. Code 00118006)</td>
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<td></td>
</tr>
<tr>
<td>First Year Completed</td>
<td>1</td>
<td>$</td>
</tr>
<tr>
<td>Second Year Completed</td>
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<td>University Co-op Programs (Occ. Code 00118007)</td>
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<tr>
<td>28 Months or More Completed</td>
<td>6</td>
<td>$</td>
</tr>
</tbody>
</table>

**Note:**

1. The step and corresponding rate paid to the student (both co-op and non co-op) is based on the academic term (measured in years or months of academic study as identified above) that the student has successfully completed.
2. An academic term is equal to 4 months.
February 10, 2015

Mr. Bob Walker  
Vice President, Sector 1

Mr. Brad Carnduff  
Vice President, Sector 2

Power Workers’ Union  
244 Eglinton Avenue East  
Toronto, Ontario M4P 1K2

Dear Bob and Brad:

Commercial Inspection and Maintenance Diver Classification

This letter is being sent to confirm the implementation of the Commercial Inspection and Maintenance Diver classification in Nuclear per Mid-Term NUC-R-1027, dated June 8, 2005. The new classification will result in two new Nuclear Business Unit Job Documents (attached) and OGLs (#172 and #173). These jobs will be placed into Band 3 and will remain as such unless significant alterations in duties and/or technological changes occur, at which time joint agreement must be reached, or the Job Challenge process in Article 8 be followed.

As a result of the implementation of the Commercial Inspection and Maintenance Diver classification, the following non-Nuclear Business Unit Job Documents and OGLs will be made obsolete, and the current incumbents will be mapped to the appropriate new Nuclear Business Unit Job Documents:

- Water Worker 3 – Supervisor (Occ Code: 460205) (OGL #158)
- Water Worker 3 – Mechanical (Occ Code: 460204) (OGL #159)
- Water Worker 3 – Electrical (Occ Code: 460206) (OGL #160)

Please review and provide your agreement by: (1) signing two original copies of this letter; and (2) signing two original copies of the OGL lists applicable to your Sector. Retain one set of originals for your records (half of the required originals outlined), and send one set of originals back to the attention of Brad Walker.

Yours truly,

Jason Fitzsimmons

cc:  
Brad Walker – OPG  
Suzanne Hotson – PWU
Concur on behalf of the PWU:

Bob Walker  

Date

Brad Carnduff  

Date
March 20, 2015

Mr. Bob Walker  
Vice President, Sector 1

Power Workers’ Union  
244 Eglinton Avenue East  
Toronto, Ontario M4P 1K2

Dear Bob:


This letter will serve to confirm our agreement to extend the above-captioned Memorandum of Agreement for the duration of the renewal collective agreement.

For clarity, all terms of the Memorandum will remain in force and neither party will exercise the option in paragraph #10 to withdraw support for the night shift and schedule until 90 days prior to the expiry of the collective agreement term.

Yours truly,

Jason Fitzsimmons

cc:  
Brad Walker – OPG  
Keri Borg – PWU
MEMORANDUM OF AGREEMENT
between
ONTARIO POWER GENERATION INC.
and
THE POWER WORKERS’ UNION

RE: Night Shift Schedule for Radiation Protection Technicians

On a without prejudice basis, the parties hereby agree to the following:

1. An 8-hour or 10-hour fixed night shift schedule for Radiation Protection Technicians at OPG Nuclear will be established for a period lasting the duration of 2014 and 2015. This schedule will be implemented on an intermittent basis for outage coverage as required by OPG.

2. The purpose of the night shift schedule is to provide coverage from 00:00 to 08:00 a.m. through the use of PWU-Represented Appendix A Radiation Protection Technicians. These employees will be paid at the Radiation Protection Technician II rate in Appendix A—1 of the collective agreement.

3. This night shift schedule will cover the time period 00:00 to 08:00, seven (7) days per week or 22:00 to 08:00 four (4) days per week. This includes a paid meal break. This coverage will require two crews of employees working five 8-hour shifts per week or two crews working four 10-hour shifts per week (7 day coverage with 40 scheduled hours per week). For eight hour crews the first crew will be scheduled to work Sun to Thurs and the second crew Tues to Sat. For ten hour crews the first crew will be scheduled to work Sun to Wed and the second crew Wed to Sat.

4. The parties recognize that this schedule is not one of the approved schedules on the master Shift schedule and that it will be used only for radiation protection coverage as per this agreement and only for outages.

5. This schedule will be staffed by PWU-Represented Appendix A Radiation Protection Technicians. When possible PWU supervision (FLMa) will be performed by regular OPG employees. Supervisors (FLMa) will be working recognized shift schedules (see exception in item #7). The selection of supervisors will follow the standard outage selection processes.

6. OPG will solicit volunteers for the night shift schedule from amongst any qualified Appendix A Radiation Protection Technicians working at the site where the night shift schedule will be implemented for an impending outage. If there are more volunteers than required, OPG reserves the right to select the required number of staff from the volunteers. If there are insufficient volunteers, OPG reserves the right to appoint any qualified Appendix A Radiation Protection Technicians working at that site to the night shift schedule and/or to seek additional qualified staff through the Appendix A hiring hall.

7. Regular Members may volunteer to work this night shift schedule as a Radiation Protection Technician or as an FLMa.

8. A shift differential of $0.85/hr shall be paid.

9. All other applicable provisions of the Collective Agreement will apply.

10. Either party can withdraw its support of this shift with ninety (90) days written notice.

Signed on the ___ day of July 2014.

[Signature]
OPG - Jim Roberson
July 14, 2014

[Signature]
Robert Walker
Sector Vice President – Nuclear
Power Worker’s Union
ATTACHMENTS

Attachment #1 – Chief Arbitrator and Grievance Procedure (Article 2 and 3)

LETTER OF UNDERSTANDING
VIA E-MAIL
Mr. Jason Fitzsimmons
VP, ESLR
Ontario Power Generation
700 University Avenue
Toronto, Ontario
M5G 1X6

Dear Jason:

January 27, 2015

Re: Appointment and Tenure of the Chief Arbitrator under the OPG/PWU Collective Agreement

This is to confirm the understanding of the parties that Martin Teplitsky, Q.C. will remain the Chief Arbitrator under all Collective Agreements between the PWU and OPG unless and until he is unwilling or unable to continue in that role. Should the office of Chief Arbitrator become vacant, the parties will seek to agree on whom to appoint to that office. Should the parties fail to agree within 10 days of the vacancy, either party may request that The Chief Justice of Ontario recommend a replacement arbitrator to fill the office. Should the Chief Justice refuse to appoint a Chief Arbitrator, the appointment of the Chief Arbitrator will be vested with the Chair of the OLRB.

This letter forms part of the Collective Agreements between the parties.

Yours very truly,

Power Workers’ Union

Bob Walker,
Sector 1 Vice-President

Brad Carnduff
Sector 2 Vice-President
March 26, 2015
Mr. Chris Dassios
General Counsel
Power Workers Union
244 Eglinton Avenue

Re: Grievance Procedure

During collective bargaining for the 2015 renewal agreement the parties discussed the benefits of utilizing mutually agreed to mediators and arbitrators to resolve disputes.

This letter will serve to confirm our agreement that neither party will apply to the Ministry of Labour for the appointment of an Arbitrator on an expedited basis as referenced in Section 49 of the Ontario Labour Relations Act without first obtaining leave from the Chief Arbitrator.

Jason Fitzsimmons
VP, ESLR
OPG
Attachment #2 – Letter re: Caretaker Staff at Lambton and Nanticoke Stations

Caretaker Staff at Nanticoke and Lambton Stations

The parties agree that implementation of Midterm GEN-PW-1006-2 re: Thermal Station Closures and Partial Closures/Refueling is complete and will be made obsolete.

Further, the parties agree that there is a requirement to facilitate continued safe operation to the point that the stations are de-staffed and retired.

Finally, the parties agree that the remaining regular employees (aka caretaker staff) at Nanticoke and Lambton should be given the opportunity to continue employment with OPG at another location, or have the option to voluntarily sever their employment as was available to other staff at the affected stations.

Should OPG officially announce the closure of one or both of the sites noted above with the intent to retire the assets the following process will apply:

1. Within 30 days following the announcement, OPG will solicit from employees a preference for either (a) or (b) below and employees will be given 14 days to make such an election:
   a. Voluntary severance in accordance with GEN-PW-1001-7 (as amended).
   b. Accept a position within Thermal-Hydroelectric, and Corporate Functions. Employees selecting this option will rank, from amongst the locations posted, all locations at which they agree to accept a position. Seniority within the classification will be the governing factor for such preferences.

2. If no preference is indicated, or the employee has not returned the form, the employee will be deemed to have elected a voluntary severance as per 1(a).

3. If the employee has indicated a preference for 1(b), but does not indicate any location preference, they may be placed at any of the posted locations at OPG’s discretion.

4. All VSP preferences are irrevocable except where the employee has subsequently experienced a life altering event.

5. All location preferences are irrevocable except that employees who do not get any of their preferred locations and are assigned a location which is not their preference, may within 48 hours of the location finalization, opt for a VSP.

6. Employees at affected locations, including those with less than three years at the current work headquarters, who are placed in positions which represent a lateral or demotion in accordance with Article 10.2 will be eligible for moving expenses in accordance with the provisions of Part “A”, Item 23.0.

7. All employees forced to transfer under 1(b) will be eligible for the financial assistance plan in accordance with Attachment #1 of this letter.

8. Term employees, as defined below, may be used in order to defer or expedite the release dates for regular staff who elect to accept a position at an available location.
a) “Term employees” are employees hired specifically to cover off what would normally be considered “ongoing” positions at the affected station and facilitate the early release of regular employees. They may also be hired at other locations to facilitate longer than normal release dates for employees at the affected station. Term employees can be used in the same manner as temporary employees and will not be used to circumvent the CPAA but have terms and conditions as outlined in below:

b) Term employees do not accumulate service, cannot become regular and have no preference over external applicants to vacancies within the company. A term employee will gain regular status if retained for longer than 12 months beyond the point at which the affected station/unit is no longer available to the IESO.

c) Term employees will be entitled to the following:

- The provisions of Part A Item 16 of the Collective Agreement, unless excluded by this agreement;
- Severance of two weeks per year of service (prorated for a partial year) to be paid upon termination of employment for other than cause;
- Term employees are not releasable to other vacancies until such time as they are no longer required for the station closure;
- If subsequently hired as a regular employee, service based on time spent as a term employee will be used to adjust their ECD.

d) Notwithstanding Article 12, if qualified term employees are not available, the work may be contracted out.

9. Any disputes involving the finalization of the VSP or locations may be referred to the SVP of Hydro Thermal Operations and the PWU VP. If agreement cannot be reached all unresolved issues may be referred to an Arbitrator for resolution.

10. This agreement and all referenced ancillary documents will expire at the end of this collective agreement.

11. Treatment of Thermal Operators will continue to be dealt with in accordance with Attachment #2 of this letter.

12. Management will not use Article 11 to involuntary reduce staff at Thermal and Hydroelectric sites as a direct result of that site receiving staff from a Thermal station that closed as a result of the government off coal strategy. Further management will not consider the positions received as a result of a thermal station being closed in determining any over compliment in a given classification for the purposes of article 11.0 (2). This commitment ends when the number of employees received within a given classification have attrited through other means.
ATTACHMENT #1 – Financial Assistance Plan

OPG shall contribute towards the interest costs on the increase in capital expenditure for an employee who is transferred to a higher cost housing area. Eligibility for this assistance will be determined by using either:

a) The current Ontario Residential Locality Differential Chart as published by Brookfield; OR

b) If either the employee's former location or his/her new location is not on this chart, a house-for-house comparison conducted by OPG.

The amount of assistance will depend upon the:

- Sale price of the residence in the former location;
- Relative value of comparable housing in the new location;
- Actual increase in housing costs (purchase price less sale price);
- Current interest costs.

The locality differential will be based on the differential in effect as of the date of closing of the purchase of the residence in the new location. The interest rate used to calculate the level of assistance will be based on OPG’s employee housing loan rate for a five year term as published by the Treasury Division (or the actual mortgage rate, whichever is less) as of the date of closing of the purchase of the residence in the new location.

The financial assistance will decrease annually in twenty (20) percent increments over a five year period.

An employee receiving financial assistance must advise OPG if he/she sells or rents his/her house in the new location within five years of purchase. Assistance provided to the employee will be reviewed and revised accordingly.

Financial Assistance ceases upon termination or retirement. However, should an employee die while receiving financial assistance associated with relocation, such assistance may continue as per the original entitlement based on a case-by-case review by the Business Unit providing the following condition is met:

- The designated beneficiary provides affidavits on an annual basis that the principal residence for which the assistance is paid continues to be his/her principal residence and that no new revenues for renting any portion of the residence are being received.
ATTACHMENT #2 – Thermal Operators

It is recognized that Thermal Operating Technicians (TOT) and Thermal Operating Supervisors (TOS) have no equivalent positions for the purposes of Article 11.

However, in an effort to maintain internal skills and qualifications, it is agreed that the following will apply:

1. The Hydro Operating Technician Trainee position (HOTT) will be considered an equivalent position for TOTs and TOSs.

2. OPG will determine the number and location of HOTT positions to be made available for placement of TOTs and TOSs.

3. If after placing TOTs and TOSs into the identified HOTT positions there remain unplaced TOTs and TOSs, the parties commit to discuss possible opportunities for the placement of these employees.

4. TOTs and TOSs that are placed in a HOTT position and have reported to the position will be subject to Mid-Term GEN-PW-1052- Hydro Operating - Technician Trainee Hiring except as modified herein.

5. The pay treatment and relocation entitlements of TOTs and TOSs who are placed into a HOTT position will be governed by the Mid-Term.
Attachment #3 – Project Tech Agreement

Memorandum of Agreement

-between-

Ontario Power Generation Inc.

“The Employer”

-and-

The Power Workers’ Union

“The Union”

Re: Nuclear Non-Trades Work PSA & Grievances OPG-P-130; OPG-PSA-98/105/106/146/176/184/196/197/198/200/201/215/231

Terms of Agreement:

1. The union agrees to the use of a purchased service agreement (“PSA”) for Non-Trades Work typically performed by PWU-represented employees for contracts associated with work assigned to the Building Trades Union (BTU) as per the CPAA and as generally referenced in the “P&M 2014 to 2016 Portfolio of Projects” (updated list dated April 9, 2015 attached as Appendix I to this agreement, list subject to amendment up until December 31, 2016).

2. The PSA only covers work within the Project Portfolio (Projects & Modifications, Minor Mods, IMS, etc.).

PSA Rationale

3. The parties acknowledge that upcoming projects, will require non-trades resources above and beyond OPG’s current resourcing levels.

4. The parties recognize that the hiring of additional regular staff, over and above current staffing levels is likely to result in an excess of staff as work programs diminish when Pickering closes and when the Darlington refurbishment project is completed.

PSA Duration

5. This PSA covers all contracts for work within the Project Portfolio (as described above) previously issued or issued in the calendar years 2015-2016. OPG commits that there will be no layoff of regular Project Technicians and Draftspersons within the Project Portfolio for the duration of the April 1, 2015-March 31, 2018 collective agreement term.

6. In the event of an unplanned event (force majeure) such as the cancellation of the Darlington Refurbishment Project or the loss of generation, the job security commitment may be revisited.

**Staffing Flexibility**

*When OPG self-performs work, OPG may elect to utilize one of the following staffing flexibility options:*

8. Secondments: OPG may utilize secondments as a means to manage the work program and resourcing for existing Project Technicians, Draftspersons, Analyst/Buyers or other resources as jointly agreed to by the parties. The parties will also explore more effective ways of transferring staff between Pickering and Darlington to enable OPG to manage its work programs.

9. Term Employees: Term employees may be used in lieu of regular or temporary Project Technicians, Draftspersons or Analyst/Buyers to avoid any shortfall in work that OPG elects to self-perform within the Project Portfolio. The terms and conditions of employment for Term Employees will be governed by Mid-Term XXX (PECO). For the classifications referred to in this agreement OPG will submit to the Union a Help Requisition form no later than thirty (30) days prior to the start of the work, or at a date mutually agreed upon to by the parties. Within seven (7) days the Union will confirm whether it can fulfill all or part of this number OPG shall have the right to request Union members by name in writing. The number of Term employees requested by name shall not exceed twenty-five percent (25%) of the total number of Term employees referred in response to a Help Requisition. This request will normally include the start date, location, expected shift, and duration of employment. A Term employee who voluntarily terminates his or her employment shall not be entitled to be referred out to OPG or any other company for a period of thirty (30) days unless agreed to by the parties.

**Other Principles**

10. Nothing in this Agreement affects the current Appendix A Collective Agreement provisions including those for Radiation Protection Technicians.

11. This Agreement is not intended to alter any jurisdictional boundary between the PWU and the BTUs.

12. This Agreement is made without precedent or prejudice with respect to any other matter and may be enforced as part of the OPG/PWU Collective Agreement.

**Secondments**

Secondment arrangements will be implemented as follows:

a) OPG will finalize secondment arrangements with the contractors.

b) Employees in Projects and Modifications who meet the qualifications will be selected for secondment on a “senior choice, junior force” basis.

c) OPG will provide the names and employee numbers of the seconded employees and the period of time for which they are expected to be seconded (the Secondment Period) to the PWU.
d) When selected for secondment, employees will be advised of the nature of the work, location, and expected duration of the secondment, and other working conditions as appropriate.

e) Seconded employees will remain on OPG’s payroll and their terms of employment are governed by the OPG/PWU Collective Agreement except as modified by this Agreement. For clarity, seconded employees will: (a) retain their status as an employee of OPG; (b) continue to accrue service credit and seniority for all purposes under the Collective Agreement; (c) be required to pay PWU dues during the Secondment Period; and (d) have the right to apply for advertised vacancies across OPG.

f) Seconded employees will receive day to day supervision by the respective Contractor and will receive appropriate training where required. The Contractor will supply competent supervision pursuant to the OHSA and is exclusively responsible for WSIA requirements although, as set out above, seconded employees will receive LTD and WSIA benefits pursuant to the OPG-PWU Collective Agreement. Seconded employees shall perform such work and services as reasonably required by the Contractor and shall abide by the working conditions established by the Contractor.

g) Expense and time approvals will be authorized by OPG based on information provided by the Contractor. This information will be subject to OPG audit to ensure transparency and appropriate resource allocation.

h) If circumstances arise that result in the desire of any party to end a secondment prior to the expiry of the expected Secondment Period, and mutual agreement cannot be reached, it will be dealt with and resolved by the Implementation Committee. This is separate and distinct from any performance management or disciplinary action that may occur in conjunction with a secondee’s work performance. In the event that the Implementation Committee cannot achieve resolution, OPG will have the right to end the secondment(s) in question. The PWU will have the right to grieve any decisions OPG makes in this regard.

i) Upon completion of the Secondment Period, the seconded employee shall return to the positions occupied before the Secondment Period or an equivalent position.

j) Where there is business justification, OPG may request a change to the term of any specific secondment. Secondee agreement is required for any extension.

k) The PWU will not seek a related employer and/or sale of a business declaration in respect of Contractors under sections 1(4) and/or 69 of the Ontario Labour Relations Act based on the use of any employees seconded under this agreement.

**Implementation Committee**

The parties will establish an Implementation Committee co-chaired by the OPGI Vice President of Health, Safety, Employee & Labour Relations and the PWU’s Vice President Sector 1 (Nuclear). This Committee will oversee the implementation and ongoing administration of this Agreement. Any disputes regarding the interpretation or application of this Agreement will be referred to the Committee.
prior to referral to arbitration. The Implementation Committee will meet regularly to discuss any issues related to this Agreement.

______________________________  ______________________________
Power Workers’ Union               Ontario Power Generation Inc.

Print Name:                                      Print Name:

Date:                                           Date:
Attachment #4 – Default in the Event the Hydro One IPO does not occur

In the event that the Hydro One IPO does not occur by December 31st, 2015, the following shall apply:

- 1 year term
- 1.0% in wages
- 1% increase in pension contributions
- 1% cash lump sum payment
- All other terms continue as amended and as agreed between the local bargaining committee
ATTACHMENT #5 – SPFPC Language

Memorandum of Agreement

Between

Ontario Power Generation Inc (Nuclear)
(The Company)

And

Power Workers’ Union
Cupe Local 1000

The negotiating committees of the Company and the Union hereby agree to recommend unanimously to their respective principals ratification of this agreement. Now therefore, the parties herein agree, subject to the ratification by their principals, that this agreement constitutes a full settlement of all matters.

1. The parties agree that the Darlington Security Officers, formerly represented by the Security Police and Fire Professionals of Canada (SPFPC), who have been certified and are now represented by the Power Workers Union, shall be included in the collective agreement between Ontario Power Generation (Nuclear) and the Power Workers Union April 1 2002 to March 31 2006. The said collective agreement shall be amended to reflect this agreement between the Parties. Part G item 32 shall be amended to include and deal with specific matters for Darlington Security. Only those terms specifically referenced below shall be included within the aforementioned collective agreement.

2. The shift schedule for 2003 for Darlington Security will be as prepared and posted in draft format. For the sake of clarity Part G item 2.0 through 2.1.7 shall not apply to the Darlington Security Officers for so long as the employees elect to work under the shift conditions as follows which shall be included for Darlington Security only under Part G item 32 (Nuclear Security Guards)

Shift Work

10.4 Eight (8) or twelve (12) hour shifts may be established on the basis of shift scheduling averaging forty (40) hours per week over approximately a one (1) year period.

10.5 The shift schedule is designed to average forty (40) hours per week over the duration of the schedule. The schedule will be prepared so that each employee’s time is balanced to zero plus or minus four (4) hours. Time will be carried into the next schedule. The
schedule will be a twelve (12) month shift schedule and be posted as close to sixty (60) days before its start as possible.

Although the content, preparation, posting and administration of shift schedules is the sole responsibility of Ontario Power Generation Inc., the preference of the majority of shift workers for a particular basic type of schedule will be adopted. Such preferences will be made known to Ontario Power Generation Inc. prior to the commencement of the preparation of new schedule. However, if in Ontario Power Generation Inc.'s opinion, the efficiency of the station or the health of a shift worker could be detrimentally affected by the chosen schedule, then Ontario Power Generation Inc. will provide the Union (Chief Steward) with reasons or medical opinions why the desired schedule cannot be implemented.

The preference of individual shift workers regarding vacation periods will be considered, providing such preferences are made known prior to commencement of preparation of new schedules.

Management will endeavour to minimize the extent to which guards must remain at a given post for extended periods of time (not normally more than 2 hours). This excludes the SMR.

Management agrees to consider employee requests in flexibility to work supernumerary shifts. (This excludes such examples as the SMR, BGG, and protected areas recognizing vulnerability issues).

The following are the recognized criteria of an acceptable shift schedule:

(a) The schedule should equitably rotate among all crews.

(b) The schedule should follow a repeating pattern so that it is easily understood.

(c) The schedule should never be far off balance and should reasonably approximate the time off provisions of day work. It follows then that a schedule should not leave long sequences of work without time off, nor long sequences of time off. In the case of 12-hour shift schedules, time balances should cycle between +/- 36 hours with an additional +/- 4 hours as an exception.

(d) Time balance shifts shall be indicated on the regular schedule as Monday to Friday and will be 8 or 12 hours.

(e) When scheduling 12-hour shifts, the maximum number of night shifts to be worked in sequence would be three (3) and the maximum number of days to be worked in a sequence would be four (4).

(f) The 12-hour shift schedule shall provide for at least 48 hours off between each sequence of shifts and at least two regular days off will be scheduled in each week (pay period).

10.6 Canadian Nuclear Safety Commission (CNSC) guidelines will be observed at all times. The parties acknowledge that the current practice of establishing shift schedules is within CNSC regulations. However, in case of change to CNSC guidelines, Ontario Power Generation Inc will not be penalized if it must alter the shift schedule to conform to changed CNSC requirements.
10.7 Management will give a minimum of seven (7) days notice for changes to an employee's hours of work, as shown on the shift schedule, except in emergent situations or to take advantage of a developmental or training opportunity or when done in response to an employee's request. Failure to provide the minimum notice will result in the payment of premium rates from the date of change to the end of the notice period.

10.8 The minimum hours off between shifts shall be as follows:

(a) Twelve (12) hours off when going from a twelve (12) hour shift to an eight (8) hour shift;

(b) Fifteen (15) hours when going from an eight (8) hour shift to a twelve (12) hour shift;

(c) Twelve (12) hours when going from a twelve (12) hour shift to a twelve (12) hour shift, or eight (8) hours when going from a twelve (12) hour shift to a twelve (12) hour shift with the consent of the employee;

(d) Fifteen (15) hours when going from an eight (8) hour shift to an eight (8) hour shift.

10.9 For pay purposes, all shifts shall be recorded and treated as if they occurred during the calendar day in which the shift ends.

10.10 For twelve (12) hour shifts:

(a) In determining credits used for vacations, floating holidays, and sick leave, one and one-half (1 ½) days will be deducted.

(b) In determining pay treatment for recognized holidays a day will mean eight (8) hours.

(c) In determining pay treatment for leaves of absence with pay, a day will mean twelve (12) hours.

10.11 When work load permits, a time balance day may be interchanged with a regular day off or a box day off may be interchanged with a regular scheduled work day, at the employee's request. Box days are the official credit for a statutory holiday.

10.12 In meeting the required manpower complements for eight (8) hour day shifts, it may become necessary to move employees from existing twelve (12) hour shifts. When this is required, the first principle management will follow will be to move employees who volunteer for day shifts. If sufficient volunteers are not available, the required number of employees will be shift changed from their twelve (12) hour shift to day shift in reverse order of seniority (i.e. the most junior employee is shift changed first). The Union acknowledges there may be exceptions to the reverse seniority rule. When such exceptions occur they will be discussed with the Chief Steward.

10.13 Time balance shifts shall be worked Monday to Friday. Time balance shifts shall begin no earlier then 0600 hours and end not later than 1800 hours.

10.14 Circumstances may arise where the twelve (12) month shift schedule must be curtailed and a contingency schedule put in place. (Examples may include unplanned station/unit outages, unplanned security events, work stoppages by members of other bargaining units or during prolonged threats to Nuclear facilities within the Darlington Nuclear property). The following conditions will apply during such circumstances:
(a) Ontario Power Generation Inc. will provide, where practical, thirty (30) days notice of the requirement for a contingency schedule. Included in such notice will be the need for such a schedule and its expected duration.

(b) Where, for reasons unique to the need to implement the contingency schedule, thirty (30) days notice cannot be given, Ontario Power Generation Inc. will give as much notice as possible.

(c) Consultation will take place between Ontario Power Generation Inc. and the PWU, concerning the need for implementation of the schedule and the details of the schedule.

(d) In determining the appropriate rates and conditions which would accompany the establishment of a contingency schedule, (i.e. premium rates, shift differential, special duty payments, etc.) reference will be made to other agreements made between the Corporation and representative bodies.

(e) If consultation fails to provide agreement on either the need for the contingency schedule or its details, Ontario Power Generation Inc. reserves the right to implement the schedule.

10.15 Employees on shift shall eat their meals as conditions permit. Meals are to be eaten in the cafeteria, lunch rooms and other areas as agreed to between the Union and Management. Employees will be entitled to meal breaks as follows:
- 12 hour shifts; 2 one-half (½) hour breaks
- 8 hour shifts; 1 one-half (½) hour break

Not to be reproduced in the Collective Agreement
When the regular schedule for 2004 is posted by the Company in 2003, pursuant to Part G item 2.0 (Hours of Work) the Darlington Security employees will at that time be given a vote on whether to continue with the schedule and associated provisions as stated above or to assume the regular schedule and the shift provisions of Part G item 2.0 (Hours of Work). For the sake of clarity this is a one-time vote on the election of which shift provisions the employees wish to adopt.

3. Not to be reproduced in the Collective Agreement
The Parties agree to meet to discuss alternative shift schedules, including a STU shift schedule. The total effectiveness of the alternatives will be evaluated. Any dispute in regards to its implementation will be deemed a fit matter for discussion between the Sector Vice President and the Director of Security.

4. Not to be reproduced in the Collective Agreement
Effective January 1st 2003 a wage increase of 5% to make the rates of pay of Darlington Nuclear Security Officers equal to the rates of pay for the Pickering Nuclear Security Officers, at various steps, who elected for Skill Broadening.
Subsequent wage adjustments shall be as per the Collective Agreement.

5. Not to be reproduced in the Collective Agreement
   Effective the date of ratification of this agreement all Darlington Nuclear Security Officers shall be required to Skill Broaden as required by the Collective Agreement.

6. Not to be reproduced in the Collective Agreement
   Those employees who have completed 12 years of service by January 1, 2003 and who chose to utilize the provisions of the previous SPFPC provisions which allowed for the deferment and accumulation of any vacation entitlement beyond 15 days per year shall be permitted to continue to do so.

7. The Darlington Nuclear Security employees will have the option to vote for the reinstatement of Reduced Work Week entitlement (RWE). The Company will conduct the vote with the assistance of the Union prior to January 10th 2003. If less than 50% of the employees are in favour of RWE, then all employees will continue to work and be paid 40 hours per week. If 50% or greater of the employees are in favour of RWE, then only those employees who chose reinstatement of RWE, will work 40 hours per week but be paid for 39 hours per week. This will result in employees accumulating 52 hours per year which will be taken as time off with pay.

8. The PWU hereby agrees to withdraw the currently outstanding grievance with respect to the Darlington Security Officers and agrees to save The Company harmless from any claims that may be made by the SPFPC including The International Union of the Security, Police, Fire Professionals of America.

9. In consideration of 8 above, without prejudice to either parties position on the merits of the grievance, the regular Darlington Nuclear Security Officers employed by the Company on or after January 1, 2002 shall have their wages increased retroactively by 2.5%.
10. The Company agrees to provide clothing to the Darlington Nuclear Security Officers to maintain a professional level of appearance which shall be consistent with the current standards at Darlington. Concerns regarding the adequacy of maintaining this appearance may be discussed between the Sector Board Chair of the PWU and the Director of Nuclear Security.

Dated this 12th day of December, 2002 at Toronto

[Signatures]

OPG  

PWU
Attachment #6 – GEN-PW-1001-7:

Mid-Term Agreement

Number: GEN-PW-1001-8

Original Date: 04/01/2006
Revision Dates: 04/011/2009; 03/20/2012
Last Revised: XX/XX/20XX
Obsolete Date:

It is jointly agreed that the following Mid-Term Agreement shall form part of the Collective Agreement between the parties ONTARIO POWER GENERATION INC. hereinafter referred to as "OPGI" and POWER WORKERS' UNION hereinafter referred to as "PWU":

Article 11 Alternative (Non-Nuclear)

The following process may be used as required by OPGI as an alternative to the triggering of Article 11.

1. OPGI will consult with the Union prior to the implementation of this process and identify affected classification(s) within a worksite(s) as defined by Article 11, worksite(s) and/or organizational units. For the purpose of this Mid-term the organizational units is are defined as:
   - A Head Office Function reporting to a Direct Report to the President Corporate Function reporting to a Director level or above;
   - A Thermal Generating Station Hydro / Thermal Operations reporting to a direct report of the SVP Hydro/Thermal Operations Plant Manager;
   - A Hydroelectric Group reporting to a Plant Group Manager;

2. All job challenges will be frozen until the end of the offer period (not to exceed 30 calendar days).

3. Management may approach all employees in an affected classification in a worksite and/or organizational unit and offer them the opportunity to participate in a voluntary severance program as outlined below. At the time of the offer, employees who are eligible for an undiscounted pension will be provided with detailed pension calculation (including commuted value). At the time of that offer, all other employees will receive an estimated pension and commuted value calculation.

4. The voluntary separation program will consist of the following:
   a) Severance Pay
      An employee may direct all or a portion of his/her payment into an RRSP up to the amount permitted by law. The employee shall provide the Company with the TD2 Form directing the payment into his/her RRSP. An employee entitled to severance pay may elect to take a lump sum severance payment, or severance may be divided into two (2) equal installments, the first on the date of termination and the second on or about January 15 of the following year. Severance will be calculated in accordance with the following, Subject to statutory deductions the employee will receive;
      - The "cash-out" equivalent of five months base pay, plus;
- 4 weeks base pay per year of service, (payments for incomplete years of service will be pro-rated) to a maximum 104 weeks plus;
- 2 weeks base pay per year of service of 21 years or greater, (payments for incomplete years of service will be pro-rated);

The combined total of the above not to exceed 120 weeks.

For regular part-time employees severance payments shall be pro-rated.

b) Benefit Continuance/Tuition/Outplacement Services

An employee who takes severance pay and terminates his/her employment is entitled to:

i) Coverage under the Company’s Health and Dental Plan for a period of nine (9) months from the date of termination of employment or until the commencement of alternate employment whichever occurs first;

ii) Reimbursement for tuition fees and other associated expenses up to a maximum of $5000.00 (less applicable statutory reductions) upon production of receipts from an approved educational program within 24 months of his/her termination;

iii) Outplacement services; the Company will determine the level of service and the service provider.

5. Employees will be given 7 calendar days to submit a written statement of willingness to accept the separation offer as described in the program;

6. OPGI may accept as many employees as it deems appropriate but is not obliged to accept all employees who are willing to accept the separation offer. Employees will be accepted in order of seniority by classification in a worksite and/or organizational unit. Such acceptances will be made following the seven day period in paragraph 5 above, but prior to the end of the 30 day period in paragraph 2 above.

7. Employee statements of willingness to accept the offer will be voluntary. However, once the written statement of willingness is submitted, it will be irrevocable. In the case of a dramatic and serious change in circumstances of an employee who has accepted the separation offer, the employee may rescind his/her statement of willingness before the date of his/her termination. Any dispute arising from this provision may be resolved by expedited mediation/arbitration before G. Charney the Chief Arbitrator.

8. Normally, employees accepted under paragraph 6 will terminate two weeks following acceptance, except as outlined in paragraph 9 and paragraph 10 below.

9. The date of termination and receipt of the separation payments and/or entitlement as set out in paragraph 4 may, by exception, be delayed by OPGI for up to 21 months. Delays beyond 21 months would require agreement of the PWU and employee. Employees on a rotation greater than 21 months within another organizational unit may be required to complete their rotation prior to termination.

10. Employees will be allowed to delay their termination date (non working bridge) for a period not to exceed an individual’s severance in order to achieve one of the following pension milestones:
- Twenty-Five (25) years service
- Rule of 82
- Or age 65

Employees who avail themselves of this option will have their severance reduced by the amount of time elapsed between the date of acceptance of request to terminate and their actual termination date.

11. Whether delayed or not, employees accepted for termination under paragraph 6 will not be part of any subsequent Article 11 or other downsizing provision.

12. Separation monies will be calculated as per the date of termination. The base rate used will be no less than the base rate on the date of offer acceptance.

13. None of the work performed by employees who have accepted a separation package under this Mid-Term shall be assigned by the employer to any non-PWU employee of OPG unless otherwise agreed to by the PWU.

Any disputes arising under this provision over the assignment of work shall be jointly discussed between representatives of the PWU and OPG using the principles set out in the Tripartite Partnership Agreement. Any disputes that cannot be jointly resolved shall be referred to Gerald Charney the Chief Arbitrator for expedited mediation/arbitration.

14. Prior to termination, the employee will be required to sign a full release and indemnification that will include an agreement not to apply to vacancies within OPG or accept a position in OPG.

15. This agreement expires on March 31, 2018.

16. If, during the term of this agreement, changes are negotiated to the voluntary separation provisions of the Society collective agreement and these changes alter the relationship established between the monetary amounts provided to the PWU and Society, OPG and the PWU agree to re-adjust this Mid-Term to establish the relative monetary relationship between the two Unions.

17. Severance payments made under this Mid-Term satisfy all employer obligations for notice and severance pay under the provisions of the Employment Standards Act and Regulations including those applicable to mass terminations.

18. OPG and the PWU will form a Voluntary Surplus Committee (VSC) which will seek ways to maximize the number of voluntary departures. The committee will design a process to seek 'without prejudice' applications from employees who are interested in voluntary termination which will provide as much information to employees as possible regarding their opportunities for meaningful work to bridge to a milestone. This process may include a one on one meeting between the employee and their manager in order to investigate his/her options thoroughly.

The joint process will look for ways to use this Mid-Term and the above process, as well as the Collective Agreement, in the most effective manner. This could include replacing temporary/contract positions and arranging for exchanges between employees willing to accept Voluntary Surplus and employees seeking ongoing work.
The VSC will include members from Management and the PWU and will be Co-chaired by the Vice President - Labour Relations and by the PWU Vice President(s).

The parties hereto have caused this Agreement to be executed as of the date first written above.

______________________________  ______________________________
Ontario Power Generation Inc.    POWER WORKERS' UNION

______________________________
DATE
Attachment #7 – NUC-PW-1001-6:

Mid-Term Agreement

Number: NUC-PW-1001-7

Original Date: 04/01/2006
Revision Dates: 04/01/2009; 03/20/2012
Last Revised: XX/XX/20XX
Obsolete Date:

It is jointly agreed that the following Mid-Term Agreement shall form part of the Collective Agreement between the parties ONTARIO POWER GENERATION INC. hereinafter referred to as "OPGI" and POWER WORKERS' UNION hereinafter referred to as "PWU":

Article 11 Alternative (Nuclear)

The following process may be used as required by OPGI as an alternative to the triggering of Article 11.

1. OPGI will consult with the PWU prior to the implementation of this process and identify the affected classification(s) as defined by Article 11 within a worksite. For the purpose of this Mid-term the individual worksites are defined as:

   Pickering Nuclear Generating Station and associated buildings,
   Darlington Nuclear Generating Station and associated buildings,
   Business Services East and associated buildings,
   Head Office Staff reporting to a Vice President
   OPG employees located on the Bruce Site.

   NOTE: New worksites established by OPGI after the date of this agreement will be discussed with the PWU.

2. All job challenges and Management reviews will be frozen until the end of the offer period (not to exceed 30 calendar days).

3. Management may approach all employees in an affected classification in a worksite and offer them the opportunity to participate in a voluntary severance program as outlined below. At the time of the offer, employees who are eligible for an undiscounted pension will be provided with detailed pension calculation (including commuted value). At the time of that offer, all other employees will receive an estimated pension and commuted value calculation.

4. The voluntary separation program will consist of the following:

   a) Severance Pay
An employee may direct all or a portion of his/her payment into an RRSP up to the amount permitted by law. The employee shall provide the Company with the TD2 Form directing the payment into his/her RRSP. An employee entitled to severance pay may elect to take a lump sum severance payment, or severance may be divided into two (2) equal installments, the first on the date of termination and the second on or about January 15 of the following year. Severance will be calculated in accordance with the following:

Subject to statutory deductions the employee will receive;
- The "cash-out" equivalent of five months base pay, plus;
- 4 weeks base pay per year of service, (payments for incomplete years of service will be pro-rated) to a maximum 104 weeks plus;
- 2 weeks base pay per year of service of 21 years or greater, (payments for incomplete years of service will be pro-rated);

The combined total of the above not to exceed 120 weeks

For regular part-time employees severance payments shall be pro-rated.

b) Benefit Continuance/Tuition/Outplacement Services

An employee who takes severance pay and terminates his/her employment is entitled to:

i) Coverage under the Company's Health and Dental Plan for a period of nine (9) months from the date of termination of employment or until the commencement of alternate employment whichever occurs first;
ii) Reimbursement for tuition fees and other associated expenses up to a maximum of $5000.00 (less applicable statutory reductions) upon production of receipts from an approved educational program within 24 months of his/her termination;
iii) Outplacement services; the Company will determine the level of service and the service provider.

5. Employees will be given 7 calendar days to submit a written statement of willingness to accept the separation offer as described in the program;

6. OPGI may accept as many employees as it deems appropriate but is not obliged to accept all employees who are willing to accept the separation offer. Employees will be accepted in order of seniority by classification in a worksite. Such acceptances will be made following the seven-day period in paragraph 5 above, but prior to the end of the 30-day period in paragraph 2 above.

7. Employee statements of willingness to accept the offer will be voluntary. However, once the written statement of willingness is submitted, it will be irrevocable. In the case of a dramatic and serious change in circumstances of an employee who has accepted the separation offer, the employee may rescind his/her statement of willingness before the date of his/her termination. Any dispute arising from this provision may be resolved by expedited mediation/arbitration before G. Charney.

8. Normally, employees accepted under paragraph 6 will terminate two weeks following acceptance, except as outlined in paragraph 9 and paragraph 10 below.
9. The date of termination and receipt of the separation payments and/or entitlement as set out in paragraph 4 may, by exception, be delayed by OPGI for up to 21 months from the date of offer acceptance by OPGI under paragraph 6. Delays beyond 21 months would require agreement of the PWU and employee. Employees on rotations greater than 21 months within another organizational unit may be required to complete their rotation prior to termination.

10. Employees will be allowed to delay their termination date (non working bridge) for a period not to exceed an individual's severance in order to achieve one of the following pension milestones:

- Twenty-Five (25) years service
- Rule of 82
- Or age 65

Employees who avail themselves of this option will have their severance reduced by the amount of time elapsed between the date of acceptance of request to terminate and their actual termination date.

11. Whether delayed or not, employees accepted for termination under paragraph 6 will not be part of any subsequent Article 11 or other downsizing provision.

12. Separation monies will be calculated as per the date of termination. The base rate used will be no less than the base rate on the date of offer acceptance.

13. All work performed by employees who have accepted a separation package under this Mid-term shall be assigned by the employer to members of the PWU so long as such work continues to be done.

This provision applies to the application of this Mid-term only and is not intended to restrict or alter the right of OPG to assign work and manage its business as set out in the PWU Nuclear Collective Agreement.

Any disputes arising under this provision over the assignment of work shall be jointly discussed between representatives of the PWU and OPG using the principles set out in the Tripartite Partnership Agreement. Any disputes that cannot be jointly resolved shall be referred to Gerald Charney for expedited mediation/arbitration.

14. Prior to termination, the employee will be required to sign a full release and indemnification that will include an agreement not to apply to vacancies within OPGI or accept a position in OPGI.

15. This agreement expires on March 31, 2018.

16. If, during the term of this agreement, changes are negotiated to the voluntary separation provisions of the Society collective agreement and these changes alter the relationship established between the monetary amounts provided to the PWU and Society, OPG and the PWU agree to re-adjust this Mid-Term to establish the relative monetary relationship between the two Unions.

17. Severance payments made under this Mid-Term satisfy all employer obligations for notice and severance pay under the provisions of the Employment Standards Act and Regulations including those applicable to mass terminations.
18. OPG and the PWU will form a Voluntary Surplus Committee (VSC) which will seek ways to maximize the number of voluntary departures. The committee will design a process to seek 'without prejudice' applications from employees who are interested in voluntary termination which will provide as much information to employees as possible regarding their opportunities for meaningful work to bridge to a milestone. This process may include a one on one meeting between the employee and their manager in order to investigate his/her options thoroughly.

The joint process will look for ways to use this Mid-Term and the above process, as well as the Collective Agreement, in the most effective manner. This could include replacing temporary/contract positions and arranging for exchanges between employees willing to accept Voluntary Surplus and employees seeking ongoing work.

The VSC will include members from Management and the PWU and will be co-chaired by the Vice President - Labour Relations and by the PWU Vice President(s).

The parties hereto have caused this Agreement to be executed as of the date first written above.

________________________________________
Ontario Power Generation Inc. Nuclear

________________________________________
POWER WORKERS’ UNION

________________________________________
DATE
ATTACHMENT #8

Mid-Term Agreement

Number: PW-38-1
Original Date: 03/29/89
Revision Dates: 09/13/2012
Last Revised: 01/15/2015
Obsolete Date:

It is jointly agreed that the following Mid-Term Agreement shall form part of the Collective Agreement between the parties:

Professional Engineering Year (P.E.Y.) Students

The Purpose of this agreement is to define the rights and benefits of Professional Engineering Year (P.E.Y.) students under the Collective Agreement.

This agreement will not be used to advance or infer rights not otherwise mentioned in this agreement.

Definition: A P.E.Y. student is employed for twelve (12) to sixteen (16) continuous months (give or take a week) and shall be paid in accordance with wage schedule 35.

1.0 P.E.Y. students will be entitled to the rights and benefits of temporary employees with the following amendments:

1.1 For purposes of Health Insurance Plan eligibility PEY students are considered to be Summer Students and are ineligible.

1.2 Employee status: The students shall retain their temporary employee status for the full duration of their P.E.Y. term.

1.3 Sick Leave: The student shall earn sick leave credits of one-half (1/2) day at 100 percent (100%) pay for each month of accumulated service to a maximum of eight (8) days.

1.4 Vacation: The student is entitled to two (2) weeks’ vacation after completion of twelve (12) months service; to be taken in accordance with General Item 4.1 Vacations, General Policy of the Collective Agreement

Payment for vacation shall be four percent (4%) of accumulated wages. Where it is mutually agreed, the student may take the above vacation payment in lieu of vacation at the expiry of the P.E.Y. term.
1.5 Wages:

(a) Students hired at the end of their third year of university shall be paid at Band 1, Step 4 as per Schedule 35 for the first 12 months, after which employee will be progressed to Band 1, Step 5.

(b) Students hired at the end of their fourth year of university shall be paid at Band 1, Step 6 as per Schedule 35.

1.6 All offer letters will be copied to the Chief Steward.

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Ontario Power Generation

Power Workers’ Union

DATE
ATTACHMENT #9

Mid-Term Agreement

Number: PW-47-2

Original Date: 04/01/92
Revision Dates: 07/19/94
Last Revised: 01/15/2015
Obsolete Date:

It is jointly agreed that the following Mid-Term Agreement shall form part of the Collective Agreement between the parties:

Professional Experience Year (PEY) Students

**Definition:** A PEY student is employed for approximately twelve (12) to sixteen (16) continuous months and shall be paid in accordance with wage schedule 35.

1. PEY students are hired for a learning work experience not to replace regular employees or to perform work of a PWU member on an ongoing basis. This is not intended to prohibit the student from performing work assignments. However, where these assignments amount to being placed in a position for which a wage or salary grade has been established, the student shall be paid the rate for that position.

2. Joint discussions will take place between local management and the chief steward resulting in an understanding and agreement of the work to be performed by the PEY students.

3. PEY students are temporary employees for the purpose of benefit and Collective Agreement administration with the following amendments:

   (a) **For purposes of Health Insurance Plan eligibility PEY students are considered to be Summer Students and are ineligible.**

   (b) The student shall commence with eight (8) days sick leave credits.

   (c) The student is entitled to two (2) weeks' vacation after completion of twelve (12) months service: to be taken in accordance with General Item 4.1 Vacations, General Policy Payment for vacation shall be four percent (4%) of accumulated wages.
4. Wage progressions will be at 12 month intervals.

5. PEY students will not be hired into a location which is being downsized.

6. All offer letters will be copied to the Chief Steward.

Ontario Power Generation

Power Workers’ Union

DATE
ATTACHMENT #10 – APPA Radiation Protection

Mid-Term Agreement
-between-
Ontario Power Generation Inc.
-and-
The Power Workers’ Union
Radiation Protection Technician II – Appendix A

This Mid-Term replaces and supersedes the provisions of the Appendix A Radiation Protection Technician II Pilot Agreement dated July 18, 2012.

The Pilot Agreement is hereby terminated and has no further force and effect.

Unless otherwise modified herein, all provisions of Appendix A of the OPG/PWU Collective Agreement will apply to the Radiation Protection Technician II classification.

1 – Scope of Application
This agreement shall apply to all Radiation Protection Technician II employees who perform radiation protection work supplementary to that work performed by PWU Regular Radiation Protection Technician II employees when such work is performed by OPG.

2 – Jurisdiction
This Mid-Term Agreement is not intended to alter any jurisdictional boundary between the PWU and the construction unions.

3 – Employment Practices, Hiring and Layoff
No regular OPG employee classified as a Radiation Technician I or Radiation Technician II will be laid off as a direct result of radiation protection work being performed pursuant to Appendix A of the Collective Agreement. For clarity, the parties agree that the provisions of Item 3 and Item 4.1 of Appendix A to the collective agreement do not apply to employees covered by this agreement. Nothing in this agreement is designed to interfere with the principal that most work of a continuing nature be done by regular employees.

NOTE - The following referral procedures only apply to Appendix A Radiation Protection Technician II employees. Whenever OPG requires additional Radiation Technician II employees the following requirements and process will apply:

A. A contact person will be designated by OPG for the purpose of co-coordinating employment as specified in this Agreement. OPG and the Union will appoint representatives who will administer the referral and employment of qualified employees.

B. OPG will notify the Union of future staffing requirements for all employees coming within the scope of this Agreement. The parties will meet regularly, and as far in advance as possible, to assess staffing needs and labour supply for upcoming work and to review the adequacy of the labour supply pool to meet OPG work programs. The parties will jointly recruit qualified individuals and new entrants into the labour supply pool in adequate numbers to meet OPG work programs.
C. OPG will provide training for new entrants and gap training as appropriate for labour supply pool participants who are qualified for non-OPG facilities. New entrants must successfully complete the appropriate training to become qualified in order to continue to participate in the labour supply pool.

OPG and the Union will pursue the possibility of joint training approaches with Bruce Power.

D. Hiring

The employment of qualified* workers shall be carried out on the following basis and sequence:

*A qualified worker is defined as individual who is:
   (1) SAC Security Cleared; AND
       a. holds or previously held a Green RPC qualification to work at one of OPG's Nuclear plants within the last 3 years; OR
       b. holds or previously held a Green RPC qualification to work at Bruce Power within the last 3 years and has provided OPG their current Bruce Power training records.

(i) Qualified workers shall be referred by the Union Hiring Hall Office.

(ii) OPG will submit to the Union an estimate of the total number of Appendix A resources required no later than six (6) months prior to the start of the work, or at a date mutually agreed upon by the parties. Within seven (7) days the Union will confirm whether it can fulfill all or part of this number at that time but without providing the names of employees.

(iii) OPG and the Union will discuss hiring and training new workers to address any shortfall and new workers will become members of the Union. In the event of a shortfall, the Steering Committee referenced in paragraph 6 below will attempt to ensure that an adequate resourcing plan is in place no later than six (6) months prior to the start of the work, or at a date mutually agreed upon by the parties. The Parties recognize there are likely to be unusual peak requirements at times (e.g. multiple overlapping outages) when it is sensible to utilize a contractor rather than oversize the labour supply pool. Subject to agreement on an adequate resourcing plan, the PWU will agree to a contingency PSA to address such requirements. If the parties cannot agree on an adequate resourcing plan, the matter shall be brought to the Steering Committee for resolution within seven (7) days of the matter being referred by either party. If there is no agreement at the Steering Committee, the issue will be referred to the Chief Arbitrator, or his designate for expedited resolution. The hearing will be scheduled and all disputes on the adequacy of the resourcing plan and PSA will be resolved by the Arbitrator within 15 days of referral.

(iv) OPG will submit the actual Help Requisition form at least 30 days prior to the start of the work. The Help Requisition form will specify the precise number of qualified employees required. OPG shall have the right to request Union members by name in writing. The number of employees requested shall not exceed twenty-five percent (25%) of the total number of employees referred in response to a Help Requisition. This request will normally include the start date, location, expected shift, and duration of employment.

(v) The Union will refer appropriately qualified members in the following sequence:
1) Members who do not require OPG gap training*
2) Members who require OPG gap training*
3) Members who are new entrants to the hiring hall**

*For purposes of this section, gap training refers to members who have worked for other employers but require identified gap training to bring them to OPG training standards. For clarity, gap training does not include training re-qualifications.

**New entrants may only be referred by mutual agreement of the parties. New entrants may be referred prior to other members where it makes sense to do so due to training needs in order to maintain an adequate labour supply.

(vi) Within three (3) working days of receiving the Help Request referred to in D (iv) above the Union will notify OPG whether it can provide the total number of requested employees. This response will provide a list of names of employees referred. If the Union is unable to provide the requested number of qualified workers, OPG may source the required resources in any manner it sees fit (for clarity, nothing in this agreement requires contractor staff to become members of the Union). OPG will consider additional referrals from the hall after the three (3) working days and prior to the start of the work, provided that OPG has not otherwise met its staffing requirements.

vii) On June 1st and December 1st of each year the Union will provide the OPG contact person referred to in 3(A) above with an updated list of all qualified employees that may be available for referral.

E. Layoff

When work at a Site is unavailable, OPG may elect to layoff qualified members referred under this Mid-Term. In all cases of layoff OPG shall layoff within the classification employed at the Site.

The purpose of this Section is to ensure fair and equitable treatment of employees to be laid off:

(i) The retention of employees who are members of the Union and covered by this Agreement in OPG’s service shall be governed by this Section.

(ii) Employees to be retained must have the necessary qualifications, skills and have demonstrated the ability to satisfactorily perform the work to be done.

(iii) In the event of a reduction of staff, employees who are not members of the Union (ie; contractors, BTU) shall be laid off prior to employees who are members of the Union.

(iv) An employee who voluntarily terminates his or her employment shall not be entitled to be referred out to OPG for a period of thirty (30) days unless agreed to by the parties.

(v) A laid off employee will be issued a Record of Employment Form indicating “layoff - shortage of work” dating back to his/her first day of layoff.

4. Selection to Vacancies
PWU represented members who have performed work for OPG pursuant to this Mid-Term Agreement will be entitled to apply to any advertised vacancy for a Regular Radiation Technician II positions for which they are qualified and will be considered after regular employees but before external applicants.
5. **Wage Rate** - Radiation Protection Technician II

The rates in place effective date of signing will continue until the expiry of the current Collective Agreement on March 31, 2015 and any adjustment will be subject to collective bargaining.

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April 1, 2014

Net Hourly Rate $36.75
Vacation and Statutory Holiday Pay $3.67
Health and Welfare $3.00
Retirement Program $4.25
Total Wage Package $47.67
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PWU Union dues, initially established at $0.85 per hour, will be deducted from the Net Hourly Rate.

6 - **Steering Committee**

The Steering Committee will consist of two (2) representatives from OPG and two (2) representatives from the Union. Additional resources may be utilized by the Committee as required. The Committee will review and resolve issues related to Radiation Protection Technician II – Appendix A, including but not limited to items such as resource forecasting, hiring and training. The Committee will meet every six months or as required.

7 – **Work Schedules**

Appendix A employees referred under this Mid-Term shall be required to work all approved schedules and/or voluntary outage schedules utilized by OPG during outages and are not eligible for outage bonus payments.

8 – **Term of Agreement**

This Mid-Term Agreement is effective April 1, 2015.

Signed ________________________________

For the PWU ________________________________ For OPG
ATTACHMENT #11 – Pickering End of Commercial Operations (PECO)

Mid-Term Agreement

Number: NUC-XX-XXXX
Original Date: 04/11/2015
Obsolete Date:

It is jointly agreed that the following Mid-Term Agreement shall form part of the Collective Agreement for the term of the 2015 renewal agreement between the parties. Nothing in this agreement is intended to be in conflict with the CPAA. In the unlikely event any portion of the agreement is ruled to be in violation of the CPAA, all provisions of this agreement that relate to Trades shall be null and void.

It is understood that the use of “Term Employees” as referenced in this Mid-Term is subject to the approval of a pension plan amendment by FSCO. Should such amendment application be denied the entirety of this Mid-Term shall be null and void.

Pickering End of Commercial Operations (PECO)

Context

OPG has announced an intention to cease commercial operations at the Pickering Nuclear Generating Station (PNGS). The current projection for plant shutdown is December 31, 2020, and will result in significant job loss. The parties acknowledge that the cessation of commercial operations at PNGS may ultimately occur at a different date.

In light of the announcement, the parties are jointly committed to addressing issues related to the staff reductions resulting from the cessation of PNGS commercial operations. Given the uncertainty regarding the ultimate shut down date, it is understood that the parties cannot codify redeployment and/or severance commitments tied to specific milestones associated with the announced shut down until such time as that certainty exists. The parties do, however, recognize a mutual requirement to achieve the following objectives from now and until staff are no longer required:

Objectives

- Mitigate the number of involuntary layoffs;
- Ensure that an adequate number of qualified employees are available to facilitate the continued safe operation of PNGS until the plant is placed into a safe shutdown state;
- Ensure that an adequate number of qualified employees are in place to ensure the continued safe operation of the Darlington Nuclear Generating Station (DNGS) and minimize operational impacts to DNGS when PNGS is safely shutdown;
- Minimize external hiring into regular PWU bargaining unit positions so as to minimize the requirement for staff turnover and/or involuntary layoffs when PNGS ceases commercial operations;
• Use Term employees* to minimize the requirement for staff turnover and involuntary terminations when PNGS ceases commercial operations;

• Facilitate the release of qualified PNGS employees, and qualified employees supporting PNGS, to work at or supporting DNGS, OPG’s Nuclear Waste Organization, or vacancies at other OPG locations.

• Ensure that staff surplus to OPG’s operational requirements are provided with reasonable voluntary and involuntary severance options upon termination of employment.

*Term employees defined below

For the term of the collective agreement, the parties agree to the following in order to facilitate achievement of the objectives listed above:

Term Employees

The parties mutually recognize the benefits of a managed staffing process where non-regular staff can be utilized to meet OPG’s work program and thereby mitigate the disruption and costs associated with deployment and involuntary terminations when Pickering is shut down. In addition to the continued use of short-term staffing options (i.e. Temporary employees, Appendix A) a core element of this strategy will be the use of a new category of employees, defined herein as “Term employees”. The use of Term employees is expressly linked to the longer term temporary staffing needs related to the announced end of PNGS commercial operations, and nothing in this agreement is designed to interfere with the assignment of Appendix A employees to temporary work associated with supplementary maintenance, repair and other PWU assigned work.

Consistent with the process set out below in this Mid-Term, the PWU shall be responsible to provide OPG with qualified Term employees as required. OPG and the PWU will jointly establish and maintain a pool of qualified and acceptable Term employees. Within thirty (30) days of the ratification of the collective agreement representatives from OPG’s staffing organization will meet with PWU representatives to discuss and develop recruitment and referral processes.

The parties agree the following terms and conditions of employment shall apply to Term employees, effective on the date of ratification:

1. Term employees may be hired to avoid adding regular staff in circumstances where additional regular employees are likely to be laid off as a result of Pickering’s end of commercial operations. Term employees are hired with the understanding that they have no expectation of ongoing employment once PNGS ceases commercial operations.

In these circumstances, Term employees may be used to backfill positions at or supporting Pickering, or hold positions at or supporting other OPG-N locations until regular employees are available.

Where an employee cannot be released to a position, they will be selected on paper and a Term employee may be hired to hold that position until they can be released. It is understood that in the event an employee cannot be released to a position, the employee is not entitled to travel
time or mileage as a result of being deemed to be an employee at the worksite where the vacancy exists.

Where the delay in transfer for a trades employee is anticipated to be less than twenty (24) months and hiring at the receiving location is necessary, Appendix A trades employees will be referred in lieu of Term employees.

Where an employee is released and someone is required to fill that position until Pickering is safely shutdown, that position may be backfilled using a Term employee.

2. Term employees will be assigned to work that falls within the scope of existing PWU job documents and perform the work of the classifications listed in Appendix I to this Mid-Term.

3. Term employees will be hired for the anticipated duration of the assignment and shall have seniority only in respect of the layoff of other Term employees. In the event of layoff, employment retention shall be by seniority within a classification at a worksite as defined by the Appendix A to Article 11.

4. Discipline and Discharge

The Discipline and Discharge provisions for Term Employees are set out below, and unless specifically incorporated herein the provisions of Articles 2.5, 2A and 3 of the collective agreement will not apply in respect of Term Employees.

Unless otherwise agreed to, after a letter of reprimand on an employee’s file for a maximum of two years, and there have been no further occurrences, then the letter(s) of reprimand will be removed from all files.

5. Discipline Process

a) Prior to the imposition of any disciplinary penalty, the Company shall hold a Disciplinary Interview, which shall replace Step 1 of the grievance process.

b) The Company shall provide the Union and any Term employees who may be disciplined two (2) days’ notice of the Interview.

c) The Interview shall take place between the Company, the Union and the accused individual. The Company shall notify the Union and employee of the substance of the allegations and, except where the allegations could constitute a criminal offence the individual(s) shall set out their version of the events.

d) On the day following the interview the Company may proceed to issue a disciplinary penalty. Should the Company choose to impose discipline, the Union has ten (10) days to file a grievance commencing at Step 2. The grievance process for all letters of reprimand or suspension shall commence at Step 2 of the grievance procedure and will proceed before the appropriate Grievance Review Board as per Article 2.4 of the collective agreement. All grievances alleging unjust discharge will proceed directly to Expedited Arbitration as per Article 3.3 of the collective agreement.
e) Nothing in the disciplinary interview process is intended to interfere with the Company’s right to investigate matters.

6. Term employees will not be used to circumvent the CPAA and will have the same terms and conditions as regular employees subject to paragraphs 7 and 8 below. Where it is anticipated that trades employees, in the classifications listed in Appendix A of the collective agreement will be required for greater than two years, OPG may utilize Term employees. Otherwise trades employees will be referred through Appendix A.

7. Term employees will be entitled to the following:

a) All wage packages outlined below are subject to negotiated increases in the 2015-2018 Collective Agreement.

Subject to the pay treatment outlined for former OPG employees in receipt of a pension as set out below, Term Employees shall be hired and paid as per the following Wage Schedule:

<table>
<thead>
<tr>
<th>Band 1 (Term)</th>
<th>Step 0</th>
<th>Step 1</th>
<th>Step 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$28.24</td>
<td>$32.87</td>
<td>--------------</td>
</tr>
<tr>
<td>Band 2 (Term)</td>
<td>Step 0</td>
<td>Step 1</td>
<td>Step 2</td>
</tr>
<tr>
<td></td>
<td>$31.11</td>
<td>$35.40</td>
<td>$40.02</td>
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<tr>
<td>Band 3 (Term)</td>
<td>Step 0</td>
<td>Step 1</td>
<td>Step 2</td>
</tr>
<tr>
<td></td>
<td>$40.37</td>
<td>$45.74</td>
<td>$51.46</td>
</tr>
</tbody>
</table>

Progressions from step to step will be annual.

Rates include vacation/statutory holiday pay. Deductions from this wage rate for dues, benefit and retirement fund to be remitted in the amounts prescribed by the PWU.

**Former OPG Employees in Receipt of a Pension**

Former OPG employees in receipt of a pension who are hired into the same classification they occupied prior to leaving OPG will be placed at the band and step at which they left.

Deductions from this wage rate for vacation pay and dues to be remitted in the amounts prescribed by the PWU. These Term employees will be entitled to Statutory Holiday pay as per Part A, Item 7 of the collective agreement.

Where Term employees in Trades classifications are not available in sufficient numbers, Term employees anticipated to be employed in a Trades classification for a period of greater than two (2) years will be recruited from the BTUs and will be paid at Appendix “A” rates and classified as Term Employees. Trades employees who are anticipated to be employed for a period of less than two (2) years, will continue to be recruited through the CPAA process and paid at Appendix
“A” rates.

a) Sick leave entitlement will be limited to an accumulation of one-half day per full month worked.

b) Severance of two weeks per year of service (prorated for a partial year) to be paid upon termination of employment for other than cause. This entitlement is inclusive of any rights to notice or severance under the ESA.

c) Employees may take up to 20 unpaid days of vacation annually. While effort will be made to grant vacation dates requested by Employees, the Company reserves the right to determine when vacation may be taken. Former OPG employees in receipt of a pension may take up to 30 unpaid days of vacation annually.

d) Entitlement to statutory leaves (e.g. Pregnancy/parental) will be governed by ESA.

8. The following exceptions shall apply to Term employees:

a) No rights under the collective agreement to apply to vacancies.

b) Do not have preference over external applicants to vacancies in regular positions within the Company. In the event a Term employee is selected to a regular vacancy, their accumulated Term service shall be recognized as service credit. For clarity, there is no entitlement to service credit for pension plan purposes. Former OPG employees in receipt of a pension are not eligible to be hired as a regular employee.

c) Not entitled to the Health/Dental Benefits under the collective agreement.

d) Not entitled to Long-Term Disability under the collective agreement.

e) Not entitled to Pension and Insurance Benefits under the collective agreement and are not eligible to join the OPG Pension Plan.

f) Not entitled to Transportation and Moving Expenses under the collective agreement.

g) Not entitled to external training opportunities or reimbursement for any such external training.

h) Not entitled to participate in any existing preference process regarding assignment to shifts or work assignments.

i) No rights under Article 11.

Staffing Process

OPG acknowledges that the Union’s interest in obtaining the details of staffing plans leading into and associated with PECO.
The parties agree to meet to discuss ongoing staffing plans for regular, temporary and term employees in a meaningful way. Quarterly meetings will be established with senior Union and management participation. The parties agree to exchange staffing information and have discussions regarding changes related to PECO, Darlington refurbishment and opportunities to mitigate the impact of OPG’s decreased staffing demands. OPG commits to disclosing and discussing any staff redeployment/severance plans, prior to implementation.

During the term of the collective agreement OPG will continue to utilize a staffing review process to determine staffing requirements within the Nuclear organization. This Mid-Term provides OPG with the discretion to move staff within Geographic Area 5/ Location 2 (see Appendix A to Article 11) to ensure the continued safe and efficient operation of OPG’s Nuclear fleet. For clarity, until such time as PNGS is placed in safe shutdown the Worksite/Location Redeployment provisions of Article 11.0(1) will be amended to permit OPG the discretion to deploy staff, as outlined below, within a job classification to worksites within Geographic Area 5/Location 2.

With the exception of supervisory vacancies, the deployment process would replace moves that would normally take place under Article 10 and 11.0 and should not to be used for short-term peaking work demands.

Vacancies that are not filled through the deployment process above shall continue to be advertised as per Article 10.

Vacancies in supervisory positions shall continue to be advertised as per Article 10.

Deployments will be initiated via request for volunteers and will be based on seniority, skills and qualifications required (senior choice/junior force).

Employees at Location 2, worksite 3 who elect to be deployed or are selected to positions outside Location 2, worksite 3 (as per Appendix A to Article 11) waive their right to accept a voluntary severance option under the Alternative to Article 11 Mid-Term related to PECO. OPG retains the exclusive right to relieve against this restriction.

Once OPG has determined its requirement for the movement of regular staff, OPG will notify the PWU of any resultant requirement for Term employees through a Term Help Requisition process as set out below:

- Once OPG has notified the PWU of the Term Help Requisition, the PWU will have sixty (60) days to provide qualified Term employees from the pool of acceptable candidates in each of the requested classifications in sufficient quantities to meet the Requisition. Should the PWU be unable to provide adequate resources OPG may source the required resources in any manner it sees fit (for clarity, nothing in this agreement requires contractor staff to become members of the Union).
- The PWU will ensure that all Term employees referred to OPG have the required skills, training and qualifications to perform the required work.
- The PWU will ensure that all Term employees referred have the appropriate level of Security Clearance required to perform the required work.
- The PWU will not refer former OPG employees who selected a full commuted pension option.
- OPG will inform the appropriate Chief Steward when a Term employee is hired or laid off.
All regular PWU represented employees may continue to apply to vacancies outside of the Nuclear organization in accordance with the collective agreement. Based on requirements at the affected station, management will determine the release date for employees as per Article 10.1.3 (b)(2). If the new position is a promotion, the employee shall be paid the rate for the new position 90 days following the acceptance of the offer. Term employees can be used to facilitate release of nuclear employees.

For the term of this agreement, NUC-PW-1026-1 and Part G, Item 27 will be suspended.

**Training for External Opportunities**

In recognition of the anticipated involuntary job loss associated with PECO, OPG is prepared to provide financial assistance to eligible employees for external training for employment opportunities outside of OPG. Following communication of post-PECO staff information to the PWU, and subject to operational requirements, such employees may be permitted to request paid time off from work to attend such training and such time to be deducted from severance entitlements under Article 11. OPG will also consider reimbursement at 100% of the cost of registration/tuition fees and learning material costs for external training that create capability for future jobs outside the Company.

OPG and the PWU jointly commit to approach to the Building Trades Unions (BTU) to explore options whereby qualified OPG employees who face job loss as a result of PECO are provided with an opportunity to become members of BTU hiring halls.

**Voluntary Severance Options**

During the term of the collective agreement OPG retains the right to utilize the Alternative to Article 11 Mid-Terms to reduce staff where OPG determines such reduction is appropriate.

If OPG elects to run the Alternative to Article 11 midterms as a direct result of the shutdown of unit(s) at PNGS, OPG will offer the VSP to eligible employees at both PNGS and surrounding buildings and DNGS and surrounding buildings and may consider a broader application where OPG deems necessary.

**Article 11 Surplus Staff Procedure**

The existing division between Nuclear and non-Nuclear remains in effect.

**Duration**

This Mid-Term agreement expires upon the end of the term of the current collective agreement and shall not be renewed or amended unless the parties specifically agree to do so through subsequent collective bargaining.
APPENDIX I

Term Classifications and Wage Rates (addition/deletion of classifications and wage rates to be discussed)

Skilled Trades

- Mechanical Maintainers
- Control Technicians
- Civil Maintainers

Operators

- Authorized Nuclear Operators
- Nuclear Operators

Clerical and Administration

- Clerical 1
- Clerical 2

Emergency Services

- Nuclear Security Officers (Unarmed) – need to have discussion around including this classification for Refurbishment
- Emergency Response Maintainers (Fire Protection)

Technical

- Project Technicians
- Chemical Technicians
- Drafting
- Planning/Cost Scheduling Technicians
- Radiation Protection Technicians
- Training Technicians
- Assessor (Technicians)

At the request of the OPG VP of Labour Relations or the PWU Vice President, the parties will meet to discuss the merits of adding any new classification(s).
**SEC Interrogatory #72**

**Issue Number: 6.6**

**Issue:** Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

**Interrogatory**

**Reference:**

[F4/3/1, p.8]

Please provide a breakdown of the cost impact (additional cost and/or savings) for each of the negotiated collective agreements with the PWU and the Society, for each of the following time periods: i) the term of the current collective agreement, ii) the test period, and iii) the total impact if the change extends beyond the test period. Please detail all assumptions made and the full calculations.

**Response**

The negotiated changes to collective agreements are detailed in Ex. L-06.6-15 SEC-071. Chart 1 and Chart 2 below provide the estimated cost impacts (for the nuclear facilities) arising from the negotiated collective agreements with each of the PWU and the Society, respectively, for the term of the agreements. This information is split out between the period preceding the IR Term and the period included within the IR Term. Information beyond the current terms of the collective agreements is not provided, as the collective agreements may change beyond this timeframe based on future bargaining (see Ex. L-06.6-15 SEC-70). Information beyond 2021 is not provided because it is not relevant to the OEB’s determination of the revenue requirement and payment amounts in this proceeding.

The impacts of pension reform related items are shown separately in each of the two charts. The costs/savings related to pension reform were not considered as part of achieving the Government mandate of ensuring any compensation issues would reflect an overall net neutral cost to the electricity ratepayers. As such, any changes to pension contributions and benefits could not count as offsets for the purposes of calculating net zero (see L-06.6-1 Staff 147, Attachment 1 and Ex. F4-3-1, p.15, lines 16-23).

While allocations were made to present information below for the nuclear facilities for the purposes of the rate application, the Government assessed the results from the collective bargaining on a total OPG basis, determined at the time of bargaining.
## Chart 1
**PWU Collective Agreement Impacts (Attributed to Nuclear)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Costs / (Savings) $M</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Non-Pension Reform Related Items:</strong></td>
<td>Apr 1, 2015 to Dec 31, 2016 (a)</td>
</tr>
<tr>
<td>3-Year Wage Increases at 1%/year</td>
<td></td>
</tr>
<tr>
<td>250-Hour Purchased Services Threshold</td>
<td></td>
</tr>
<tr>
<td>Nuclear Outage Purchased Services Agreement</td>
<td></td>
</tr>
<tr>
<td>Radiation Protection Technician (RPT) Appendix A Midterm</td>
<td></td>
</tr>
<tr>
<td>Project Technician Purchased Services Agreement</td>
<td></td>
</tr>
<tr>
<td>Temporary Work Headquarters Travel Time Provisions</td>
<td></td>
</tr>
<tr>
<td>Minor Benefit Improvements</td>
<td></td>
</tr>
</tbody>
</table>

**Pension Reform Related Items:**

| Increased Employee Pension Contributions                           |                       |                       |                                       |
| Lump Sum Payments                                                 |                       |                       |                                       |
| Hydro One Share Performance Plan                                  |                       |                       |                                       |

*Numbers may not add due to rounding*
### Chart 2
Society Collective Agreement Impacts (Attributed to Nuclear)

<table>
<thead>
<tr>
<th>Item</th>
<th>Costs / (Savings) $M</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jan 1 to Dec 31, 2016 (a)</td>
</tr>
<tr>
<td><strong>Non-Pension Reform Related Items:</strong></td>
<td></td>
</tr>
<tr>
<td>3-Year Wage Increases at 1%/year^1</td>
<td></td>
</tr>
<tr>
<td>Purchased Services Agreement LOU #193^2</td>
<td></td>
</tr>
<tr>
<td>Overtime PWU Rate Equivalency^3</td>
<td></td>
</tr>
<tr>
<td>Hours of Work Averaging Permit^4</td>
<td></td>
</tr>
<tr>
<td>Minor Benefit Improvements</td>
<td></td>
</tr>
<tr>
<td>Elimination of Band N Goal Sharing Equivalent Payment</td>
<td></td>
</tr>
<tr>
<td>Other Miscellaneous Items</td>
<td></td>
</tr>
<tr>
<td><strong>Pension Reform Related Items:</strong></td>
<td></td>
</tr>
<tr>
<td>Increased Employee Pension Contributions^5</td>
<td></td>
</tr>
<tr>
<td>Lump Sum Payments^6</td>
<td></td>
</tr>
<tr>
<td>Hydro One Share Performance Plan^7</td>
<td></td>
</tr>
</tbody>
</table>

Numbers may not add due to rounding

Notes:
SEC Interrogatory #73

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:

[F4/3/1, p.8]

Did OPG receive any instructions from its shareholders regarding the negotiations of its most recent collective agreements? If so, please provide details, and copies of those instructions.

Response

Please refer to L6.6-1 Staff-147, Attachment 1 (Confidential).
SEC Interrogatory #74

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
[F4/3/1, p.8]

Please provide all documents, including but not limited to, strategies, proposals, memorandum, analysis, opinion and expert opinions, utilized during the negotiations of the last collective agreement with the PWU and the Society.

Response

OPG is providing its bargaining agendas relating to its bargaining with the Society and PWU in 2015 as Attachments 1 and 2 to this response. Both Attachments 1 and 2 will be filed confidentially in their entirety, in accordance with the OEB’s practice direction on confidential filings.

OPG declines to provide the balance of the requested information on the basis of relevance. The agendas attached indicate the topic areas that were the subject of negotiation. The outcomes of the negotiations are apparent on the face of the collective bargaining agreements that were concluded and which are publically filed. It is not possible to re-create the bargaining dynamic through the provision of the documents in this interrogatory. Moreover, what OPG could provide would be only one side of a bi-lateral process and so would have no probative value in deciding the issues on the approved Issues List.
L-6.6-15 SEC 074 ATTACHMENT 1
IS CONFIDENTIAL IN ITS ENTIRETY
L-6.6-15 SEC 074 ATTACHMENT 2
IS CONFIDENTIAL IN ITS ENTIRETY
Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
[F4/3/1, p.11]

Is OPG’s current executive compensation program in compliance with O. Reg. 304/16 made pursuant to the Broader Public Sector Executive Compensation Act, 2014? If so, please explain how. If not, please explain what changes are required and the expect cost impact.

Response

OPG is currently in compliance with Broader Public Sector Accountability Act, 2010 (Bill 55) with regards to compensation arrangement and compensation plans of designated executives and designated office holders as well as the employer’s performance pay envelopes. This is the relevant legislation. As it relates to O. Reg. 304/16, an employer, including OPG, has until September 5, 2017 to first post a compliant executive compensation program on its website, at which time the executive compensation program comes into effect. Prior to September 2017, OPG will ensure its executive compensation program is in compliance with the regulation.
Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
[F4/3/1, p.12]

With respect to any management employee's incentive plan:

a. Is OPG still using the Annual Incentive Plan (AIP) for management incentive pay? If so, please provide details of the plan. If not, please explain the new program.

b. Has the plan changed since 2012? If so, please explain how.

c. Please provide a similar chart to that of Figure 10 on p.168 of the 2013 Annual Report of Office of Auditor General of Ontario, showing the distribution of AIP scores for Executive and Senior Management (Bands A–F) and Below Executive and Senior Management (Bands G–L), for each year between 2013 and 2015.

d. For each year between 2016 and 2021, what assumptions is OPG making regarding the distribution of its AIP scores for the purposes of its setting its budget.

Response

a. No, OPG is no longer using the Annual Incentive Plan (AIP) for management incentive pay. OPG has replaced the AIP with a rebranded program: the Stakeholder Return Program (SRP). Details of the revised SRP program are provided in the Program brochure attached to this response as Attachment 1.

b. Yes, the AIP program has changed. Key changes included:
   • Rebranding AIP as the “Stakeholder Return Program” (SRP).
   • Reducing the number of metrics on the Corporate Balanced scorecard to increase the focus on key metrics and increase score variability by reducing diversification.
   • Eliminating Fleet scorecards for purposes of calculating incentive awards; Fleet metrics were incorporated into individual ELT and SLT scorecards.
   • Changing the scale (and descriptors) for individual performance ratings to provide increased granularity and drive more differentiation in individual results.

   In 2015, the 5-point rating scale was replaced with a 7-point rating scale. This new scale incorporated employees’ demonstration of OPG behaviours. This change made it easier
for managers to differentiate performance, strengthening the link between employees’ actual performance and their incentive payments.

c. OPG has prepared a similar chart to that of Figure 10 on p.168 of the 2013 Annual Report of Office of Auditor General of Ontario, showing the distribution of AIP scores for Executive and Senior Management (Bands A–F) and Below Executive and Senior Management (Bands G–L), for each year between 2013 and 2015. This chart is filed as Attachment 2 to this response. The assumptions for SRP budget setting are that both Corporate and individuals receive a score at target.
Stakeholder Return Program

SRP
Effective January 1, 2015

Stakeholder Return Program
In 2015, Ontario Power Generation’s Board of Directors approved revisions to the Stakeholder Return Program for Management Group employees. The program revisions help to reinforce OPG’s performance driven culture.

The intent of the program is to deliver a portion of total compensation paid to Management Group employees on a “pay-at-risk” or performance-linked basis. Under the program, eligible employees can earn annual payments if OPG’s key financial and operational objectives and individual performance targets are met during the program year.

The corporate scorecard identifies OPG’s performance priorities for the year to support its short and long-term business strategies and value creation.

Individuals will also have a personal scorecard that identifies their performance priorities for the year. Individual performance assessments will be based on the manager’s appraisal of the individual’s performance against scorecard deliverables, including the individual’s demonstration of OPG behaviours. Individual performance will also be assessed relative to peers to ensure consistent application of performance ratings. Staff will receive one of seven performance ratings.

Individual scorecards will consist of approximately five performance objectives. The performance objectives should follow the SMART principles (Specific, Measurable, Achievable, Realistic, Time-bound) and should be aligned with higher level scorecards whenever possible. Corporate goals will drive individual goals.

An overall score below threshold on the corporate scorecard means no one would receive a payment. If an individual’s rating is 1, that individual would not receive an SRP payment.

This brochure provides an overview of the program, a table outlining incentive opportunities and weightings for each performance rating, and sample SRP calculations. Further information is available from the HR Service Centre and on the Human Resources website.

This program is effective January 1, 2015, and covers the assessment of performance and determination of payments for a calendar year (i.e. January 1 to December 31).

OPG reserves the right to amend the program in whole, or in part, or to terminate the program at any time. On termination of the program, all rights under the program will cease, except with respect to any incentive payments authorized by the Board for payment prior to the date of program termination.

The individual incentive opportunity for each performance rating varies by Management Group band and is expressed as a percentage of annual base salary. An individual’s incentive payment will depend on OPG’s performance and the manager’s assessment of the individual’s performance.

Corporate performance impacts incentive payments by establishing the funding (corporate SRP pot) that is available for payments.

- The size of the corporate SRP pot fluctuates directly with the corporate score and the corporate pot sets an upper limit on how much can be distributed as payments.
Eligibility

All Regular employees in Management Group positions during the calendar year are eligible to participate in the program. However, excluding retirement, death, or disability, only those who are active employees of OPG on December 31 of the program year are eligible to receive an incentive payment.

If an employee changes base positions during the year, eligibility for the SRP and SRP percentages are pro-rated accordingly (i.e. moves into or out of Management Group, or changes MG band).

Scorecards

The program has two key components: corporate and individual performance.

1. Corporate – The corporate scorecard includes measures that the President and Board agree are key OPG objectives for the program year. The Board assesses the overall annual corporate performance to provide a corporate score.

2. Individual – Individual goals are set out in performance contracts during the first quarter of each program year. Managers work with their employees to establish individual goals aligned with the initiatives and objectives established for their business unit and OPG. OPG behaviors expected of management group employees will be incorporated into assessments and may impact performance ratings. How goals are achieved is as important as what is achieved. At year-end, managers assess results and determine the performance rating.

Before the individual performance ratings are communicated to employees and payments are finalized, a calibration process will occur to ensure consistent evaluation of employees’ performance across the organization and relative to peers.

Performance Measures and Weightings

To determine the individual incentive, the manager assesses individual performance against scorecard deliverables, considers demonstration of OPG behaviours and reviews overall performance relative to peers to place employees into one of the following seven performance categories:

1 = does not meet expectations
2 = meets minimal expectations
3 = developing/moderately meets expectations
4 = fully meets expectations
5 = exceeds some expectations
6 = exceeds most expectations
7 = exceeds all expectations
Figure 1 indicates the available incentive opportunity as a percentage of base salary for each band level based on the individual performance rating. This table assumes OPG achieved target performance.

<table>
<thead>
<tr>
<th>Performance Rating</th>
<th>A</th>
<th>B/C</th>
<th>D/E</th>
<th>F</th>
<th>G/H1/H2</th>
<th>I</th>
<th>J/K/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>9</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1.6</td>
</tr>
<tr>
<td>3</td>
<td>70</td>
<td>31.5</td>
<td>17.5</td>
<td>14</td>
<td>10.5</td>
<td>7</td>
<td>5.6</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
<td>45</td>
<td>25</td>
<td>20</td>
<td>15</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>110</td>
<td>49.5</td>
<td>27.5</td>
<td>22</td>
<td>16.5</td>
<td>11</td>
<td>8.8</td>
</tr>
<tr>
<td>6</td>
<td>125</td>
<td>56.3</td>
<td>31.3</td>
<td>25</td>
<td>18.8</td>
<td>12.5</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>150</td>
<td>67.5</td>
<td>37.5</td>
<td>30</td>
<td>22.5</td>
<td>15</td>
<td>12.0</td>
</tr>
</tbody>
</table>

Determination of SRP Budget

The SRP budget is determined through the following process:

**Step 1: Establish Corporate SRP Pot**

- Initial corporate SRP budget is established by assuming the corporate results are at target and all individual results are rated at 4 (fully meets expectations).
- The corporate score is used to adjust the SRP budget up or down to reflect corporate performance. The result is the current year corporate SRP pot.
- The corporate SRP pot sets an upper limit on how much we can spend on SRP payments.

**Step 2: Determine Individual Payment**

Once the corporate pot is set, the individual's performance rating is used to determine their preliminary SRP payment using the table presented in Figure 1.

The total amount to be paid under the SRP program must stay within the SRP pot.

If the sum of all preliminary individual amounts exceeds the SRP pot, every individual SRP amount is reduced proportionately to keep the total program cost within the SRP pot.

The process used to calculate individual SRP amounts is described on the next page, and is followed by two examples.
Example 1: A Band G Manager whose base salary is $100,000 per year has been in this role for the entire performance year, and has not had any change in their base salary during this period. The employee’s performance rating was initially rated as a 4 (fully meets expectations). Through the calibration process, the performance rating as a 4 was confirmed.

Based on their band and performance rating the employee’s SRP is 15 per cent (see Figure 1). The preliminary SRP amount is 15 per cent of their base salary. This calculation is shown below:

<table>
<thead>
<tr>
<th>Example 1</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual base salary</td>
<td>$100,000</td>
</tr>
<tr>
<td>Days in position</td>
<td>365</td>
</tr>
<tr>
<td>Band</td>
<td>G</td>
</tr>
<tr>
<td>Performance rating</td>
<td>4</td>
</tr>
<tr>
<td>SRP percentage</td>
<td>15%</td>
</tr>
<tr>
<td>Final SRP amount</td>
<td>$15,000</td>
</tr>
</tbody>
</table>

Example 2: A Band J Associate was promoted to a Band I Advisor position on May 1. Prior to the promotion, their base salary was $75,000 per year. They are now earning $80,000 per year. Their performance rating was initially rated as a 4 (fully meets expectations). Through the calibration process, the performance rating as a 4 was confirmed.

<table>
<thead>
<tr>
<th>Example 2</th>
<th>Position 1</th>
<th>Position 2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual base salary</td>
<td>$75,000</td>
<td>$80,000</td>
<td></td>
</tr>
<tr>
<td>Days in position</td>
<td>120</td>
<td>245</td>
<td>365</td>
</tr>
<tr>
<td>Proration of days in position</td>
<td>0.32877%</td>
<td>0.67123%</td>
<td>100%</td>
</tr>
<tr>
<td>Band</td>
<td>J</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td>Performance rating</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>SRP percentage</td>
<td>8%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Final SRP amount</td>
<td>$1,973</td>
<td>$5,370</td>
<td>$7,343</td>
</tr>
</tbody>
</table>
Payment of Incentive Amounts

- Incentive payments will be made following approval by the Board and generally paid early in the year following the program year.
- Applicable taxes will be withheld from the incentive payment.
- For all Management Group employees, a portion of the SRP payment is pensionable. The pension contributions are withheld at source.
  - For employees who participate in the Supplementary Payment Schedule (original supplementary pension plan), a portion of your SRP payment (up to five per cent of your annual base salary at the time SRP is paid) is included in your pensionable earnings.
  - For employees who participate in the Executive Supplementary Payment Schedule (plan introduced in 2000), your pensionable earnings will include the lesser of the SRP paid, or three-year average target SRP amount based on your annual base salary, averaged over your best three consecutive years.

Administration

The President and CEO is responsible for establishing the policies and procedures for operating and administering the program. The day-to-day administration of the program is delegated to the SVP of People & Culture.

For questions regarding the SRP, please contact the HR Service Centre:

**Online help:**
Access [HR Self Serve Tool](#) (Workspace through PowerNet).

**Contact help:**
[HR Service Centre](#) at extension 3700 from any OPG work site, 7:30 am to 4:30 pm, Monday to Friday. For employees at an OPG location without network access or who are calling from home, the HR Service Centre can be reached toll free at 855-592-3700 or 416-592-3700.
The 2014 program was rebranded Stakeholder Return Program (SRP).
In 2015 the 5 point rating scale (target 2) was replaced with the 7 point rating scale (target 4).
SEC Interrogatory #77

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
[F4/3/1, p.16]

OPG states that its negotiations with the PWU and Society were with "assistance of the Government". Please explain the involvement of the Government in these negotiations?

Response

The Province assigned the same counsel to lead a centralized bargaining table to address wages and pension benefits on behalf of OPG and Hydro One for each of the PWU and Society negotiations. Assistance was provided by key management leads from each of OPG and Hydro One.

The resulting Memorandum of Settlements from the centralized bargaining table were contingent upon separate OPG and Hydro One local bargaining tables reaching agreement with the PWU and Society respectively. The local bargaining tables were responsible to offset modest wage increases agreed to at the centralized bargaining table as directed by the Province. Please refer to L06.6-1 Staff-147, Attachment 1 (Confidential), which was filed confidentially, for a copy of direction from Province to OPG regarding revised collective bargaining mandates.
SEC Interrogatory #78

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
[F4/3/1, p.17-18] Regarding the Share Performance Plan:

a. How many FTEs in each year of the test period, for each of the Society and PWU, will be eligible for the Share Performance Plan?

b. What is the total amount of compensation in each year of the test period, for each of the Society and PWU that is forecasted to be paid by way of Hydro One Inc. Shares?

c. If the shares OPG purchases increase or decrease in price before they are paid to eligible employees, who bears the benefit (if the share price increases) and the cost (if the share price decreases) between OPG’s shareholder and ratepayer?

d. What is the current value of OPG’s 9M Hydro One share? What is the variance from the value that it paid for those shares?

Response

a. The total amount of employees, attributable to nuclear, that are eligible for the Share Performance Plan in each year of the IR Term is forecasted to be:

<table>
<thead>
<tr>
<th></th>
<th>$millions</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWU</td>
<td></td>
<td>3,905</td>
<td>3,614</td>
<td>3,407</td>
<td>3,186</td>
<td>2,994</td>
</tr>
<tr>
<td>Society</td>
<td></td>
<td>-</td>
<td>1,876</td>
<td>1,759</td>
<td>1,642</td>
<td>1,554</td>
</tr>
</tbody>
</table>

b. The total cost of nuclear compensation in each year of the IR Term that is forecasted to be paid by way of Hydro One share awards is as follows:

<table>
<thead>
<tr>
<th></th>
<th>$millions</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWU</td>
<td></td>
<td>18.0</td>
<td>14.1</td>
<td>10.3</td>
<td>9.7</td>
<td>9.0</td>
</tr>
<tr>
<td>Society</td>
<td></td>
<td>-</td>
<td>9.9</td>
<td>4.5</td>
<td>4.2</td>
<td>3.9</td>
</tr>
</tbody>
</table>

Witness Panel: Corporate Groups, Compensation
c. As noted at Ex. F4-3-1, pp. 17-18, OPG has acquired nine million Hydro One Inc. shares as a risk management strategy against future fluctuations in the price of the shares and expects to be able to satisfy its share award obligations to eligible PWU and Society employees during the IR Term by using these shares. The nuclear revenue requirements in this application include the 2017-2021 compensation expense associated with projected share award obligations, at the share purchase price of $23.65. Therefore, the ratepayers are protected from fluctuations in the market price of the shares, with the impact of all such changes (decreases or increases) being borne by the shareholder.

d. As at September 30, 2016, the market value of the nine million Hydro One Inc. shares held by OPG was $233M.
**SEC Interrogatory #79**

**Issue Number: 6.6**

**Issue:** Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

**Interrogatory**

**Reference:**

[Application Presentation, September 1, 2016, p. 21]

Please recalculate the expected wages increases including the expected value of the shares of Hydro One. Please provide a detailed explanation of how the cost or value of the shares of Hydro One, and the value to the employees of the compensation they represent, is expected to be reflected in rates either in the period 2017-2021 or beyond. For greater certainty, and without limiting the generality of the foregoing, please ensure that any share compensation that will be reflected in the capital cost of assets, and any tax implications to OPG of the use of share compensation, is reflected in the answer.

**Response**

Expected wage increases inclusive of the value of forecasted Hydro One share awards are captured in the table below. The information for the period beyond the current collective agreements reflects wage escalation planning assumptions set out in Ex. L-6.6-15 SEC-70 (filed confidentially).

<table>
<thead>
<tr>
<th>PWU</th>
<th>Negotiated Increase (effective April 1)</th>
<th>2016 Business Plan Assumption (CONFIDENTIAL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negotiated &amp; Assumed Wage Increase</td>
<td>1.0%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Wage Increases PLUS Impact of Shares</td>
<td>1.0%</td>
<td>1.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Society</th>
<th>Negotiated Increase (effective Jan 1)</th>
<th>2016 Business Plan Assumption (CONFIDENTIAL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negotiated &amp; Assumed Wage Increase</td>
<td>1.0%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Wage Increases PLUS Impact of Shares</td>
<td>1.0%</td>
<td>1.0%</td>
</tr>
</tbody>
</table>

As noted at Ex. F4-3-1, p. 16, lines 27-29, the Share Performance Plan is provided to employees in exchange for pension reforms negotiated during the most recent round of collective bargaining with the assistance of the Government. Unlike employee contribution increases that apply to both existing and new employees, the Share Performance Plan applies only to employees contributing to the pension plan on April 1, 2015 (PWU) and January 1, 2016 (Society), and having less than 35 years of pensionable service as of those...
Witness Panel: Corporate Groups, Compensation

dates, as noted at Ex. F4-3-1, p. 17, lines 7-11. This means that while savings from higher employee contributions are expected to continue at similar levels beyond 2021, the cost of the Share Performance Plan will continue to decline as the number of eligible employees declines.

Ex. L-6.6-15 SEC-78 (b) sets out the compensation costs for each year 2017-2021 that are expected to be paid by Hydro One share awards, of which, on average 9% is forecasted to be capitalized. The OM&A portion of the costs is reflected in the nuclear revenue requirements in the year incurred. In addition, there is a small total forecast tax cost of approximately $3M included in the revenue requirement over the 2017-2021 period, due to differences in the timing between cost accrual and award to employees.
SEC Interrogatory #80

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
[F4/3/1, p.19]

Did OPG undertake a RFP process to select Willis Towers Watson to undertake the compensation benchmarking? If so, please provide a copy of the RFP. If not, please explain how Willis Towers Watson was selected.

Response

Yes, OPG initiated a Request for Proposal (RFP) for actuarial, retirement and compensation consulting services. Compensation consulting includes performing benchmarking activities for OPG.

Attachment 1 is a copy of the 2010 RFP for actuarial, retirement and compensation consulting services (RFP Number: C2010-028).
REQUEST FOR PROPOSALS

for

Actuarial, Retirement and Total Compensation Consulting Services
for OPG

Issue Date: August 6, 2010

Ontario Power Generation Inc. RFP Number: C2010-028

Closing Date and Closing Time: 4:45 p.m. (Toronto time) on August 23, 2010

Closing Location: Proposal Depository, HG103
700 University Avenue, Toronto, Ontario, Canada M5G 1X6

Ontario Power Generation Inc. Supply Chain Representative: Catherine Giorgetti, Senior Supply Chain Specialist, 700 University Avenue (H7B15), Toronto ON, 416-592-3040 (T), 416-592-2649 (F); catherine.giorgetti@opg.com
August 6, 2010

[Company Name]
[Address]
Attention: [Name]

Dear Sirs/Mesdames:

Actuarial, Retirement and Total Compensation Consulting Services Request for Proposal #C2010-028 (the “Project”)

This request for Proposals, as cancelled, amended or clarified from time to time (collectively, this “RFP”), is a request for Proposals for Actuarial, Retirement and Total Compensation Consulting Services as defined in our Specification. The documents that constitute this RFP are listed below.

The first document that is part of this RFP is this cover letter (this “Invitation Letter”). This Invitation Letter is an invitation to you to submit a Proposal to provide services and/or goods for the Project. This RFP is available only through www.Biddingo.com, the electronic tendering system used by Ontario Power Generation Inc. (“OPG”). Any Proponent who has not obtained this RFP through Biddingo may have its Proposal disqualified unless a third party has requested this RFP from Biddingo on that Proponent’s behalf and that Proponent has identified the third party in its Proposal. Failure to identify the third party in this manner may result in disqualification of such Proposal.

The terms that govern this RFP are set out in the enclosed RFP Rules (the “RFP Rules”) and this Invitation Letter. All capitalized terms used in this Invitation Letter are as defined in the RFP Rules or this Invitation Letter. Your Proposal(s), and all other Proposals that OPG receives in respect of this Project, may be subject to negotiations. This RFP is expressly not a call for tenders. All actions and failures to act of OPG, all Representatives and the Proponents respecting any procurement contemplated by this RFP are part of this RFP and governed exclusively by the RFP Rules.

Kindly complete, sign and return, by fax or by sending a .pdf copy by e-mail, to my attention within two business days of your receipt of this RFP, the Proponent acknowledgement form attached to this Invitation Letter to: (a) indicate whether or not you will participate in this RFP, and (b) confirm your agreement with the RFP Rules. We confirm that you have been invited to participate in this RFP based on your agreement that the confidentiality terms in the RFP Rules will apply immediately.
This RFP is composed of the following documents:

1. this Invitation Letter;
2. the Proponent acknowledgement form;
3. the RFP Rules;
4. the enclosed draft agreement for consulting services, (the “Agreement”), including
   (a) the commercial terms,
   (b) OPG’s Business Expense Schedule, and
   (c) all schedules to the commercial terms, including the specifications (the “Specifications”);
5. the enclosed proponent information form (the “Proponent Information Form”);
6. the enclosed pricing submission form (the “Pricing Submission Form”); and
7. all other documents that are made part of this RFP under the RFP Rules, including all Amendments and Clarifications.

Kindly prepare your Main Proposal by completing both the Proponent Information Form and the Pricing Submission Form in accordance with the RFP Rules. As part of the Proposal, the Pricing Submission Form should be submitted in a separate sealed envelope (and labelled as the Pricing Submission Form). In most instances OPG will evaluate the Pricing Submission Form only after the evaluation of the Mandatory Criteria, if applicable, and the Rated Criteria. OPG may, in its sole discretion, accept or reject any Proposal: (a) that does not have a Pricing Submission Form in a separate sealed envelope (and labelled as the Pricing Submission Form), or (b) that includes any material pricing information in the Proponent Information Form.

You may submit one or more Alternative Proposals. OPG will evaluate each Alternative Proposal based on the same Criteria (including Mandatory Criteria, if applicable) as the Main Proposal. If you wish to submit an Alternative Proposal, it should be included as a schedule to your Main Proposal and, therefore, any Alternative Proposal should be attached as a schedule, as set out in section 12 of the RFP Rules, to the Proponent Information Form. The pricing information for the Alternative Proposal should be included in your Pricing Submission Form and should be clearly identified as an Alternative Proposal.

After the Closing Date for the receipt of Proposals, OPG will evaluate the various Proposals and determine which of the actions set out in section 16 of the RFP Rules OPG will proceed with under this RFP. Please note that in accordance with section 16, OPG may, among other things, negotiate with one or more Proponents. The Criteria for evaluating each Proposal, the Criteria weightings and the evaluation methodology are as described in the RFP Rules. **The Criteria, the Criteria weightings and the evaluation methodology are set out in Schedules A and B to the RFP Rules.**

If further information is required, please contact me.

Yours truly, **ONTARIO POWER GENERATION INC.**

_________________________________
Catherine Giorgetti
Senior Supply Chain Specialist
[PROPOSENT ACKNOWLEDGEMENT FORM ON LETTERHEAD OF THE PROPOSENT]

[Date]

Ontario Power Generation Inc.
700 University Avenue, H7B15
Toronto, Ontario
Canada, M5G 1X6

Attention: Catherine Giorgetti, Senior Supply Chain Specialist
Fax: 416-592-2649
E-mail: catherine.giorgetti@opg.com

Actuarial, Retirement and Total Compensation Consulting Services Request for Proposal
Ontario Power Generation Inc. RFP Number C2010-028
Closing Date: August 3, 2010

PROPOSENT ACKNOWLEDGEMENT FORM

We confirm receipt of OPG’s request for proposals dated August 6 relating to the Project, RFP# C2010-028 (this “RFP”). Defined terms used in this Proponent acknowledgement form are as set out in the Invitation Letter or the RFP Rules relating to this RFP. We have reviewed this RFP and we have decided that:

___ we will submit one or more Proposals in the form of the Proponent Information Form and Pricing Submission Form (and this form will be submitted in a separate sealed envelope within the Proposal (and labelled as the Pricing Submission Form)), on or before the Closing Date and we have read, understood and agree with the terms set out in the Invitation Letter and the RFP Rules; or

___ we decline to submit a Proposal and are returning this RFP to the above address and confirm that the confidentiality terms in the RFP Rules apply. We are not submitting a Proposal because __________________________________________________________
__________________________________________________________
__________________________________________________________
Send all communications respecting this RFP to us at:

Company:
Address:
Attention:
Telephone:
Fax:
E-mail:

Name of Proponent:

Name of Authorised Signatory:
Title:
# RFP RULES

Actuarial, Retirement and Total Compensation Consulting Services for OPG

RFP#C2010-028

## Table of Contents

1. **Definitions** ........................................................................................................................................... 1  
2. **Interpretation** ......................................................................................................................................... 1  
3. **Amendments and Clarifications** ................................................................................................................... 2  
4. **Communications with OPG** ................................................................................................................................. 3  
5. **Standards and Information** ......................................................................................................................... 3  
6. **Credit Information** ........................................................................................................................................ 3  
7. **Proponent’s Due Diligence** .............................................................................................................................. 4  
8. **No Communication with Other Proponents, Code of Business Conduct** .................................................. 4  
9. **Equal Access to Information** .......................................................................................................................... 4  
10. **Pricing** ....................................................................................................................................................... 4  
11. **Main Proposal** .......................................................................................................................................... 5  
12. **Alternative Proposal** .................................................................................................................................... 5  
13. **Submission of Proposals** ............................................................................................................................. 6  
14. **Withdrawal or Revision of Proposals** ............................................................................................................ 7  
15. **Criteria for Evaluating Proposals and Evaluation Methodology** ............................................................... 7  
16. **Entry into Agreement or Negotiations** ......................................................................................................... 7  
17. **Proponents to Obtain RFP Only Through Biddingo™** ............................................................................... 9  
18. **Confidentiality of RFP Information** ............................................................................................................. 9  
19. **Cost of Preparation** .................................................................................................................................... 9  
20. **No OPG Guarantees** .................................................................................................................................... 9  
21. **Finality** ...................................................................................................................................................... 10  
22. **Acceptance of Terms** ................................................................................................................................ 10

## Schedules

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schedule A</td>
<td>- Mandatory Criteria</td>
</tr>
<tr>
<td>Schedule B</td>
<td>- Rated Criteria and Pricing Criteria</td>
</tr>
</tbody>
</table>
**RFP RULES**

**Actuarial, Retirement and Total Compensation Consulting Services for OPG**

**RFP#C2010-028**

1. **Definitions**

In these RFP Rules, the following terms have the respective meanings set out below.

(a) **Agreement** is defined in the Invitation Letter.

(b) **Alternative Proposal** is defined in section 12.

(c) **Amendments** means changes to the Closing Date, changes to the Closing Time, or deletions, additions or other changes to terms or other information respecting this RFP that are issued to Proponents in writing by the OPG Supply Chain representative referenced in section 4.

(d) **Clarifications** means explanations or interpretations respecting this RFP that are issued to one or more Proponents in writing by the OPG Supply Chain representative referenced in section 4.

(e) **Closing Date** is defined in section 13.

(f) **Closing Time** is defined in section 13.

(g) **Confidential Information** is defined in section 18.

(h) **Criteria** is defined in section 15.

(i) **Invitation Letter** means the cover letter included in this RFP inviting each Proponent to submit a Proposal to provide services and/or goods for the Project.

(j) **Main Proposal** is defined in section 11.

(k) **Mandatory Criteria** is defined in section 15.

(l) **Minimum Rated Criteria** is defined in section 15.

(m) **OPG** is defined in the Invitation Letter.

(n) **Preferred Proponents** is defined in section 16.

(o) **Pricing Submission Form** is defined in the Invitation Letter.

(p) **Project** is defined in the Invitation Letter.

(q) **Proponent** means a proponent submitting a Proposal under this RFP.

(r) **Proponent Information Form** is defined in the Invitation Letter.

(s) **Proposal** means a Main Proposal and/or an Alternative Proposal.

(t) **Proposal Depository** means the address and location set out in section 13.

(u) **Rated Criteria** is defined in section 15.

(v) **Representatives** means OPG’s subsidiaries and all employees, officers, directors, agents and representatives of OPG or any of its subsidiaries.

(w) **RFP** is defined in the Invitation Letter.

(x) **RFP Rules** is defined in the Invitation Letter.

(y) **Specifications** is defined in the Invitation Letter.

2. **Interpretation**

In these RFP Rules and in the Invitation Letter, words importing the singular include the plural and vice versa and words importing gender include all genders. The term “including” means “including without limitation”, and will not be given a restrictive meaning because that word is followed by particular examples intended to fall within the meaning of the general words, and the terms “include”, “includes” and “included” have similar meanings. The term “will” has the
same meaning as “shall”. A decision which is in OPG’s “sole discretion” is deemed to be in OPG’s “sole and absolute discretion”. All matters respecting this RFP and any Proposals are governed by, and are to be construed and interpreted in accordance with, the laws of Ontario and the laws of Canada applicable in Ontario. Subject to section 21, each of the Proponents irrevocably submits to the exclusive jurisdiction of the courts of Ontario in respect of all matters respecting this RFP. The Invitation Letter, the Proponent acknowledgement form, these RFP Rules and all written cancellations, Amendments and Clarifications (to the extent that any Amendments or Clarifications apply to the Invitation Letter or these RFP Rules) constitute the entire agreement between OPG and each Proponent with respect to this RFP and supersede all prior agreements (except for any separate confidentiality agreement), negotiations, discussions, undertakings, representations, warranties and understandings, whether written or oral. No rule of contractual interpretation to the effect that any ambiguity is to be resolved against OPG will be applicable in the interpretation of these RFP Rules.

The last paragraph in section 16 and sections 18 and 21 will survive each of the completion, expiry and cancellation of this RFP.

3. Amendments and Clarifications

OPG may, at any time, issue an Amendment, Clarification or written cancellation to this RFP. No Proponent may rely on any oral explanation or interpretation respecting this RFP by OPG or any of the Representatives. Accordingly, this RFP will not be considered to be amended or clarified by any oral explanation or interpretation respecting this RFP by OPG or any of the Representatives. In addition, no Proponent may rely on any cancellation, amendment, clarification or any other information whatsoever respecting this RFP, and no term of this RFP may be amended or clarified in any way whatsoever, unless issued by OPG as an Amendment, a Clarification or a written cancellation.

OPG will issue all Amendments to this RFP as numbered authorised Amendments. OPG will issue all Clarifications to this RFP as numbered authorised Clarifications. All cancellations, Amendments or Clarifications respecting this RFP that are issued by the OPG Supply Chain representative referenced in section 4 will automatically upon issue, become part of this RFP. Each Proponent must include in its Proposal a statement that the Proponent has taken into account in the preparation of its Proposal each Amendment and Clarification. If a Proponent has not sought a Clarification and there is a subsequent controversy respecting the interpretation of a term of this RFP, including the Agreement, OPG’s interpretation will govern. OPG strongly encourages each Proponent to contact the OPG Supply Chain representative at the address set out in section 4 at least five business days before the Closing Date to confirm that such Proponent has received all Amendments and Clarifications.

Each Proponent is strongly encouraged not to make any assumptions and to seek Clarifications of any questions that such Proponent might have, particularly related to any error or discrepancy in this RFP identified by a Proponent. Proponents may not rely on any assumptions made or on any errors or discrepancies. Proponents are responsible for seeking a Clarification respecting any questions they may have respecting commercial, technical, site or other issues. OPG may issue any notices or other communication to any Proponent by hand, fax, courier, mail or e-mail. Except as otherwise provided in these RFP Rules, OPG will neither be bound by responses to oral questions nor answer any questions received by OPG within five business days of the Closing Date.
4. Communications with OPG

Except as set out in section 4, every notice or other communication of a Proponent required or permitted in respect of this RFP must be in writing and may be delivered by hand, fax, courier, mail or e-mail to OPG as follows:

Name: Catherine Giorgetti, Senior Supply Chain Specialist
Actuarial, Retirement and Total Compensation Consulting Services, Ontario Power Generation Inc. RFP Number C2010-028
Closing Date: August 3, 2010
Address: Ontario Power Generation Inc.
700 University Avenue, H7B15
Toronto, ON M5G 1X6
Telephone: 416-592-3040
Fax: 416-592-2649
E-mail: catherine.giorgetti@opg.com

OPG encourages Proponents to submit questions, notices and other communications (excluding delivery of Proposals) to OPG by e-mail.

5. Standards and Information

A Proponent may obtain any OPG internal documents referred to, but not included, in this RFP by contacting the OPG Supply Chain representative at the address set out in section 4. Each Proponent must itself obtain any documents issued by a standards, regulatory or other organisation referred to in this RFP or any collective agreement applicable to the services or goods. Each Proponent must ensure that it has the current version of all such documents, collective agreements and OPG internal documents referred to or applicable to this RFP and take these documents and agreements into account in the preparation of any Proposal.

6. Credit Information

Each Proponent authorises OPG to make credit enquiries about the Proponent and any of its affiliates and to receive and exchange credit information from credit reporting agencies or other persons with which the Proponent or any of its affiliates has or may expect to have financial dealings. Each Proponent must provide OPG with the Proponent’s (and, on request by OPG, any of the Proponent’s affiliate’s) audited financial statements for the last three financial years for which they are available and financial statements for any period after the last audited period. If a Proponent submits audited financial statements from a parent company to satisfy this requirement, the Proponent must provide OPG with a parental indemnity if the Proponent enters into an agreement with OPG. Each Proponent will also provide OPG with any other legal or financial information respecting the Proponent or any of its affiliates that OPG may reasonably request.
7. **Proponent’s Due Diligence**

The prices set out by each Proponent in its Proposal are deemed to include all the costs associated with the Due Diligence Information. OPG will make no allowance to any Proponent (whether by an extension to the Project schedule, by an additional payment or otherwise) because of any failure to carry out sufficient examinations or any failure to obtain any Due Diligence Information. By submitting a Proposal, each Proponent represents and warrants to OPG that:

(a) the Proponent has familiarised itself with all matters respecting the services and the Due Diligence Information, including all special conditions respecting the services which are not referred to in the Specifications;

(b) the Proponent has relied solely on the Proponent’s findings, conclusions, interpretations and other opinions in evaluating the risks, contingencies and other circumstances that may be encountered in carrying out all the requirements of this RFP;

(c) the Proponent has made due allowance (including by way of pricing) for all those matters referred to above in this section 7 in such Proponent’s Proposal; and

(d) all the information contained in the Proponent Information Form and Pricing Submission Form is accurate, complete and not misleading.

(collectively, the “Due Diligence Information”).

8. **No Communication with Other Proponents, Code of Business Conduct**

No Proponent will share information or otherwise communicate, either directly or indirectly, with any other Proponent in respect of this RFP. No Proponent will engage in any conduct that compromises, or could reasonably be perceived to compromise, the integrity of this RFP process. Specifically, no Proponent will communicate with any person with a view to obtaining preferred treatment respecting this RFP. No Proponent will engage in any conduct that would cause OPG or any of its Representatives to be in breach of any of the obligations set out in OPG’s Code of Business Conduct. A current copy of the code may be reviewed at www.opg.com.

9. **Equal Access to Information**

If OPG discovers that it has provided any Amendment or Clarification to any Proponent and such Amendment or Clarification has not been provided to all the Proponents, OPG will provide such Amendment or Clarification to all the Proponents and, in OPG’s sole discretion, OPG may extend the Closing Date by an Amendment. Despite any term in this section 9, OPG may, in its sole discretion, provide a Clarification to a single Proponent if the Clarification is specific to that Proponent.

10. **Pricing**

Each Proponent must submit a Proposal containing pricing terms, denominated in Canadian dollars, for the completion of the entire Project. The prices offered by each Proponent in its Proposal must include all applicable taxes and duties except Canadian goods and services tax/harmonized sales tax. Each Proponent must include in its Pricing Submission Form a breakdown of the pricing information that will allow OPG to understand how the pricing for each
component of the services and goods was calculated. The Proponent should submit to OPG the Pricing Submission Form as part of the Proposal. The Pricing Submission Form should be submitted in a separate sealed envelope (and labelled as the Pricing Submission Form). In most instances OPG will evaluate the Pricing Submission Form only after the evaluation of the Mandatory Criteria, if applicable, and the Rated Criteria. OPG may, in its sole discretion, accept or reject any Proposal: (a) that does not have a Pricing Submission Form in a separate sealed envelope (and labelled as the Pricing Submission Form), or (b) that includes any material pricing information in the Proponent Information Form.

11. Main Proposal

OPG strongly encourages each Proponent to complete its Proposal in accordance with all the requirements of this RFP, both commercially and technically (the “Main Proposal”). Any Proposal containing any amendments, qualifications or other changes to the requirements of this RFP or that is otherwise incomplete will be considered to be an Alternative Proposal. Unless specifically designated as such or clearly intended as such, in the sole judgement of OPG, OPG will assume that any explanatory or descriptive material included in a Proposal does not constitute such an amendment, qualification or other change. Each Proponent must submit any Proposal in English and in the form of the Proponent Information Form and Pricing Submission Form. OPG may, in its sole discretion, accept or reject any Proposal which is not submitted in the form of a Proponent Information Form and Pricing Submission Form.

12. Alternative Proposal

A Proponent may also submit any number of Proposals in a single Proponent Information Form and a single Pricing Submission Form. If a Proponent wishes to make any amendments, qualifications or other changes to the requirements of this RFP, the Proponent is strongly encouraged to submit one Proposal, the Main Proposal, which is in accordance with all such requirements in the form of the Proponent Information Form and the Pricing Submission Form and any other Proposals containing all such amendments, qualifications or other changes (any one of which is referred to as an “Alternative Proposal”) as part of Schedule 6 and, if applicable, Schedule 10 to the Proponent Information Form. If a Proponent proposes any changes to the draft Agreement, that Proposal will be deemed to constitute an Alternative Proposal. The pricing information for any Alternative Proposal should be included in the Pricing Submission Form and should be clearly identified as an Alternative Proposal. In accordance with the Criteria and the Criteria weightings, OPG may reject or subject to adverse weighting in the Proposal evaluation process any Proposal containing only an Alternative Proposal and no Main Proposal. It is for this reason that all Proponents are advised of this risk if a Proponent chooses to submit only an Alternative Proposal and no Main Proposal.

Nevertheless, OPG welcomes all Alternative Proposals that a Proponent considers advisable in light of its technical and commercial knowledge. A Proponent should make clear in any Alternative Proposal the advantages and disadvantages of the proposed alternative. Each Proponent must state expressly in any Alternative Proposal, all of its amendments, qualifications and other changes to the requirements of this RFP, including all amendments, qualifications and other changes to the Agreement, set out precisely on a line by line basis in; (a) a chart form, or (b) a blackline format. Each Proponent is deemed to have offered to agree to each term in this RFP that the Proponent has not expressly amended, qualified or otherwise changed. Each Proponent which submits an Alternative Proposal will provide OPG (by the time specified by OPG) with such information, if any, as OPG may request to evaluate the Alternative Proposal. OPG will evaluate each
Alternative Proposal based on the same Criteria (including Mandatory Criteria, if applicable) as the Main Proposal.

OPG may reissue a request for proposals based on an Alternative Proposal, except to the extent that an Alternative Proposal is based on trade secrets of the Proponent and the Proponent has identified such trade secrets in an Alternative Proposal.

13. Submission of Proposals

Each Proponent must submit seven paper copies of each Proposal (which includes seven copies of the completed Proponent Information Form and seven copies of the Pricing Submission Form, each submitted in a separate sealed envelope), together with an electronic copy of the Proponent Information Form and the Pricing Submission Form in Microsoft Word, preferably on a CD-ROM, memory stick or other similar form of electronic media (with the Proponent Information Form and the Pricing Submission Form being on two separate CD-ROMs, DVDs or other similar forms of electronic media). Each Proponent must submit its Proposals (including all required paper and electronic copies) in a sealed package identified and addressed as follows:

**ACTUARIAL, RETIREMENT AND TOTAL COMPENSATION CONSULTING SERVICES**
Ontario Power Generation Inc. RFP Number C2010-028
Closing Date: August 3, 2010

to: Ontario Power Generation Inc.
Proposal Depository, HG103
700 University Avenue
Toronto, Ontario
Canada M5G 1X6

OPG will not accept responsibility for the delivery of any Proposal that is delivered to any location other than the Proposal Depository. If any Proposal is delivered to any location other than the Proposal Depository, OPG, in its sole discretion, may reject any such Proposal. If the name of the Project, the OPG RFP number and the Closing Date are not displayed prominently on the outside of a Proponent’s Proposal, that Proposal may be opened inadvertently, by unauthorised personnel or before the Closing Time and, therefore, may be rejected by OPG, in OPG’s sole discretion.

Proponents must deliver their Proposals by hand, courier or mail. Proponents must ensure that their Proposals are delivered to the Proposal Depository by no later than 4:45 p.m. Toronto time (the “Closing Time”) on August 3, 2010 (the “Closing Date”). OPG may, in its sole discretion, accept or reject any Proposals received after the Closing Time. OPG will not accept faxed, e-mailed or oral Proposals or faxed, e-mailed or oral modifications to Proposals. OPG will not return any Proposals.

Upon receipt of each Proposal, OPG will mark each Proposal with the date and time received and will store it in secure custody with all other Proposals until the Closing Time.
14. **Withdrawal or Revision of Proposals**

A Proponent may withdraw any previously submitted Proposal at any time by submitting a notice signed by an authorised signatory of the Proponent requesting the removal of the Proponent’s submitted Proposal. The Proponent must deliver its notice to the OPG Supply Chain representative at the address set out in section 4.

A Proponent may revise all or part of a previously submitted Proposal at any time up to the Closing Time by submitting a new Proposal to the Proposal Depository referred to in section 13. Subject to section 12 relating to the submission of one or more Alternative Proposals, the last Proposal submitted by a Proponent will supersede all previously submitted Proposals by that Proponent. At the opening of the Proposals, OPG will discard unopened all superseded Proposals. It is the responsibility of each Proponent to clearly indicate to OPG in writing which Proposals, if any, are to be discarded.

15. **Criteria for Evaluating Proposals and Evaluation Methodology**

OPG will evaluate each Proposal, to determine which Proposal(s) are best suited to OPG’s requirements as set out in this RFP, in a staged sequential process based on:

(a) the criteria listed in Schedule A attached to these RFP Rules (the “**Mandatory Criteria**”), if any;

(b) the criteria listed in Part I of Schedule B attached to these RFP Rules (the “**Rated Criteria**”), including the Rated Criteria with thresholds which are required to be met (the “**Minimum Rated Criteria**”), if any; and

(c) the criteria listed in Part II of Schedule B attached to these RFP Rules,

(collectively, the “**Criteria**”). Despite any term in these RFP Rules, OPG may, in its sole discretion, carry out any of the evaluation stages in parallel instead of in sequence. The Criteria, weightings assigned to each of the Criteria and the evaluation methodology are described in Schedules A and B.

**Stage 1**  
**Mandatory Criteria** – See Schedule A.

**Stage 2**  
**Rated Criteria** – See Part I of Schedule B.

**Stage 3**  
**Pricing Criteria** – See Part II of Schedule B.

16. **Entry into Agreement or Negotiations**

Each Proposal will constitute an offer by the Proponent to OPG to enter into an Agreement on the terms of that Proposal. After the Closing Date, OPG may interview any Proponent and may specifically seek clarification or additional information in any format whatsoever in respect of the Proponent’s Proposal. The response received by OPG from a Proponent will, if accepted by OPG, form part of that Proponent’s Proposal. OPG may verify with the Proponent or any third party any information set out in the Proponent’s Proposal. OPG may check any references of a Proponent in addition to any references submitted in the Proponent’s Proposal. Each Proponent authorises OPG to make any enquiries about the Proponent, any affiliates of the Proponent and the Proponent’s Proposal respecting the verification of any such information or in respect of any references. If OPG receives information at any time that, in OPG’s view, reveals that earlier
information submitted by the Proponent is inaccurate, incomplete or misleading, OPG may, in its sole discretion, re-evaluate the Proponent’s Proposal based on the Criteria and take such other actions as OPG considers appropriate in the circumstances. OPG is not obliged, however, under any circumstance, to seek any clarification or any additional information from any Proponent or any third party. All of the terms of the first paragraph of this section 16 apply despite any other term in these RFP Rules.

Nothing in this RFP constitutes an offer of any kind whatsoever to any Proponent. OPG is not obliged to accept the lowest priced Proposal, negotiate with the Proponent offering the lowest priced Proposal, accept any Proposal whatsoever or negotiate with any Proponent whatsoever. Accordingly, OPG may reject all Proposals, cancel this RFP or accept or negotiate any Proposal in whole or in part at OPG’s sole discretion. OPG may seek additional Proposals. OPG may contract with others, use its own resources to carry out any services or extend or renegotiate an existing contract for services and/or goods that are the subject of this RFP.

Once OPG has undertaken its evaluation (and any re-evaluation for any reason) of each of the Proposals based on the Criteria, OPG may, in its sole discretion, and without taking into account any custom, usage or agreement in the industry or trade, any other policy or practice or any other term in this RFP, take any of the following three actions:

(a) enter with the Proponent into the Agreement or an amended Agreement (which will be a conformed contract) for the services and/or the goods which are the subject of this RFP (based on the offer of such Proponent set out in a Proposal) which OPG has determined, in its sole discretion, has submitted the Proposal which best satisfies the Criteria;

(b) select, or short-list, one or more preferred Proponents (the “Preferred Proponents”) with whom to commence negotiations on the Agreement or an amended Agreement (which will be a conformed contract) to determine which Proposal, if any, in OPG’s sole discretion, best satisfies the Criteria; or

(c) cancel this RFP and not enter into an agreement for the services and goods contemplated under this RFP, or issue a new RFP, tender or otherwise.

If OPG proceeds in the manner described in section 16(b), OPG may change the scope of services and/or goods contained in this RFP or change any other terms or other information contained in this RFP and otherwise negotiate with the Preferred Proponent(s) the Agreement, including the Specifications, in any manner whatsoever. Based on these negotiations and the Criteria, OPG will choose, in its sole discretion, the Preferred Proponent(s), if any, to enter into the Agreement or an amended Agreement with on agreed terms. OPG will not provide any such changes to any Proponent that is not a Preferred Proponent. If OPG proceeds in the manner described in section 16(b), OPG may, in its sole discretion, subsequently proceed under section 16(c) for any reason whatsoever.

Except with the approval of a Proponent, under no circumstances, however, will OPG disclose any information contained in a Proposal of that Proponent to any other Proponent, including a Preferred Proponent. OPG will, however, disclose that part of any Proposal that OPG is obliged to disclose under the Freedom of Information and Protection of Privacy Act (Ontario). In addition, OPG may disclose, on a confidential basis, to OPG’s advisers any information contained in a Proposal.
17. **Proponents to Obtain RFP Only Through Biddingo™**

This RFP is available only through Biddingo™, the electronic tendering system used by OPG. A Proponent who has not obtained this RFP through Biddingo™ may have its proposal disqualified unless a third party has requested this RFP from Biddingo™ on that proponent's behalf and that proponent has identified the third party on the Proposal Return Label for its proposal. Failure to identify the third party in this manner may result in disqualification of a proposal.

18. **Confidentiality of RFP Information**

The fact that OPG is conducting this RFP and the material contained in this RFP or disclosed in respect of this RFP is confidential information of OPG (collectively, the “Confidential Information”). This RFP is the sole property of OPG. Each Proponent will use, and will ensure that each person to whom the Proponent discloses this RFP, in whole or in part, will use, the Confidential Information solely for the purpose of preparing a Proposal and, if applicable, negotiating the Agreement with OPG and carrying out the Proponent’s obligations under a signed Agreement, if any.

At any time, at OPG’s request, a Proponent will deliver promptly to OPG all, or an OPG-specified portion of, the Confidential Information, together with all copies, extracts or other reproductions in whole or in part of the Confidential Information. In addition, at any time, at OPG’s request, a Proponent will destroy, demonstrably, promptly and irrevocably, all such copies, extracts or other reproductions of the Confidential Information, or an OPG-specified portion of the Confidential Information, which cannot, because of the device on which such information is stored, be removed from the possession of the Proponent by delivery to OPG. Following such delivery and destruction, the Proponent will promptly provide OPG with written confirmation of completion. In any event, the Proponent will complete all such actions within 30 days of receipt of OPG’s initial request. If OPG does not exercise any of its rights under this section 18 and a Proponent is not the successful Proponent, such Proponent will destroy, promptly and irrevocably, all Confidential Information and all such copies, extracts or other reproductions of the Confidential Information in the Proponent’s possession or control. In any event, the Proponent will complete all such actions within 60 days of being informed or becoming aware that it was not the successful Proponent.

19. **Cost of Preparation**

Each Proponent will be solely responsible for all of its costs and other expenses in respect of this RFP, including any site visits and the preparation and negotiation of any Proposal or Agreement.

20. **No OPG Guarantees**

OPG has included statements of facts and other information in this RFP merely for the general information of the Proponents. Neither OPG nor any of the Representatives make any representation, warranty or guarantee, express, implied or otherwise, as to the accuracy or completeness of any of these statements or other information or any subsequent written or oral statements of fact or other information provided to any Proponent. Each Proponent releases OPG and all Representatives from all claims, demands and other complaints in respect of all such statements, other information and any representation, warranty or guarantee contained in, or
omitted from, this RFP or in any subsequent written or oral statements of fact or other information provided to any Proponent.

21. **Finality**

OPG has become concerned about the increasing degree of litigation and threats of litigation in the request for proposals and tendering processes across North America. Litigation and threats of litigation increase costs, delay projects and reduce the certainty for OPG and all Proponents. Accordingly each Proponent agrees that OPG’s evaluation process and ultimate selection of the successful Proponent is final and binding on all Proponents. All the terms of this RFP are expressly set out in this RFP and there are no implied terms respecting this RFP. Despite any other term in this RFP, no Proponent may make any claim, demand or other complaint respecting OPG or any of the Representatives to any court, other adjudicative body, governmental authority or regulatory authority respecting this RFP for any reason whatsoever, including respecting the RFP Rules, fundamental breach, the conduct of the process of evaluation, interpretation or application of this RFP, the ultimate selection of the successful Proponent or the selection of no successful Proponent. Without limiting the generality of the foregoing, no Proponent may seek any judgement, order, decree, injunction, declaration or other relief respecting this RFP, including that such Proponent’s Proposal was the “lowest” or “best” Proposal, that such Proponent is or should be chosen as the successful Proponent, that OPG erred in its evaluation of any of the terms of any Proposal of any Proponent as compared to the successful Proponent or that OPG or any of the Representatives otherwise exercised any discretion or conducted the process in an inappropriate, unreasonable or unfair manner or in breach of any term of this RFP. Each Proponent releases OPG and all Representatives from all such claims, demands and other complaints. In no event whatsoever will OPG or Representatives be liable to any Proponent for consequential damages, including lost profits.

Should a Proponent have any complaint or concern regarding this RFP, the Proponent is encouraged to submit such complaint or concern in writing to OPG’s Director – Corporate Supply Chain, 700 University Avenue, H7D15, Toronto, Ontario, Canada, M5G 1X6.

The Proponent will defend and indemnify OPG and all Representatives in respect of all claims, demands or other complaints made against OPG or any of the Representatives by any subcontractor of any tier or proposed subcontractor of any tier to the Proponent in respect of this RFP.

22. **Acceptance of Terms**

If a Proponent has not signed and delivered to OPG the Proponent acknowledgement form, then by attending a site visit or by submitting a Proposal, each Proponent who so attends a visit or submits a Proposal is deemed to agree to the terms of the Invitation Letter and these RFP Rules.
### Schedule A – Mandatory Criteria

<table>
<thead>
<tr>
<th>REQUIREMENTS</th>
<th>YES</th>
<th>NO</th>
<th>Location of information in Proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proponents must have previous experience with providing a full range of actuarial, investment, retirement, and total compensation consulting services related to defined benefit pension plans, other post employment benefits, and total compensation programs to unionized companies in the public sector in Canada. Must be willing to provide references.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proponents must be able to demonstrate that the firm, including the assigned personnel, have a minimum of 3 years of directly related experience. The lead personnel for the actuarial components of the Specifications must be Fellows of the Canadian Institute of Actuaries and Fellows of the Society of Actuaries.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proponents must provide evidence of professional service liability insurance in excess of $10M.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Important, please note:** OPG will review each Proposal to determine whether it complies with all of the Mandatory Criteria required in this Schedule A.

Each Proponent **must complete**, as Schedule 11 to the Proponent Information Form, a form identical to the table above in its entirety, clearly identifying in the last column of the table where in its Proposal OPG can find information evidencing the Proponent’s compliance with each of the Mandatory Criteria.

**OPG will discontinue the evaluation of, and reject, any Proposal** that does not satisfy all of the Mandatory Criteria.
Schedule B – Rated Criteria and Pricing Criteria

Part I – Rated Criteria

Related Experience, Qualifications and Capacity to Deliver (Weighting: 70%)

<table>
<thead>
<tr>
<th>“RATED CRITERIA”</th>
<th>MINIMUM RATED CRITERIA THRESHOLD</th>
<th>WEIGHTING</th>
<th>SUB-WEIGHTING</th>
<th>SCORE (?/10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experience &amp; Qualifications: Qualifications and experience of key staff and subcontractors, if any</td>
<td>8/10</td>
<td>25%</td>
<td>10%</td>
<td>8/10</td>
</tr>
<tr>
<td>Historical performance of the Proponent and any significant subcontractors, including, performance on previous projects (particularly projects of a similar nature)</td>
<td>8/10</td>
<td></td>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>Schedule: Schedule guarantees offered and Project schedule</td>
<td>8/10</td>
<td>10%</td>
<td>5%</td>
<td>8/10</td>
</tr>
<tr>
<td>Availability within requested time frame</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methodology and approach Proponent’s methodology/approach; - Industry best practices to be used during the engagement; - Any exceptions to the Scope of services Consistent with OPG’s policies and procedures.</td>
<td>7/10</td>
<td>20%</td>
<td></td>
<td>7/10</td>
</tr>
<tr>
<td>“RATED CRITERIA”</td>
<td>MINIMUM RATED CRITERIA THRESHOLD</td>
<td>WEIGHTING</td>
<td>SUB-WEIGHTING</td>
<td>SCORE (?/10)</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>---------------------------------</td>
<td>-----------</td>
<td>---------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Quality Assurance: Process to ensure quality of service</td>
<td>8/10</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial Terms Provision of information to OPG in adherence to the requirements of this RFP. Amendments, qualification or other changes to the requirements of this RFP Acceptance of agreement / No exceptions.</td>
<td>8/10</td>
<td>5%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

OPG will score each Proposal on the basis of the Criteria set out in this Schedule B. OPG will use a scoring scale of 0 to 10 (where 0 is poor, 5 is average and 10 is excellent). These scores will then be multiplied by either the weighting or the sub-weighting for each of the Criteria. OPG will discontinue the evaluation of, and reject, any Proposal that does not meet all requirements of the Minimum Rated Criteria threshold, if any.
Part II – Pricing Criteria

The Pricing Submission Form will account for 30% of the total evaluation.

<table>
<thead>
<tr>
<th>“RATED CRITERIA”</th>
<th>MINIMUM RATED CRITERIA THRESHOLD</th>
<th>WEIGHTING (%)</th>
<th>SUB-WEIGHTING (%)</th>
<th>SCORE (?/10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price and Financial Terms</td>
<td>8/10</td>
<td>30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

OPG places a significant focus on value for money and expects each Proponent to take this into account with regard to pricing (see Pricing Submission Form attached).

**NOTE:** The Pricing Submission Form must be submitted in a separate sealed envelope within the Proposal (and labelled as the Pricing Submission Form).
SPECIFICATION
Actuarial, Retirement and Total Compensation Consulting Services for OPG
RFP # C2010-028

1. Background

Ontario Power Generation (OPG) is an Ontario-based electricity generation company whose principal business is the generation and sale of electricity in Ontario. Our focus is on the efficient production and sale of electricity from our generation assets, while operating in a safe, open and environmentally responsible manner. OPG is wholly owned by the Province of Ontario.

OPG's generating portfolio has a total capacity of over 21,000 megawatts (MW) making us one of the largest power generators in North America. Our generating assets include:

- 3 nuclear generating stations
- 5 thermal generating stations
- 65 hydroelectric generating stations

OPG’s registered pension plan is a contributory defined benefit pension plan with approximately 12,000 active members and 10,000 inactive members, with a pension fund of approximately $8 billion. OPG’s supplementary pension plan includes the Supplementary Payment Schedule (“SPS”), the Executive Supplementary Payment Schedule (“ESPS”) and the Designated Supplementary Payment Schedule (“DSPS”). OPG’s other post employment benefits include post retirement health, dental and group life insurance plans and a long term disability plan.

2. Objective

OPG is seeking the services of a firm to provide actuarial, investment and retirement consulting services for OPG’s pension and other post employment benefit plans in addition to providing consulting and benchmarking services for OPG’s total compensation programs.

3. Scope of Services

Please see the scope of services outlined below which the Proponent will be required to provide. Please note that these services will not automatically be awarded to the successful Proponent and will be required on an ad hoc basis. This information has been provided as part of this competitive bidding process to give an understanding of required services. These services will be included in the schedule to any negotiated agreement with the successful Proponent, as it will allow OPG to avoid having to negotiate separate terms if the Proponent is awarded a project. Each Proponent will be required to quote individually on one or all of
the scope areas defined below:

A. Service/Deliverables - Actuarial and Retirement Consulting Services for OPG’s Human Resources Department:

- Assist OPG with maintaining compliance with changes in legislation and standards affecting pensions.
- Provide analytical support to OPG Human Resources on issues such as (but not limited to):
  - divestitures, mergers and acquisitions;
  - early retirement programs;
  - union negotiations;
  - changes in legislation and standards affecting pensions;
  - calculation of US pension obligations; and
  - calculation of benefits for executive members.
- Attend OPG Board of Directors, sub-committees of the Board of Directors, Pension Committee, Administration Committee, and other meetings.
- Prepare DSPS annual statements and membership reports.
- Develop communication strategies for pension-related matters and prepare pension-related communications for plan members.
- Provide annual actuarial valuations for funding the Supplementary Pension Plan, and other supplementary pension arrangements.
- Provide periodic updates on the financial position of OPG’s Supplementary Pension Plan and other supplementary pension arrangements.
- Provide advice to OPG relating to the development and changes to the funding policy for its supplementary pension arrangements.
- Provide other actuarial and retirement consulting services.

B. Services/Deliverables – Retirement Program Consulting for OPG’s Human Resources Department

- Provide consulting advice on pension issues such as (but not limited to):
  - divestitures, mergers and acquisitions;
  - early retirement programs;
  - union negotiations;
  - costing of plan design changes (both for OPG’s Registered Pension Plan and Supplementary Pension Plan);
  - changes in legislation and standards affecting pensions;
  - reciprocal transfer agreements with other pension plans;
  - benefit design of US pension obligations; and
  - benefit design of benefits for executive members.
- Provide support to members on situations such as (but not limited to):
  - individual counselling to members having to choose between the SPS and the ESPS;
  - update SPS/ESPS decision tool; and
  - individual calculations for DSPS members.
- Attend Administration Committee and Pension Committee meetings.
Provide information briefings to OPG Human Resources personnel.
Provide other retirement program consulting services.
Assist OPG in drafting plan amendments and restatements, including review of drafts and/or filings of pension plan documentation (amendments and restatements) supplied by OPG legal counsel.
Assist with answering inquiries from FSCO and CRA.

C. Service/Deliverables - Total Compensation Consulting /Benchmarking Services Supplied to OPG Human Resources

- Provide internal and external data to compare OPG compensation, perquisites and benefits with annual benchmarks.
- Conduct comparative analyses.
- Produce comprehensive report.
- Attend meetings.
- Develop communication strategy.
- Develop personalized statements.
- Provide other total compensation consulting services.

D. Services/Deliverables – Actuarial Services for OPG’s Treasury Department

- Provide quarterly updates on the estimated financial position of the Registered Pension Plan in a reporting format agreed with OPG.
- Provide guidance and advice to OPG in the development of a workable funding policy for the Registered Pension Plan and provide regular input and recommendations annually for setting the annual objectives.
- Attend OPG Board of Directors, Audit & Finance Committee, Compensation and Human Resources Committee, Pension Committee, Administration Committee and other meetings as may be required to provide insight on regulatory and actuarial matters.
- Provide analytical support to OPG Fund Management on issues such as (but not limited to):
  - corporate restructuring (divestitures, mergers and acquisitions) as it impacts pension benefits;
  - early retirement programs;
  - changes in regulations, pension benefits, or tax legislation affecting pension plans; and
  - union negotiations.
- Provide other consulting services relating to Pension Fund management from time-to-time.
- Provide actuarial valuations for funding the Registered Pension Plan and for filing purposes with the pension regulator.
- Provide assistance to OPG with preparation of documents for filing with pension regulators including (but not limited to) Annual Information Returns, cost certificates in respect of plan amendments, and documents in respect of asset transfers arising from corporate restructurings.
E. Services/Deliverables – Investment Consulting Services for OPG’s Treasury Department:

- Provide investment consulting services such as (but not limited to):
  - Periodic asset liability/asset mix review updates;
  - Manager search services or review of incumbent investment managers;
  - Advice or assistance with the review/update of the Statement of Investment Policies and Procedures (SIPP);
  - Manager transitions;
  - Contract negotiations;
  - On-site due-diligence visits with managers or custodians;
  - Custodial search or review of incumbent custodian and,
  - Review of and recommendations for investment manager structure (particular asset class and/or the total Fund).
- Provide advice and insight on industry developments, as required or proactively as issues arise.
- Attend and make presentations to OPG Pension Committee and OPG Board Committees as may be required.

F. Services/Deliverables: Actuarial Services for OPG’s Corporate Accounting Department

- Provide expensing analysis and annual actuarial valuations for year-end disclosure in respect of pension and non-pension benefit arrangements sponsored by OPG.
- Provide advice to OPG on the selection of actuarial assumptions used in the preparation of year-end disclosures and calculation of benefit expense in respect of pension and non-pension benefit arrangements sponsored by OPG.
- Provide projections for business planning of expensing valuations in respect of pension and non-pension benefit arrangements sponsored by OPG.
- Provide analytical support on issues such as (but not limited to):
  - changes in accounting standards related to pension and non-pension benefit arrangements
  - corporate restructuring
  - divestitures, mergers and acquisitions;
  - early retirement programs;
  - changes in pension benefits or tax legislation affecting pension plans; and
  - union negotiations.
- Provide other consulting services.

G. Other Services/Deliverables:

Project Management

Where appropriate, the Proponent will enlist designated project managers to ensure that OPG’s primes are aware of timelines and deliverables. The following project management services may be required:
- Planning and budgeting;
- Regular check-ins and e-mail updates;
- Coordination among the Proponent and OPG resources;
- Scheduling and preparing for meetings;
- 8 -

- Monthly reconciliation of budget; and
- Project debrief.

4. Timing/Term
Your responses should contemplate a 3 year contract with an option to renew for a 4th and 5th year. The commencement date of the contract is September 1, 2010 and transition must be completed by December 1, 2010.

5. Consultant’s Organization
Consultant to provide prior to award of contract. Provide names of team members and brief bios for each.

6. Mandatory Expertise Required
Refer to Schedule “A”

7. Ranked Criteria
Refer to Part I of Schedule “B”

8. Pricing
Refer to Part II of Schedule “B”

9. Additional Information Requested

Your response should include a brief description of your methodology for determining the discount rates under Section 3461 of the Canadian Institute of Chartered Accounts Handbook.

Please describe and demonstrate your experience with International Financial Reporting Standards with respect to pension and non-pension benefits.

Please outline your plan for transitioning actuarial and retirement consulting services from our current provider and give an estimate of the associated time taken together with costs.

10. Interview

After the Ranked Criteria has been evaluated, OPG may create a shortlist of potential Proponents and these Proponents may or may not be invited in for a clarification meeting and may or may not be asked for additional information.

11. RFP Schedule

Key steps and milestones in the selection process are provided below:

<table>
<thead>
<tr>
<th>Request for Proposals (RFP) Process</th>
<th>Proposed Milestones/ Durations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commencement of RFP process</td>
<td>August 6</td>
</tr>
<tr>
<td>Acknowledgement of intent to submit RFP</td>
<td>August 11</td>
</tr>
<tr>
<td>Submission of questions to RFP</td>
<td>No later than end of day August 12</td>
</tr>
<tr>
<td>Submission of Proposals</td>
<td>August 23</td>
</tr>
<tr>
<td>Request for Proposals (RFP) Process</td>
<td>Proposed Milestones/Durations</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>Review and evaluation of Proposals</td>
<td>Week of August 23</td>
</tr>
<tr>
<td>Short-listed Proponents Presentations</td>
<td>TBD</td>
</tr>
<tr>
<td>Review, selection and negotiation of final service contract with the successful Proponent</td>
<td>Week of August 30</td>
</tr>
</tbody>
</table>

**Notes:**

1. Dates and duration are estimated and subject to change.

Please note any difficulties in meeting any of the above dates due to vacations, absences etc.
PRICING SUBMISSION FORM

REQUEST FOR PROPOSALS

for

ACTUARIAL, RETIREMENT AND TOTAL COMPENSATION CONSULTING SERVICES
RFP# C2010-028
submitted by

Name of the Proponent

THIS FORM SHOULD BE SUBMITTED IN A SEPARATE SEALED ENVELOPE CLEARLY LABELLED PRICING SUBMISSION FORM
ACTUARIAL, RETIREMENT AND TOTAL COMPENSATION CONSULTING SERVICES
RFP# C2010-028

Table of Contents

1. Price .......................................................................................................................... 1
2. Pricing Information for Alternative Proposal ........................................................... 2

Schedules

Schedule 2 - Pricing Information for Alternative Proposal
PRICING SUBMISSION FORM

Actuarial, Retirement and Total Compensation Consulting Services
RFP# C2010-028

1. Price

As stated in the RFP Rules, the Pricing Submission Form will account for 30% of the total evaluation. OPG places a significant focus on value for money and expects each Proponent to take this into account with regard to pricing.

Please see the scope of services defined in detail in the Specification section of the RFP which the Proponent will be required to provide. Please note that these services will not automatically be awarded to the successful Proponent and will be required on an ad hoc basis. This information has been provided as part of this competitive bidding process to give an understanding of required services. These services will be included in the schedule to any negotiated agreement with the successful Proponent, as it will allow OPG to avoid having to negotiate separate terms if the Proponent is awarded a project.

Each Proponent will be required to provide individual pricing for one or all of the scope areas:

A. Services/Deliverables - Actuarial and Retirement Consulting Services for OPG’s Human Resources Department;
B. Services/Deliverables – Retirement Program Consulting for OPG’s Human Resources Department;
C. Service/Deliverables - Total Compensation Consulting/Benchmarking Services Supplied to OPG Human Resources
D. Services/Deliverables – Actuarial Services for OPG’s Treasury Department
E. Services/Deliverables – Investment Consulting Services for OPG’s Treasury Department
F. Services/Deliverables: Actuarial Services for OPG’s Corporate Accounting Department
G. Other Services/Deliverables: Project Management

Please note that OPG may decide not to update the valuation data annually. Please also provide estimates for the following packages of work under the specified conditions:

- funding valuation of the registered pension plan
- funding valuation of the SPS; the ESPS and the DSPS
- accounting valuation of the pension plans
accounting valuation of the other post employment benefits under the following specified conditions:

- assuming that the valuation data is updated annually
- assuming that the valuation data is not updated annually.

In the second situation, please provide estimates for

- the year data is updated, and
- the years the data is not updated.

Also provide, the hourly rates that the Proponent would charge to OPG for the services of the individuals and their titles as per example set out in the table below. Insert fixed billing rates for each year for each role that the Proponent would use in providing the services.

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Year One Hourly Rate ($)</th>
<th>Year Two Hourly Rate ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Rates would only be chargeable for services of these individuals requested and approved in writing by OPG.

2. **Pricing Information for Alternative Proposal**

Attach pricing information for the Alternative Proposal, if applicable, in Schedule 4.
Schedule 2 - Pricing Information for Alternative Proposal
PROPOSED INFORMATION FORM

REQUEST FOR PROPOSALS

for
Actuarial, Retirement and Total Compensation Consulting Services
for OPG
RFP# C2010-028

submitted by

___________________________
Name of the Proponent
PROPONENT INFORMATION FORM

Actuarial, Retirement and Total Compensation Consulting Services for OPG
RFP# C2010-028

Table of Contents

1. BASIC PROPONENT INFORMATION ................................................................. 1
2. AMENDMENTS AND CLARIFICATIONS ........................................................... 2
3. QUALIFICATIONS AND EXPERIENCE ............................................................ 2
4. SUBMISSIONS ................................................................................................. 4
5. EXCEPTIONS TO TERMS OF AGREEMENT ....................................................... 4
6. METHODOLOGY AND APPROACH ................................................................. 4
7. OTHER REQUIREMENTS OF SPECIFICATIONS ............................................... 4
8. CONFLICT OF INTEREST ................................................................................ 4
9. OTHER INFORMATION ..................................................................................... 4
10. MANDATORY CRITERIA FORM ..................................................................... 5

Schedules

Schedule 1(c) - Partnership or Joint Venture
Schedule 3(a) - Historical Performance
Schedule 3(b) - Financial Statements
Schedule 3(c) - Organisation
Schedule 3(d) - Key Individuals
Schedule 3(e) - Dispute Resolution
Schedule 3(f) - Subcontractors
Schedule 3(h) - Insurance
Schedule Error! Reference source not found. - Workplace Safety
and Insurance Board Clearance Certificate and Workplace Injury Summary Report
Schedule 4 - Submittals
Schedule 5 - Exceptions to Terms of Agreement
Schedule Error! Reference source not found. - Conflict of Interest Declaration
Schedule 8 - Other requirements as set out in the Specifications
Schedule 9 - Other Information
Schedule 0 - Mandatory Criteria Form
PROPONENT INFORMATION FORM

Actuarial, Retirement and Total Compensation Consulting Services for OPG

RFP# C2010-028

In this Proponent Information Form each capitalised term has the meaning given to it in the Invitation Letter or the RFP Rules.

1. Basic Proponent Information

(a) Name and Contact Information. Insert the name and contact information of the Proponent

____________________________________________________________________
(Full Legal Name of Proponent)
____________________________________________________________________
(Full Address)
____________________________________________________________________
(Name of Contact Individual at Proponent and E-Mail Address)
____________________________________________________________________
(Telephone Numbers – General and of Contact Individual)
____________________________________________________________________
(Fax Numbers – General and of Contact Individual)

(b) Corporation or Company. The Proponent is a corporation or company (but not a joint venture corporation or company) existing under the laws of

____________________________________________________________________
(Jurisdiction)

OR
(c) **Partnership or Joint Venture.** The Proponent is a partnership, joint venture corporation or company or contractual joint venture. Attach in Schedule 1(c) all the information requested in section 1(a) for the Proponent and for each of the Proponent’s partners, shareholders, members and joint venturers, as applicable, and, if applicable, indicate the jurisdiction under which the Proponent and each such partner, shareholder, member or joint venturer exists. In addition, indicate the percent participation or interest of each such partner, shareholder, member or joint venturer in the Proponent.

OR

(d) **Individual Using Business Name.** The Proponent is an individual carrying on business under the business style name set out in section 1(a) and the Proponent’s full legal name is

_____________________________________________________________________

OR

(e) **Individual.** The Proponent is an individual carrying on business under his or her name.

(f) **Applicable Section.** Confirm which of sections 1(b), 1(c), 1(d) and 1(e) applies: ________.

2. **Amendments and Clarifications**

By completing the table below, the Proponent confirms that the Proponent has received, reviewed and taken into consideration all of the following Amendments and Clarifications. Insert in the table below the date that the Proponent received each Amendment and Clarification.

<table>
<thead>
<tr>
<th>No.</th>
<th>Amendment</th>
<th>Clarification</th>
<th>Date Received</th>
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</tbody>
</table>

3. **Qualifications and Experience**

(a) **Historical Performance.** Attach in Schedule 3(a) details of previous experience on similar projects or providing similar services for OPG, Ontario
Hydro and other clients. Where other clients are referred to, insert in Schedule 3(a) for each such client, the name, telephone number and address of an employee of the client who can act as a reference for the Proponent. Also insert a description of the services provided, the estimated contract value/approximate annual value of services provided, the duration of the project, the date the work commenced and if the work is continuing, the expected end date and the value of all amounts claimed in any arbitration or litigation. Also insert any other details demonstrating the Proponent’s ability to provide the services.

(b) **Financial Statements.** Attach in Schedule 3(b) audited financial statements for the Proponent’s last three fiscal years. These financial statements must be for the Proponent that proposes to enter into the Agreement and not any affiliate of the Proponent. OPG may also ask for similar financial statements from any affiliate from whom OPG requires a parental indemnity. Alternatively, if financial statements are available on a website, indicate the website address. Consolidated financial statements, however, are not sufficient.

(c) **Organisation.** Attach in Schedule 3(c) the current or proposed organisational structure of the Proponent to meet the requirements identified by OPG, including the names of individuals or positions.

(d) **Key Individuals.** Attach in Schedule 3(d) the names of the key individuals that the Proponent proposes to use and identify the nature of the work that each such individual would be responsible for in providing the services. Also attach in 3(d) résumés for each of those key individuals, including all relevant qualifications and experiences.

(e) **Dispute Settlement.** Attach in Schedule 3(e) a description of each claim or other dispute in excess of $100,000 in which the Proponent was involved in the last five years for which any arbitration or court proceeding was commenced.

(f) **Subcontractors.** Attach in Schedule 3(f) the full legal name and address of each subcontractor (including suppliers) that the Proponent proposes to use under the Agreement. In Schedule 3(f) indicate the services that each subcontractor would provide.

(g) **Taxes.** The Proponent’s registration number for Canadian goods and services tax/harmonized sales tax purposes under the *Excise Tax Act* (Canada) is: 

__________________

(h) **Insurance.** Attach in the chart in Schedule 3(h) the requested information about current insurance coverages maintained by or on behalf of the Proponent. Also, attach in Schedule 3(h) a description of each insurance claim in excess of $100,000 made by the Proponent, or any subcontractor of the Proponent, in respect of services or goods provided by the Proponent in the last five years.
(i) **Workplace Safety and Insurance Board.** The Proponent’s Workplace Safety and Insurance Board number is: __________________. Attach in Schedule 3(i) copies of the Proponent’s current Workplace Safety and Insurance Board clearance certificate and current Workplace Safety and Insurance Board Workplace Injury Summary Report (WISR) or tell us why you are exempt.

4. **Submissions**

Attach in Schedule 4:

(a) Any schedule guarantees offered and your Project schedule;
(b) Your availability within the requested timeframe.

5. **Exceptions to Terms of Agreement**

Attach in Schedule 5 a comprehensive and specific list of all the proposed changes (and the reasons for each change) the Proponent wishes to make to the draft Agreement (that is a part of this RFP). These changes can be made in either a chart form or legible mark-up of the pages of the draft Agreement that the Proponent would wish to change. Please note that if any changes to the draft agreement are proposed, such Proposal will be deemed to constitute an Alternative Proposal.

6. **Methodology and approach**

Attach in Schedule Error! Reference source not found. your methodology and approach.

7. **Other requirements of Specifications**

Go through the Specifications in the RFP and ensure that you have answered all questions asked and attach any additional answers in Schedule 8.

8. **Conflict of Interest**

Attach in Schedule 8 a conflict of interest declaration. If the Proponent is a contractual joint venture, each member of the joint venture must complete a conflict of interest declaration.

9. **Other Information**

Attach in Schedule 9 any other information that the Proponent wishes OPG to consider in connection with the Proponent’s Main Proposal or any Alternative Proposal.
10. **Mandatory Criteria Form**

Attach in Schedule 10 a Mandatory Criteria form as required by Schedule A to the RFP Rules, if applicable. Clearly identify where in your Proposal the information evidencing compliance or non-compliance with the Mandatory Criteria can be found.
Schedule 1(c) - Partnership or Joint Venture

Insert the following information for each of the partners in the partnership or for each of the members or shareholders of the joint venture.

______________________________________________________________________
(Full Legal Name of Partner or Member or Shareholder of Joint Venture)
______________________________________________________________________
(Full Address)
______________________________________________________________________
(Name of Contact Individual at Partner or Member or Shareholder of Joint Venture and E-Mail Address)
______________________________________________________________________
(Telephone Numbers – General and of Contact Individual)
______________________________________________________________________
(Fax Numbers – General and of Contact Individual)
______________________________________________________________________
(Jurisdiction)
Schedule 3(a) - Historical Performance
Schedule 3(b) - Financial Statements
Schedule 3(c) - Organisation
Schedule 3(d) - Key Individuals

[Add as many rows as necessary to identify the Key Individuals that the Proponent proposes to use for the Project. Also, identify the nature of the work that each such individual would be responsible for and attach résumés for each of those key individuals, including all relevant qualifications and experiences. Incorporate additional columns if additional information is required. Use attachments if spaces below are not sufficient.]

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Title</th>
<th>Nature of work/Role</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
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</tbody>
</table>
Schedule 3(e) - Dispute Resolution
Schedule 3(f) - Subcontractors

[Add as many rows as necessary to identify each subcontractor (including suppliers) that the Proponent proposes to use under the Agreement.]

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Address</th>
<th>Description of goods/services to be provided</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>
## Schedule 3(h) - Insurance

<table>
<thead>
<tr>
<th>Type of Insurance</th>
<th>Name of Insurer</th>
<th>Policy Number</th>
<th>Amount</th>
<th>Expiry Date</th>
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</tbody>
</table>
Schedule 3(i) - Workplace Safety and Insurance Board Clearance Certificate and Workplace Injury Summary Report
Schedule 4 - Submittals
Schedule 5 - Exceptions to Terms of Agreement

[Include a comprehensive and specific list of all proposed changes (and reasons for each change) that the Proponent wishes to make to the draft Agreement (that is part of this RFP). These changes can be made in either a chart form or legible mark-up of the pages of the draft Agreement that the Proponent would wish to change. If using a chart form set out below, add as many rows as necessary to identify all proposed changes.]

<table>
<thead>
<tr>
<th>No.</th>
<th>Section</th>
<th>OPG Language</th>
<th>Proposed Change</th>
<th>Rationale</th>
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<tbody>
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</tbody>
</table>

---
Schedule Error! Reference source not found. - Other Requirements as set out in Specifications
Schedule 8 - Conflict of Interest Declaration

CONFLICT OF INTEREST DECLARATION

To: Ontario Power Generation Inc.

Re: [Insert Name of the Project] (the “Project”)

The undersigned (the “Proponent”) hereby declares that, except as disclosed, accurately and completely, in Schedule A:

1. no director, officer or employee of, (a) Ontario Power Generation Inc. (“OPG”), (b) any affiliates of OPG, or (c) any contractor to OPG which is working on the Project or any affiliates of such contractor, and no immediate family member of any such individual, has any connection or relationship with, or any pecuniary interest in, the Proponent or any affiliate[ partner, member or shareholder] of the Proponent;

2. neither the Proponent nor any affiliate of the Proponent has within its possession or control, and neither the Proponent nor any affiliate of the Proponent has at any time received, read or reviewed, any information not otherwise in the public domain respecting the Project, regardless of the manner that such information was transmitted, obtained, read or reviewed, other than information made available to all Proponents by OPG or information delivered as a clarification by OPG to the Proponent;

3. no current or former director, officer, employee or contractor of OPG, with information not otherwise in the public domain respecting the Project, has, directly or indirectly, provided information to, or assisted, the Proponent in any manner whatsoever in respect of any proposal of the Proponent respecting the Project;

4. the Proponent does not now have nor has it ever had any other arrangement, contract, alliance, connection or relationship with OPG, any affiliate of OPG or any of their directors, officers or employees that may in any way affect or impair the integrity or public perception of the integrity of the request for proposals process respecting this Project, or give rise to a conflict of interest or the appearance of a conflict of interest; and

5. the Proponent has made all necessary inquiries and investigations to permit the Proponent to make this Declaration.

1 What to Do with the Wording in Brackets. Insert these words if a Proponent is a partnership or joint venture corporation or company. If the Proponent is a contractual joint venture, each joint venturer should sign a declaration.
Dated ________________, 2_____.

2

By: ___________________________
Name: ³
Title: ⁴

By: ___________________________
Name: 
Title:
SCHEDULE A to Conflict of Interest

[Note to Draft: The Proponent must complete this Schedule A, setting out accurately and completely, any exceptions to the statements made in the Declaration. If there are no such exceptions, the Proponent must insert the word “nil” in this Schedule A.

If there are exceptions set out in this Schedule A, the Proponent should submit to OPG, as a separate document, the Proponent’s suggested measures for addressing each such conflict or potential conflict. OPG will review such suggested measures and determine whether, in OPG’s opinion, such measures satisfactorily address the conflict or potential conflict. If the conflict or potential conflict cannot be addressed to the satisfaction of OPG, OPG may, in its sole and absolute discretion, disqualify the Proponent.]

5 Declaration to be Referenced in the Criteria. Ensure that the Criteria in the Request for Proposals document expressly references this Declaration.
Schedule 100 - Mandatory Criteria Form
### Compensation Data

#### A. Employee Name
- **Name:**
- **Employee Number:** 123456
- **Organization:** Org

#### B. General Data
- **Date:**
  - 31-Dec-2009 to 01-Jan-2010
- **Position:** Same
- **Band:** Same
- **Base Salary Range:** $XXX,000-$XXX,000
- **Annual Incentive Plan:** Same

#### C. Personal Data
- **Date (31-Dec):**
  - **Base Salary:** $xxx,xxx
  - **Annual Incentive - Actual:** $xxx,xxx
  - **Annual Incentive - Target:** $xxx,xxx
  - **Annual Incentive - Other:** $xxx,xxx
  - **PowerFlex Value:** $xxx,xxx
  - **Total Cash:** $xxx,xxx
  - **Value of Benefits:** $xxx,xxx
  - **Total Remuneration:** $xxx,xxx

---

**TO ALL MANAGEMENT GROUP (MG) STAFF**

This statement summarizes your compensation data including: Base Salary, Annual Incentive, PowerFlex, Total Cash, Estimated Value of Benefits, Total Remuneration. For a more detailed explanation on these various components, check the OPG website or the Plan documents. This incorporates the 2009 salary review and Annual Incentive Program payout for the 2009 Plan Year. This data is used only as a guide, together with other factors, in considering any compensation adjustments. It must further be remembered that actual cash compensation, plan designs and actuarial assumptions influence pension and benefit values. (Pension and benefit values may change from year to year to reflect adjustments to compensation, emerging economic conditions and inflation, as well as changes to the plans themselves.)
More specific definitions and descriptions are on the reverse side of this sheet.
### Change in benefit obligation
- Benefit obligation - end of prior period
- Current service cost (employee)
- Interest cost
- Employee contributions
- Benefits paid
- Actuarial loss (gain)
- Transfer to NIVO
- Plan amendments
- Benefit obligation - end

### Change in plan assets
- Market value of plan assets - end of prior period
- Actual return on plan assets
- Employee contributions
- Employee contributions
- Benefits paid
- Transfer to NIVO
- Market value of plan assets - end

### Reconciliation of funded status (beginning of period)
- Funded status - surplus (deficit)
- Unamortized transitional obligation (asset)
- Unamortized past service costs
- Unamortized net actuarial loss (gain)
- Accrued benefit asset (liability)
- Unamortized net actuarial loss (gain), market value
- Difference between market value and market related value
- Unamortized net actuarial loss (gain), market related value
- 10% Corridor Threshold
- Unamortized actuarial loss (gain) subject to amortization
- EAPSL in retirement age
- Amortization of net actuarial loss (gain)

### Reconciliation of funded status (end of period)
- Funded status - surplus (deficit)
- Unamortized transitional obligation (asset)
- Unamortized past service costs
- Unamortized net actuarial loss (gain)
- Accrued benefit asset (liability)

### Components of expense
- Current service cost (including provision for plan expense
- Interest cost
- Expected return on plan assets
- Amortization of transitional obligation (asset)
- Amortization of past service costs
- Amortization of net actuarial loss (gain)
- Surplus transferred (NIVO)
- Net expense (income)

### Assumptions - Beginning of Year
- Discount rate
- Rate of compensation increase
- Rate of inflation
- Return on assets
- Mortality

### Data
- Estimated Pensionable Earnings (beginning of period) \(^1\)

\(^1\) The estimated pensionable earnings exclude LTD numbers.
Amendment No. 2 to RFP #C2010-028 Actuarial, Retirement and Total Compensation Consulting Services dated August 13, 2010

This Amendment is to extend the closing date of the captioned RFP from the Original Closing Date of August 23, 2010 at 4:45PM EST to the new closing date of August 30, 2010 at the same time – 4:45PM EST. All other Rules apply.

Catherine Giorgetti
Senior Supply Chain Specialist
Ontario Power Generation
SEC Interrogatory #81

Issue Number: 6.6
Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Reference: [F4/3/1, Attach 1]

Please provide a copy of the Attachment 1 in MS Excel format.

Response

Please find attached as Attachment 1 to this response a copy of Ex. F4-3-1, Attachment 1 in MS Excel format.
Filed: 2016-10-26

Filed: 2016-05-27

EB-2016-0152

EB-2016-0152

Exhibit L, Tab 6.6
Numbers may not add due to rounding

Schedule 15 SEC-081, Attachment 1

Line
NUCLEAR FACILITIES
No.

1
2
3
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9
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12
13
14
15
16
17
18
19
20
21
22
23

2014
Actual

2015
Actual

2016
Budget

2017
Plan

2018
Plan

2019
Plan

2020
Plan

2021
Plan

(a)

(b)

(c)

(d)

(e)

(f)

(g)

(h)

(i)

FTEs

FTEs

FTEs

FTEs

FTEs

FTEs

FTEs

FTEs

FTEs

Subtotal

578.6
2,008.5
4,026.9
60.2
6,674.2

553.1
1,922.2
4,002.4
69.6
6,547.3

521.7
1,893.7
3,975.2
94.2
6,484.8

573.3
2,089.7
4,164.9
119.6
6,947.4

605.8
2,119.0
4,162.8
170.7
7,058.4

602.9
2,117.1
4,165.6
172.1
7,057.7

606.2
2,065.9
4,173.2
139.6
6,984.9

596.0
1,994.4
4,015.4
165.1
6,770.9

583.2
1,955.1
3,885.7
213.1
6,637.0

Subtotal

382.2
607.1
930.2
0.0
1,919.5

376.0
625.6
882.8
0.0
1,884.4

368.6
590.3
658.0
12.0
1,628.9

353.6
664.2
739.5
16.0
1,773.3

352.7
665.5
708.7
16.0
1,742.8

347.3
652.8
687.6
16.0
1,703.7

339.6
642.2
682.0
16.0
1,679.8

337.6
638.9
666.6
16.0
1,659.0

337.4
636.9
665.9
16.0
1,656.2

Total

960.8
2,615.5
4,957.1
60.2
8,593.7

929.1
2,547.8
4,885.2
69.6
8,431.8

890.3
2,484.0
4,633.2
106.2
8,113.7

926.9
2,753.9
4,904.3
135.6
8,720.7

958.5
2,784.5
4,871.4
186.7
8,801.2

950.2
2,769.9
4,853.2
188.1
8,761.4

945.7
2,708.1
4,855.3
155.6
8,664.7

933.6
2,633.3
4,681.9
181.1
8,429.9

920.6
2,592.0
4,551.5
229.1
8,293.2

Nuclear - Direct
Management
Society
PWU
EPSCA

Nuclear - Allocated
Management
Society
PWU
EPSCA

NUCLEAR FACILITIES
Management
Society
PWU
EPSCA

Salary & Incentive Pay

25
26
27
28
29
30
31
32
33
34
35

Management
Society
PWU
EPSCA

36

Benefits

37
38
39
40
41
42
43
44
45
46

Management
Society
PWU
EPSCA

47

Management

48
49
50
51
52
53

Society
PWU
EPSCA

Attachment 1

2013
Actual

Staff (Regular and Non-Regular)

24

Ex. F4-3-1

(including Fiscal Adjustment)

Total
Overtime
Management
Society
PWU
EPSCA
Total
(Current Benefits and Pension & OPEB)

$M

$M

$M

145.8
318.9
502.1
8.9
975.7
$M
0.0
46.8
110.5
1.8
159.2

147.8
312.9
507.0
10.6
978.4
$M
0.0
32.2
83.4
1.9
117.6

144.1
310.8
487.3
14.3
956.5
$M
0.0
36.8
89.4
5.7
132.0

$M

$M

$M

$M
147.2
348.9
535.8
13.6
1,045.6
$M
0.0
33.1
77.5
1.3
111.9
$M

$M
152.9
361.0
549.1
19.1
1,082.1
$M
0.0
36.0
79.6
1.8
117.5
$M

$M
153.5
367.3
555.2
19.3
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$M
0.0
35.7
78.4
1.7
115.7
$M

$M

$M

155.0
363.0
565.2
16.3
1,099.5
$M
0.0
36.8
80.3
1.5
118.6
$M

154.8
362.1
560.4
19.3
1,096.7
$M
0.0
30.4
69.9
1.6
101.9
$M

$M
153.7
363.5
553.9
25.0
1,096.1
$M
0.0
24.0
54.6
2.5
81.1
$M

Total

57.8
147.1
194.0
0.5
399.5

48.7
117.7
174.8
0.6
341.9

51.3
136.3
228.6
1.0
417.2

50.2
141.0
200.2
5.1
396.5

52.6
145.0
201.8
7.2
406.5

51.4
141.7
200.0
7.2
400.3

51.8
142.8
204.6
6.1
405.2

51.6
142.5
203.1
7.2
404.4

51.0
143.1
201.4
9.4
404.9

Current Benefits (Statutory)
Current Benefits (Non-Statutory)
Pension & OPEB (Current Service)*
TOTAL COMPENSATION

56.5
48.3
294.7
$M

55.6
47.5
238.8
$M

58.7
47.2
311.3
$M

56.1
63.2
277.2
$M

58.2
65.1
283.2
$M

57.2
64.5
278.7
$M

57.4
64.2
283.6
$M

57.5
64.0
283.0
$M

57.7
65.1
282.1
$M

203.6

196.6

195.4

197.5

205.5

204.8

206.8

206.4

204.8

512.8
806.6
11.3
1,534.4

462.9
765.3
13.1
1,437.8

483.9
805.4
21.0
1,505.7

523.0
813.5
20.0
1,554.0

542.0
830.5
28.2
1,606.1

544.7
833.7
28.2
1,611.4

542.6
850.0
23.8
1,623.3

535.0
833.5
28.2
1,603.0

530.7
809.9
36.9
1,582.2

Total
*presented on an accrual basis

L-06.6-15 SEC-081_Attachment 1.xlsx


SEC Interrogatory #82

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
[F4/3/1, Attach 2]

With respect to the Willis Towers Watson study:

a. Please provide a chart showing the difference between the comparators used for each category (utility, nuclear, and general industry) in the Aon Hewitt study filed in EB-2013-0321, and the Willis Towers Watson study filed in evidence in this proceeding. Please explain any changes made.

b. Please detail a methodological difference between the Willis Towers Watson study and the Aon Hewitt study filed in EB-2013-0321.

Response

a. Attachment 1 provides the comparator organizations used for each segment (utility, nuclear, and general industry) in the Aon Hewitt study filed in EB-2013-0321, and the Willis Towers Watson study filed in Ex. F4-3-1, Attachment 2.

Agreement of external organizations to participate in the surveys used to prepare the benchmarking study is a primary driver for changes in specific companies selected.

Other factors contributing to individual organization changes included:
- expansion into the United States for the Nuclear Authorized segment to improve the level of matches available for authorized positions (there are very few nuclear power generators in Canada)
- restricting general industry comparators to Ontario based organizations (rather than Canada wide), reflecting a mix of 50% public and 50% private.

OPG notes that the specific organizations utilized in the AON study for the General Industry is not available.

b. Please refer to L-06.6-1 Staff 149 for an explanation of key differences.
## Comparator Organizations Used in OPG Compensation Benchmarking Studies

<table>
<thead>
<tr>
<th>Line No.</th>
<th>Comparator Organizations</th>
<th>Willis Towers Watson</th>
<th>AON Hewitt</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Utility</td>
<td>Nuclear</td>
</tr>
<tr>
<td>1</td>
<td>Alcoa Canada</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Barrick Gold</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Kinross Gold Corporation</td>
<td>X</td>
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<td>4</td>
<td>Rio Tinto Alcan Canada</td>
<td>X</td>
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<td>43</td>
<td>Canadian Pacific Railway Ltd</td>
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<td>Canadian National Railway</td>
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## Comparator Organizations Used in OPG Compensation Benchmarking Studies

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<th>Line No.</th>
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## Comparator Organizations Used in OPG Compensation Benchmarking Studies

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<th>Line No.</th>
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<td>AON Hewitt's Total Compensation Measurement Survey</td>
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<td>109</td>
<td>Mercer Benchmark Database (MBD)</td>
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SEC Interrogatory #83

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
[F4/3/1, Attach 2]

With respect to the Willis Towers Watson study:

a. What percentage of OPG’s employees, that are either directly assigned or allocated (at least in part) to the nuclear facilities, are in each of the Utility, Nuclear, or General Industry comparator category?

b. For each employee category (PWU, Society, Mgmt Group, and Total), please provide the cost impact, for each year of the test period, if OPG was at the 50% median, for each comparator category (Utility, Nuclear, General Industry, Total). Please only include the cost impact as they relate to costs that are either directly attributable to or allocated to the nuclear facilities. Please provide all assumptions used in the calculation.

Response

a. OPG estimates that approximately 68% of employees associated with OPG’s Nuclear Regulated Facilities are in the Utility segment, 5% in the Nuclear Authorized segment, and 27% in the General Industry segment.

b. The compensation benchmarking results captured in Ex. F4-3-1, Attachment 2, provide directional information to understand how OPG’s compensation compares with the market place as of April, 2015. In Willis Towers Watson’s experience, most organizations use this information by considering a range of pay around their desired reference point given the variability within the market data. Typical practice is to consider actual compensation that falls within +/- 10% of the organization’s targeted market positioning to be “at market”. For OPG, this is the +/- 10% to the 50th percentile or, in the case of a small portion of the population in the nuclear authorized segment +/- 10% of the 75th percentile targeted due to scope and complexity. OPG’s overall positioning for total direct compensation currently falls within that market range.

Cost impacts associated with OPG’s total direct compensation being above or below the specific targeted market positioning as of April, 2015 can be estimated for the data included in the study, and have been estimated by Willis Towers Watson for total OPG.
OPG attributed the total OPG cost impact estimates of above target total direct compensation determined by Willis Towers Watson to the nuclear facilities based on the proportion of total OPG FTEs associated with the nuclear facilities. This yielded a cost impact of approximately $30M for the nuclear facilities of being 5% above the targeted marketed positioning. This is comprised of approximately $29M for PWU represented employees and approximately $15M for Society represented employees, and is offset by Management Group employees where OPG’s costs are approximately $14M below the 50th percentile. OPG notes that the applicability of these point-in-time benchmarking results to a future period is speculative, as wage increases and compensation changes in the market place are not known.

Cost impacts associated with OPG pension and benefits benchmarking above market are not available because the benchmarking is based on the value of these forms of compensation to the employee, not the cost to the employer. Willis Towers Watson describes this at Ex. F4-3-1, Attachment 2, p. 35:

> The methodology used determines the value to employees of each organization’s benefits program by plan. The purpose is to quantify the provisions offered by each organization. The pension and benefit plan values are determined by applying a common set of actuarial methods and assumptions to employee profiles (these values are not intended to represent actual plan/program costs).

The approach followed by Willis Towers Watson in conducting the pension and benefits benchmarking analysis is consistent with the prevalent industry practice for the competitive benchmarking of employee pension and benefits, and is similar in this regard to the previous benchmarking study prepared by AON Hewitt (see EB-2013-0321, Ex. F5-4-1, p. 65).
SEC Interrogatory #84

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
[F4/3/1, Attachment 3]

With respect to the Willis Towers Watson Comparison of Salary Schedules for Society and PWU rules (OPG vs Bruce Power):

a. Please confirm the weekly and yearly salaries for OPG employees are based on the band amount contained in the collective agreement, and not an average of actual base salary compensation paid to all employees in each OPG band?

b. As of April 2015, for each OPG position listed, how many employees due to grandfather provisions in the collective agreements are paid above the maximum pay amount in their respective pay band?

Response

a. Confirmed.

b. Figure 1 and Figure 2 below capture the number of employees that were paid above the maximum pay amount in their respective pay band as of April 2015 for the PWU and Society positions listed due to grandfather provisions in the collective agreements.
### Figure 1 - PWU Staff Above Band

<table>
<thead>
<tr>
<th>OPG Band</th>
<th>Job Titles</th>
<th>Number of Staff Above Band</th>
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</thead>
<tbody>
<tr>
<td>Authorized</td>
<td>Authorized Nuclear Operators (including Trainees, excluding supervisors)</td>
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<tr>
<td></td>
<td>Certified Unit 0 Control Room Operator (including Trainees)</td>
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</tr>
<tr>
<td>Band 3</td>
<td>Nuclear Operator (including Trainees)</td>
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</tr>
<tr>
<td></td>
<td>Electrical &amp; Control Techn &amp; Technologist</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Mechanical Technician &amp;Technologist</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Chemical Technician</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Planning &amp; Cost Control Technician / Cost &amp; Scheduling Technician</td>
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</tr>
<tr>
<td></td>
<td>Project Technician</td>
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<tr>
<td>Band 2</td>
<td>Civil &amp; Service Trades Maintainer</td>
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<td></td>
<td>Nuclear Security Officer</td>
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<td></td>
<td>Emergency Response Maintainer</td>
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<td></td>
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<td>Band 1</td>
<td>Office Support Representative I</td>
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**Table Total:** 286

### Figure 2 - Society Staff Above Band

<table>
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<th>OPG Band</th>
<th>Sample Job Titles</th>
<th>Number of Staff Above Band</th>
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<td>Authorized</td>
<td>Shift Supervisor in Training</td>
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<td>Control Room Shift Supervisor, Training Supv</td>
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<tr>
<td>MP6 40</td>
<td>Section Manager Outage, Real Time Markest Supv (Shift)</td>
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<tr>
<td>MP5 40</td>
<td>Project Site Supervisor, Real Time Markets Specialist (Shift)</td>
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<tr>
<td>MP4 40</td>
<td>FLM, Control/Mechanical / Trades Mgmt Supv, Hydroelectric</td>
<td>22</td>
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<tr>
<td>MP3 40</td>
<td>FLM, Civil Maintenance</td>
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<tr>
<td>MP6 35</td>
<td>Section Head Information Systems, Senior Performance Improvement Off</td>
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<td>MP5 35</td>
<td>Sr Engineer/Scientist - Specialist</td>
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<tr>
<td>MP4 35</td>
<td>Senior Technical Engineer/Officer, Eng/Applied Science Trainee</td>
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<td>MP3 35</td>
<td>Assistance Procurement Specialist, Financial Analyst</td>
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<tr>
<td>MP2 35</td>
<td>Materials Co-ordinator, Support Specialist</td>
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**Table Total:** 273
**SEC Interrogatory #85**

**Issue Number: 6.6**

**Issue:** Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

**Interrogatory**

**Reference:**

[F4/3/2]

**With respect to the pension benefits:**

a. Please provide a detailed summary of the assumed returns for each asset class of the assets or forecast assets of the pension plans.

b. Please provide the current investment guidelines for each plan including any expectations related to returns by asset class.

c. If external investment managers or advisors have arrangements to invest components of the plan assets, please provide the contracts or other documents related to those arrangements that set out expected, forecast, or benchmark returns by asset class.

**Response**

a), b) and c)

The table below outlines the target asset mix for the OPG registered pension plan and the expected long-term returns for each asset class calculated by Aon Hewitt, OPG’s independent actuary, as reflected in the latest actuarial funding valuation of the plan. The valuation is as of January 1, 2016 and is provided in Ex. L-6.6-1 Staff-156 Attachment 1 (page 32 shows the target asset mix). The table below also identifies the indices used as performance benchmarks for each asset class. The benchmarks are determined based on the actual performance of the indices for the period.
<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Target Asset Mix</th>
<th>Expected Return (30 yrs)</th>
<th>Benchmark</th>
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<td>FTSE TMX 91-Day Treasury Bill</td>
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<td>Canadian Structured Fixed Income</td>
<td>15.0%</td>
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<td>58% FTSE TMX Long Term Federal Province Bond Index</td>
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<td>Canadian Corporate Fixed Income</td>
<td>3.0%</td>
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The above expected long-term returns are determined by Aon Hewitt using a Monte Carlo simulation, taking into account current market factors, historical relationships between equities and fixed income instruments, expectations of long-term inflation, current market yields on fixed income instruments, and expected risk premiums above risk-free investment returns. A Monte Carlo simulation is then used to project the best estimate return for the overall asset portfolio, assuming annual rebalancing. OPG is not providing contracts with its fund managers (of which there are approximately 50), as these contracts do not form the basis for determining expected long-term returns used as inputs into the actuarial valuations. OPG does not believe that these contracts are relevant to the assessment of pension costs before the OEB, or any other issue on the approved Issues List.
SEP Interrogatory #13

Issue Number: 6.6
Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref: Exh F4-3-1 p6 “… in 2015, Nuclear attrition was at its highest level in years, with over 300 retirements” (“These retirements include only those reporting to the Nuclear organization directly. Attrition associated with support staff attributed to the prescribed nuclear facilities is not reflected in this number.”)

a) Please provide a table showing Nuclear Direct Regular staff for 2013 until 2021 broken down by Management, Society, PWU and EPSCA trades. Exclude PWU “Term Employees” from the table.

b) In the table created in a), please provide annual actual and forecast retirements for 2013 until 2021 broken out by the four staff categories.

c) In the same table, please provide actual and forecast annual total attrition and attrition excluding retirement.

Response

a) Table 1 below shows regular employee headcount for the Nuclear organization for 2013 to 2015 and projections for 2016 to 2021. This information is not available for EPSCA trades and excludes Term employees.

Table 1: Nuclear Regular Employee Headcount

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b) and c)

Witness Panel: Corporate Groups, Compensation
Table 2 below shows actual attrition for the Nuclear organization for 2013 to 2015 and forecast attrition for 2016 to 2021, broken down by PWU, Society and Management. OPG does not have attrition information for EPSCA trades, and Term employees are excluded. Retirements are shown separately from other attrition in Table 2.

Table 2 - Nuclear Regular Employees - Actual and Forecast Attrition By Representation

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R = Retirement Attrition
O = Other Attrition

Notes
1. Includes Nuclear Operations and Nuclear Refurbishment
SEP Interrogatory #14

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Ref Exh F4-3-1, Attachment 1 “FTE, Compensation and Benefit Information for OPG’s Nuclear Facilities (“Appendix 2k”) “

a) Please provide versions of this table for Regular staff only and Non-Regular staff only.

Response

Attachment 1 to this response depicts FTE, Compensation and Benefit Information for OPG’s Nuclear Facilities, for each of regular staff and non-regular staff. OPG notes that overtime and benefit information was not available for the period prior to 2015, as reflected in Attachment 1 to this response.
### Appendix 2K - Regular FTE

Numbers may not add due to rounding

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*presented on an accrual basis
### Appendix 2K - Non-Regular FTE

Numbers may not add due to rounding

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*Not available prior to 2015
SEP Interrogatory #15

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Reference:
Ref Exh F2-1-1, p13

“In 2015, actual FTEs were below budgeted FTEs primarily due to higher than planned attrition of Nuclear Operations regular staff, which, because of hiring lags, was managed through the use of non-regular staff, overtime and purchased services.”

a) What is the typical hiring lag for Nuclear Operations regular staff?

b) What is the typical period of time for Nuclear Operations new hires to become “fully competent”.

c) In 2015, what were the total contractor ftes and cost?

Response

a) Integrated fleet staffing plans (including Nuclear Operation) are developed to ensure sufficient resources are available for safe and reliable operation and for the lag time between attrition and recruitment of new hires to be mitigated. Lag time is not tracked as OPG does not necessarily wait for staff to retire before the hiring process begins. The goal is to establish staffing plans to manage the allocation of resources across the nuclear fleet. These staffing plans optimize the resources between sites within key functional areas, and provide the input for yearly external recruitment of staff based on attrition data, to maintain an adequate number of qualified staff.

b) Newly hired Nuclear Operators go through a formal training program of 18 month duration prior to be qualified in the generating unit stream. Following the completion of the standard 18 months formal nuclear operator training, an oral review board is conducted by the operator’s supervisor before the operator is deemed “fully competent” for the minimum complement role and placed on shift.

c) OPG obtains contractor services through non-regular staff, augmented staff and other purchased services.

As per Ex. F2-1-1 Table 3, Nuclear Operations had 670 non-regular staff FTEs in 2015. Augmented staff and other purchased services contractors are not quantified as FTEs.

Witness Panel: Nuclear Operations and Projects
Base OM&A includes contractor costs for 2015 of $30.2M for non-regular labour, 1 $4.4M for augmented staff and $108.4M for other purchased services (see Ex. F2-2-1 Table 2). Outage OM&A includes contractor costs for 2015 of $19.9M for non-regular labour, $25.8M for augmented staff and $123.3M for other purchased services (see Ex. F2-4-1 Table 3).

1 The non-regular labour amount is included in the total labour amount as shown in Ex. L-6.1-2 AMPCO-109 (b).

Witness Panel: Nuclear Operations and Projects
VECC Interrogatory #31

Issue Number: 6.6

Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Interrogatory

Reference:
Reference: F4/T3/S1/pg.22 & Attachment 3

a) The evidence states that a comparison of OPG wages with those provided by Bruce Power was undertaken by Towers. Attachment 3 there are tables showing such comparisons for Society and PWU employees. However we are unable to locate a similar table for management employees. Was such a comparison done? If so please provide the comparison table. If not please explain what analysis was done to compare OPG management costs with those of Bruce Power.

Response

No, a similar comparison of wages for management employee was not undertaken. Wages for PWU and Society employees at Bruce Power is publicly available information; however, this information is not publicly available for management employees at Bruce Power. As a result, OPG was not able to undertake a similar analysis to Ex. F4-3-1, Figure 12 and Attachment 3 for management employees.
VECC Interrogatory #32

Issue Number: 6.6
Issue: Are the test period human resource related costs for the nuclear facilities (including wages, salaries, payments under contractual work arrangements, benefits, incentive payments, overtime, FTEs and pension costs, etc.) appropriate?

Reference: F4/T3/S1/pgs. 17-18

a) Please confirm that OPG has spent $212.85 million for Hydro One shares (9M x $23.65). If this is not correct please provide the actual cost.

b) How/where is this asset recorded for the purpose of regulatory accounting?

Response

a) Confirmed.

b) The Hydro One shares asset is held corporately rather than as an asset of the regulated business and therefore has not been reflected for regulatory accounting purposes. Accordingly, the shares are not included in the regulated rate base, and as noted at Ex. F4-3-1, p. 17, line 26 to p. 17, line 1, the ratepayers are protected from fluctuations in the market price of the shares.
Board Staff Interrogatory #165

Issue Number: 6.7

Issue: Are the corporate costs allocated to the nuclear businesses appropriate?

Interrogatory

Reference:
Ref: Exh F3-1-1 Table 7

a) Please provide reasons for the 16% increase in Supply Chain costs from 2015 to 2016. Please also explain if the factors that caused the increase are expected to continue in the test years.

b) The actual expenditures for 2013 - 2015 average $44M. The average forecast for Supply Chain costs for the period 2017-2021 is $48.3M. What are the reasons that have caused OPG to increase the test year forecast for Supply Chain costs by 10% compared to actuals?

Response

a) Supply Chain costs increase by $6.5M from 2015 to 2016 mainly due to the implementation of the equipment reliability initiative, inflationary increases, and hiring lags. The inflationary increases are expected to continue in the test years.

b) Supply Chain costs increase for the test period mainly due to inflationary increases and incremental headcount for procurement oversight of supplier quality and vendor management.
Board Staff Interrogatory #166

Issue Number: 6.7

Issue: Are the corporate costs allocated to the nuclear businesses appropriate?

Interrogatory

Reference:
Ref: Exh F3-1-1 Table 7

a) What are the reasons for the increase in Real Estate Service costs from $82.5M in 2015 to $94.5M in 2017? Please identify the factors that caused the increase and are these factors expected to continue in the test years?

b) The average of test year costs is $95.3M and represents a 12% increase compared to the average of actual costs for the most recent period (2013-2015), which is $84.7M. What are the factors that have caused OPG to increase the test year forecast for Real Estate costs by 12% compared to actuals?

Response

a) Real Estate costs increase from $82.5M in 2015 to $94.5M in 2017 due to incremental lease costs for OPG Head Office, inflationary increases, and higher labour costs as a result of the 53 week year in 2017. The inflationary increases and lease costs for OPG Head Office are expected to continue in the test years. The Asset Service Fees related to OPG’s Head Office are discontinued and replaced by the lease costs in the test years as described in Exhibit F3-2-1, page 5.

b) Real Estate costs increase during the test period primarily due to the incremental lease costs for OPG Head Office. As stated above in part (a), there are no Asset Service Fees related to OPG’s Head Office in the test years.
Board Staff Interrogatory #167

Issue Number: 6.7

Issue: Are the corporate costs allocated to the nuclear businesses appropriate?

Interrogatory

Reference:
Ref: Exh F3-1-1 Table 3

Please provide the reasons for the increase in Corporate Centre costs from $26.9 M in 2014 to $44.3M in 2016. What are the factors that caused the increase and does OPG expect these factors to continue in the test years?

Response

The increase in Corporate Centre costs from $26.9M in 2014 to $44.3M in 2016 is due to the transfer of the Assurance group from Finance, a budget transfer of legal fees associated with labour relations from People and Culture, and incremental costs for independent oversight advisors reporting to the Darlington Refurbishment Committee of OPG’s Board of Directors. These costs are expected to continue in the test years.
Board Staff Interrogatory #168

Issue Number: 6.7

Issue: Are the corporate costs allocated to the nuclear businesses appropriate?

Interrogatory

Reference:
Ref: Exh F3-1-1 Attachment 1 page 6
The Hackett Group benchmarked corporate support functions and costs. Some OPG functions were excluded from benchmarking to facilitate comparisons.

Please explain why training, security and warehouse management were excluded from the comparisons.

Response

OPG followed the Hackett Group’s benchmarking taxonomy. As indicated in Ex. F3-1-1 Attachment 1, page 6, OPG’s training, security, and warehouse management are functions considered to be out of scope according to this taxonomy and “were not included in the benchmark to facilitate an apples to apples comparisons to the peer.”
**Board Staff Interrogatory #169**

**Issue Number: 6.7**  
**Issue:** Are the corporate costs allocated to the nuclear businesses appropriate?

**Interrogatory**

**Reference:**  
Ref: Exh F3-1-1 page 14  
Ref: EB-2010-0008 Exh F5-3-2

Figure 1 on page 14 presents a summary of corporate cost benchmarking results.

a) Are the peer results at column (c) at 2014?

b) In EB-2010-0008, OPG filed a Finance benchmarking report prepared by the Hackett Group. The report included reporting by peer group quartiles. What was OPG’s performance by quartile for each corporate function in 2010 and 2014?

c) For the 2017-2021 test period, please provide IT cost per end user, HR cost per employee, finance cost as a percent of forecast revenue and ECS cost as a percent of forecast revenue.

**Response**

a) As shown in Ex. F3-1-1, Attachment 1, p. 6, all data is represented in 2014 Canadian Dollars for comparison purposes.
   - PPP (Purchasing Power Parity) was used to adjust the peer data from US to Canadian Dollars
   - A 2%/year inflation rate was applied to the peer companies and OPG’s 2010 costs/revenue to normalize the data to 2014 Canadian Dollars

b) Attachment 1 to this response is OPG’s performance by quartile as provided by the Hackett Group. Note, Attachment 1 is marked “confidential”, however, OPG has determined this attachment to be non-confidential in its entirety.

c) Referring to the 2014 values at Ex. F3-1-1, Attachment 1, and forecasted corporate costs in Ex. F3-1-1, OPG has completed a high level estimate of the HR cost per employee, finance cost as a percent of forecast revenue and ECS cost as a percent of forecast revenue for OPG’s nuclear business for 2017-2021, as illustrated in Chart 1 below. IT cost per end user is not included as OPG does not forecast end users.

**Chart 1:** Estimate of 2017-2021 HR cost per employee, Finance cost as a percent of forecast revenue and ECS cost as a percent of forecast revenue, for OPG’s nuclear business.
OPG notes that the values indicated in Chart 1 above represent an estimate based on information available to OPG, and have not been derived using the Hackett Group’s taxonomy applied to 2010 and 2014 costs, or otherwise vigorously vetted by a similar taxonomy, as this is not an exercise OPG performs in its normal course of business.

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<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR per employee</td>
<td>$2,659</td>
<td>$2,661</td>
<td>$2,695</td>
<td>$2,781</td>
<td>$2,839</td>
</tr>
<tr>
<td>ECS as a %</td>
<td>2.84</td>
<td>2.85</td>
<td>2.95</td>
<td>2.58</td>
<td>2.81</td>
</tr>
<tr>
<td>Finance as a %</td>
<td>0.78</td>
<td>0.78</td>
<td>0.81</td>
<td>0.71</td>
<td>0.77</td>
</tr>
</tbody>
</table>
Benchmarking Study of OPG’s Corporate Support Functions and Costs – Quartile Data
September 2016
Finance and HR Quartile Data

**Finance Cost as a % of revenue**

- **Quartile 4**: 1.61%
- **OPG 2010** – 1.02%
- **OPG 2014** – 0.75%

- **Quartile 3**: 1.01%

- **Quartile 2**: 0.66%

- **Quartile 1**: 0.45%

**HR Cost per employee**

- **Quartile 4**: $6,928
- **OPG 2010** – $3,400
- **OPG 2014** – $3,375

- **Quartile 3**: $4,751

- **Quartile 2**: $3,350

- **Quartile 1**: $2,673

- **Quartile 1**: $2,083
IT and ECS Quartile Data

**IT Cost Per End User**

- **Quartile 1**: $8,240
- **Quartile 2**: $12,781
- **Quartile 3**: $14,495
- **Quartile 4**: $29,427

**ECS Cost as a % of revenue**

- **OPG 2010** - 3.39%
- **OPG 2014** - 2.75%

- **Quartile 1**: 0.04%
- **Quartile 2**: 1.07%
- **Quartile 3**: 1.81%
- **Quartile 4**: 2.21%
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Board Staff Interrogatory #170

Issue Number: 6.7

Issue: Are the corporate costs allocated to the nuclear businesses appropriate?

Interrogatory

Reference:
Ref: Exh F3-1-1 page 14

One of the corporate functions benchmarked by Hackett was executive and corporate services (ECS) function. Footnote 11 on page 14 lists the 11 sub-categories within ECS.

a) Are some of the groups within ECS included in those that were not benchmarked in the Towers report at Exh F4-3-1 Attachment 2?

b) Are some of the groups within ECS included in those that were not benchmarked in the Goodnight report at Exh F2-1-1 Attachment 4?

c) ECS cost in 2010 and 2014 is provided as a % of revenue. Please provide the ECS costs in dollars for 2010 and 2014.

d) Please provide the 2010 and 2014 ECS costs allocated to the nuclear business. Please provide the forecast ECS costs allocated to the nuclear business for each year 2017-2021.

Response

a) No, all of the groups within ECS were included in the Towers report at Ex. F4-3-1, Attachment 2.

b) Yes, some of the groups within ECS are included in those that were not benchmarked in the Goodnight report at Ex. F2-1-1, Attachment 2. For example, Corporate Support not directly supporting the Nuclear Program, such as the Law Division and Enterprise Risk Management, was excluded from the Goodnight report. The inclusion of these groups within ECS is consistent with the Hackett group benchmark methodology (Ex. F3-1-1, Attachment 1, p. 6); and similarly, the exclusion of these groups is consistent with Goodnight Consulting benchmarking methodology (Ex. F2-1-1, Attachment 2, p. 14). The difference in methodology is expected, as the Hackett Group and Goodnight benchmarking were performed for different objectives (see Ex. F3-1-1, Attachment 1, p. 5 and Ex. F2-1-1, Attachment 2, p. 3, respectively). Furthermore, each methodology ensures OPG is compared to peers on an apples to apples basis.
c) The ECS costs for OPG’s regulated operations in dollars for 2010 and 2014 can be found at Ex. F3-1-1, Attachment 1, p. 11.

d) Referring to the 2014 ECS cost at Ex. F3-1-1, Attachment 1, p. 11 and forecasted corporate costs in Ex. F3-1-1, OPG has completed a high level estimate of the ECS costs allocated to nuclear business for 2017-2021: $99M in 2017; $99M in 2018; $99M in 2019; $99M in 2020; and $100M in 2021.

As in L-06.6-1 Staff-169, it should be further noted that these values represent an estimate based on information available to OPG. The values above have not been derived using the Hackett Group’s taxonomy applied to 2010 and 2014 costs, or otherwise vigorously vetted by a similar taxonomy, as this is not an exercise OPG performs in its normal course of business. Furthermore, although ECS cost as a percentage of revenue was higher than peer in the Hackett Study, driven by OPG specific requirements (see Ex. F3-1-1, p. 15, lines 7-24), OPG HR cost per employee was comparable to peer and OPG IT cost per end user was better than peer (Ex. F3-1-1, p.14, lines 14-17).
Board Staff Interrogatory #171

Issue Number: 6.7

Issue: Are the corporate costs allocated to the nuclear businesses appropriate?

Interrogatory

Reference:
Ref: Exh F3-1-1 page 15 Attachment 1 page 16
At page 16 of Attachment 1, some of the individual ECS functions are compared with peers.

a) At page 15 of Exh F3-1-1 OPG explains that its real estate costs are affected by the large number of facilities and geographic spread. There are only two nuclear facilities in close proximity. How does the 2014 nuclear business real estate cost of $83.3M compare with peers?

b) How does the 2014 nuclear supply chain cost of $42.5M compare with peers?

c) OPG states that its performance relative to peers is influenced by labour costs and would be impacted to the extent that peers are non-unionized. How many of the peers listed on page 9 of Attachment 1 to Exh F3-1-1 are non-unionized?

Response

a) The scope of the Hackett Group benchmarking study of OPG’s Support Functions and Costs includes all OPG regulated operations as noted in Ex. F3-1-1 Attachment 1, p. 6. Therefore, the total OPG regulated Real Estate costs were benchmarked against peers. Nuclear business real estate costs were not benchmarked separately.

b) Nuclear Supply Chain costs were not benchmarked separately. Nuclear Supply Chain costs that were in scope in accordance with the Hackett Group benchmarking taxonomy were included as part of the Procurement category. Total Procurement costs were benchmarked against peers as shown in Ex. F3-1-1, Attachment 1, p. 16. As noted in Ex. F3-1-1, p. 15, lines 7-9 and 21-24, OPG’s costs associated with Procurement continue to be driven by nuclear-specific requirements, and the majority of utilities included in OPG’s peer benchmarking group were not nuclear power producers with the same breadth of requirements as OPG in this area.

c) Hackett Group has indicated 11 of the peers listed in Ex. F-3-1-1, Attachment 1, p. 9 are unionized.
Board Staff Interrogatory #172

Issue Number: 6.7

Issue: Are the corporate costs allocated to the nuclear businesses appropriate?

Interrogatory

Reference:
Ref: Exh F3-1-3
Exh F3-1-3 reviews Regulatory Affairs costs.

Please complete the following table for all one-time costs related to this application.

<table>
<thead>
<tr>
<th>Historical Year(s)</th>
<th>2016 Bridge</th>
<th>2017 Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Expert Witness costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Legal costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Consultants’ costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Incremental operating expenses associated with staff resources allocated to this application.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Incremental operating expenses associated with other resources allocated to this application.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Intervenor costs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please identify the resources involved.

Response

Please see Chart 1 for the one-time costs related to EB-2016-0152.
# Chart 1

<table>
<thead>
<tr>
<th>$k</th>
<th>2015 (Actual)</th>
<th>2016 (Bridge)</th>
<th>2017 (Test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Expert Witness Costs</td>
<td>-</td>
<td>450</td>
</tr>
<tr>
<td>2</td>
<td>Legal Costs</td>
<td>506</td>
<td>1,500</td>
</tr>
<tr>
<td>3</td>
<td>Consultant Costs</td>
<td>212</td>
<td>1,050</td>
</tr>
<tr>
<td>4</td>
<td>Incremental operating expenses associated with staff resources allocated to this application</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Incremental operating expenses associated with other resources allocated to this application</td>
<td>1,196</td>
<td>1,350</td>
</tr>
<tr>
<td>6</td>
<td>Intervenor Costs</td>
<td>17</td>
<td>1,000</td>
</tr>
</tbody>
</table>

**Notes**

1. OPG has interpreted the phrase “incremental operating expenses associated with staff resources allocation to this application” to mean expenses incurred by Regulatory Affairs that are beyond the Regulatory Affairs Departments approved budget. As indicated in the table, no such incremental expenses were allocated to this application.

2. Incremental operating expenses associated with other resources allocated to this application consist of OEB Annual Assessment & Section 30 expenses, and costs for stakeholdering sessions.
AMPCO Interrogatory #115

Issue Number: 6.7

Issue: Are the corporate costs allocated to the nuclear businesses appropriate?

Interrogatory

Reference:
Ref: F3-3-2

a) Please provide the forecast and actual purchases by vendor for the years 2013 to 2015.

b) Please provide the OM& Purchased Services Support Services forecast for 2016 to 2021.

Response

a) and b) Actual purchases by vendor for 2013 to 2015 for all OPG and forecast OM& Purchased Services Support services for 2016 to 2021 for all OPG are provided in the table below.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NHSS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ARI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Total</td>
<td>103.6</td>
<td>95.5</td>
<td>96.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Witness Panel: Corporate Groups, Compensation
EP Interrogatory #26

Issue Number: 6.7

Issue: Are the corporate costs allocated to the nuclear businesses appropriate?

Interrogatory

Reference:
Application, Ex F3-T1-Sch 1-Table 1, Table 3

The corporate costs shown in these tables are either directly assigned or allocated to the regulated businesses. The latter amounts are based on drivers. (Ex F3-T1-Sch 1 at page 1).

1. The corporate support and administrative costs in Table 1 ($562.8 in 2013) appear to be the total of all allocated costs of OPG’s various businesses. Since the title of Table 1 refers to “groups”, please indicate which OPG businesses or entities other than its nuclear business have the costs shown in Table 1 allocated to them.

2. For each amount shown in Table 3, please state the dollar portion thereof that is directly assigned and the portion thereof that is allocated based on drivers.

3. Please confirm or disconfirm the following:

a. that the share of OPG’s Corporate Support & Administrative Costs that are allocated to the nuclear business is 76.1% in 2013 and 78.7% in 2021 (Plan)

b. that for the years 2013-2015, that average annual share of those costs was $421 million and for the years 2016-2021, the average annual share is $445 million

c. that shares of OPG Corporate Support & Administrative Costs allocated to the nuclear business are:

<table>
<thead>
<tr>
<th></th>
<th>2013 Actual</th>
<th>2021 Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business &amp; Admin</td>
<td>83.42%</td>
<td>84.98%</td>
</tr>
<tr>
<td>Finance</td>
<td>72.46%</td>
<td>71.51%</td>
</tr>
<tr>
<td>People &amp; Culture</td>
<td>79.58%</td>
<td>84.24%</td>
</tr>
<tr>
<td>Commercial Ops</td>
<td>39.30%</td>
<td>48.66%</td>
</tr>
<tr>
<td>Corporate Centre</td>
<td>57.48%</td>
<td>67.55%</td>
</tr>
</tbody>
</table>

Witness Panel: Corporate Groups, Compensation
Response

1. The amounts listed in Ex. F3-1-1, p. 1, lines 10-12 represent total OPG Corporate Support and Administrative costs. The term “groups” in Ex. F3-1-1, Table 1 refers to business areas included in Corporate Costs (i.e. Business and Administrative Service, Finance, People and Culture, Commercial Operations & Environment, and Corporate Centre). Other than its nuclear business, Corporate Costs are either directly assigned or allocated to OPG’s regulated hydroelectric and unregulated businesses.

2. Please refer to Attachment 1 for support services costs directly assigned and allocated to the nuclear business for the amounts shown in Ex. F3-1-1, Table 3.

3. OPG confirms parts (a) to (c).
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Business and Administrative Service</td>
<td>229.4</td>
<td>17.2</td>
<td>211.5</td>
<td>15.7</td>
<td>215.4</td>
<td>15.6</td>
<td>229.9</td>
<td>15.1</td>
<td>230.4</td>
</tr>
<tr>
<td>2</td>
<td>Finance</td>
<td>29.3</td>
<td>17.0</td>
<td>28.9</td>
<td>15.5</td>
<td>15.8</td>
<td>19.8</td>
<td>16.7</td>
<td>23.5</td>
<td>16.9</td>
</tr>
<tr>
<td>3</td>
<td>People and Culture</td>
<td>75.2</td>
<td>16.4</td>
<td>76.7</td>
<td>21.5</td>
<td>73.1</td>
<td>22.7</td>
<td>72.0</td>
<td>20.4</td>
<td>74.6</td>
</tr>
<tr>
<td>4</td>
<td>Commercial Operations and Environment</td>
<td>11.4</td>
<td>3.3</td>
<td>16.6</td>
<td>2.9</td>
<td>13.2</td>
<td>3.6</td>
<td>16.5</td>
<td>3.9</td>
<td>15.9</td>
</tr>
<tr>
<td>5</td>
<td>Corporate Centre</td>
<td>6.6</td>
<td>22.6</td>
<td>7.4</td>
<td>19.5</td>
<td>15.7</td>
<td>23.9</td>
<td>21.9</td>
<td>22.4</td>
<td>23.0</td>
</tr>
<tr>
<td>6</td>
<td>Total</td>
<td>351.9</td>
<td>76.5</td>
<td>341.1</td>
<td>75.1</td>
<td>333.2</td>
<td>85.6</td>
<td>367.0</td>
<td>85.3</td>
<td>360.8</td>
</tr>
</tbody>
</table>
SEC Interrogatory #86

Issue Number: 6.7

Issue: Are the corporate costs allocated to the nuclear businesses appropriate?

Interrogatory

Reference: [F3/1/1]

For each of the business units (functions) listed, please provide the forecast number of FTEs for 2017 (and each year between 2018 and 2021 if available).

Response

Please refer to the table below.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Business and Administrative Service</td>
<td>795.6</td>
<td>776.9</td>
<td>767.5</td>
<td>752.3</td>
<td>752.5</td>
</tr>
<tr>
<td>2</td>
<td>Finance</td>
<td>208.0</td>
<td>200.7</td>
<td>190.9</td>
<td>186.9</td>
<td>187.2</td>
</tr>
<tr>
<td>3</td>
<td>People and Culture</td>
<td>489.9</td>
<td>479.9</td>
<td>481.5</td>
<td>480.8</td>
<td>477.5</td>
</tr>
<tr>
<td>4</td>
<td>Commercial Operations and Environment</td>
<td>85.6</td>
<td>82.2</td>
<td>82.2</td>
<td>81.8</td>
<td>81.9</td>
</tr>
<tr>
<td>5</td>
<td>Corporate Centre</td>
<td>139.6</td>
<td>139.3</td>
<td>133.7</td>
<td>133.3</td>
<td>133.1</td>
</tr>
<tr>
<td>6</td>
<td>Total</td>
<td>1,718.7</td>
<td>1,679.0</td>
<td>1,655.7</td>
<td>1,635.1</td>
<td>1,632.3</td>
</tr>
</tbody>
</table>

Allocation of Corporate Support Nuclear FTEs

Witness Panel: Corporate Groups, Compensation
SEC Interrogatory #87

Issue Number: 6.7

Issue: Are the corporate costs allocated to the nuclear businesses appropriate?

Interrogatory

Reference:
[F3/1/1, Attach 1]

With respect to the Hackett Group *Benchmarking Study of OPG’s Corporate Information Support Functions and Costs* (April 2016):

a. Please explain the selection process of the composite peer group.

b. Please explain why Hackett believes they are appropriate.

c. Please provide some background details regarding each of the peer group companies.

Response

a. As illustrated in Figure 1 below, the Hackett Group’s composite peer group selection process includes evaluating peers for similar demand or structural factors as OPG such as revenue, size, spend, products supported and countries supported.

Figure 1

Peer Group methodology is based on certain size and complexity characteristics that are correlated to cost within an organization

- Complexity drivers include:
  - Company revenue
  - Number of employees
  - Number of IT and users
  - Number of operating locations (offices, factories, etc.)
  - Number of countries with a physical presence
  - Company spend
  - Number of business units and/or product lines
  - Number, and type, of customers served

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>DEMAND</th>
<th>STRUCTURAL</th>
<th>PERFORMANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPES OF DRIVERS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geographies served</td>
<td>Products supported</td>
<td>Regulatory environment</td>
<td>Cost</td>
</tr>
<tr>
<td>Process</td>
<td>Organization</td>
<td>People</td>
<td>Error rate</td>
</tr>
<tr>
<td>People</td>
<td>Technology</td>
<td>Technology</td>
<td>Productivity</td>
</tr>
<tr>
<td>Technology</td>
<td>Strategy</td>
<td>Strategy</td>
<td>Environment &amp; resources</td>
</tr>
<tr>
<td>Strategy</td>
<td></td>
<td>Supplier leverage</td>
<td></td>
</tr>
</tbody>
</table>

Witness Panel: Corporate Groups, Compensation
b. The Hackett Group believes that the peers included in the composite peer group are reasonable because they have similar industry and structural components to OPG. In addition, in order to reduce the impact of outliers and anomalies in the data, the median of the Peer Group was used for comparison in each benchmark.

c. OPG does not have additional background details on peers, other than what is publicly available.
SEC Interrogatory #88

Issue Number: 6.7

Issue: Are the corporate costs allocated to the nuclear businesses appropriate?

Interrogatory

Reference:
[F3/1/1. Attach 1]

Please provide on the same basis as the Hackett Group Benchmarking Study, for each year 2017 and 2021, OPG’s forecast:

a. IT Cost Per End User.
b. HR Cost per Employee.
c. Finance Cost per Employee.
d. ECS Cost as Percentage of Revenue.

Response

Please see OPG’s response to 6.7-Staff-169, part (c).
VECC Interrogatory #33

Issue Number: 6.7

Issue: Are the corporate costs allocated to the nuclear businesses appropriate?

Interrogatory

Reference:
Reference: F3/T1/S1/pgs. 14-

a) OPG notes that in comparison to its peers costs in the area of Risk Management and Environmental, Health and Safety are different due to the unique requirements of nuclear energy production. What other studies has OPG undertaken of its costs in Risk Management and Environmental Health and Safety to understand whether its costs are reasonable as compared to comparable operations?

Response

a) No, OPG has not undertaken any additional studies of its costs in Risk Management and Environmental Health and Safety. The costs within Risk Management and Environmental Health and Safety support the mitigation of safety and environmental risks as well as the risk of non-compliance with legislative requirements (see Ex. A1-3-2, p. 30-31) and other nuclear specific requirements (see Ex. F3-1-1, p. 15, lines 7-24). OPG has undertaken total cost benchmarking for its regulated nuclear and hydroelectric facilities (see Ex. F2-1-1, Attachment 3 and Ex. A1-3-2, Attachment 2).
VECC Interrogatory #34

Issue Number: 6.7

Issue: Are the corporate costs allocated to the nuclear businesses appropriate?

Interrogatory

Reference:
Reference: F3/T1/S3/Table 1

a) Please provide the FTEs for the Regulatory Affairs Department for the years 2013 through 2020. Please separate these into Management and Non-Management categories.

b) There is significant variance year to year in the Salaries/wages, operating expenses. In 2015 Board approved amounts for this category were approximately 3.4m. In 2016 these costs are forecast at $3.3m and 3.1m in 2017. Yet in 2015 only $2.8m was actually spent. Please explain how the forecast for salaries/wages, operating expenses is derived for 2016-2020.

Response

a) The FTEs for the Regulatory Affairs Department for 2013-2020 are provided in Chart 1 below.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Management</td>
<td>7.7</td>
<td>8.4</td>
<td>8.4</td>
<td>10.0</td>
<td>9.6</td>
<td>8.4</td>
<td>8.4</td>
<td>8.4</td>
</tr>
<tr>
<td>2</td>
<td>Non-Management</td>
<td>5.5</td>
<td>4.6</td>
<td>4.6</td>
<td>4.6</td>
<td>4.2</td>
<td>4.2</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>3</td>
<td>Total</td>
<td>13.2</td>
<td>13.0</td>
<td>13.1</td>
<td>14.6</td>
<td>13.8</td>
<td>12.6</td>
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b) The forecast for salaries/wages and operating expenses is derived by assessing staffing level needs in relation to projected workload arising from OPG’s rate application and other regulatory proceedings.
Board Staff Interrogatory #173

Issue Number: 6.8

Issue: Are the centrally held costs allocated to the nuclear business appropriate?

Interrogatory

Reference:
Ref: Exh A1-3-4, page 3 Ref: Exh F4-4-1

OPG is subject to the Nuclear Liability Act (Canada), which governs civil liability for nuclear damage in Canada. On February 26, 2015, the federal Nuclear Liability and Compensation Act under Bill C-22 received Royal Assent. OPG forecasts increased nuclear insurance premiums starting in 2016.

What is the status of the Governor in Council [sic] that will replace and repeal the Nuclear Liability Act (Canada)?

Response

In February 2015, the Nuclear Liability and Compensation Act (NLCA) received Royal Assent, replacing the 1976 Nuclear Liability Act. On May 18, 2016, the Nuclear Liability and Compensation Regulations (the Regulations) were published in Part II of the Canada Gazette. The Governor General in Council has now fixed January 1, 2017 as the date that both the NLCA and the Regulations will come into force.
**EP Interrogatory #27**

**Issue Number: 6.8**

**Issue:** Are the centrally held costs allocated to the nuclear business appropriate?

**Interrogatory**

**Reference:**
Application, Ex F4-Tab 4-Sch 1-Table 1, Table 3

Total centrally held costs (Table 1) and centrally held costs allocated to nuclear (Table 3) decline over the period 2013 to 2012. The declines are particularly pronounced in 2017 and subsequent years.

1. Do the centrally held costs shown in Table 1 include hydroelectric/Ottawa St. Lawrence shared engineering and operating costs? If not, what other Common Costs (as that term is defined in the report of the HSG Group Inc. report to OPG dated August 13, 2013) are excluded from Table 1?

2. For each of the amounts shown in Table 3, please provide the amounts thereof (i) that are directly assigned to the nuclear business and (ii) that are allocated to the nuclear business on the basis of drivers.

3. Please confirm that, omitting the line items “Pension/OPEB Related Accrual Costs” and the “Pension/OPEB Adjustment”, the share of total centrally held costs allocated to the nuclear business rises from 74.77% in 2013 to 80.82% in 2021.

**Response**

1. Centrally held costs presented at Ex. F4-4-1 Table 1 are company-wide costs recorded centrally. Therefore, these costs do not include hydroelectric business unit common support costs, Ottawa-St. Lawrence common support costs, or any other hydroelectric costs that are incurred wholly by OPG’s Hydro-Thermal business unit. The definition and presentation of centrally held costs is consistent with EB-2013-0321 and EB-2010-0008. No other Common Costs as the term is defined in the referenced report are excluded from Ex. F4-4-1 Table 1.

2. The requested breakdown is provided in Attachment 1. The classification of costs as directly assigned or allocated on the basis of drivers is consistent with that used by HSG Group Inc. in their report on the review of OPG’s corporate cost allocation methodology (EB-2013-0321 Ex. F5-5-1).

3. Not confirmed.

Witness Panel: Finance, D&V Accounts, Nuclear Liabilities, Cost of Capital
Omitting the line item “Pension/OPEB Related Accrual Costs” in Ex. F4-4-1 Table 1 and line items “Pension/OPEB Related Accrual Costs” and “Pension/OPEB Adjustment for Test Period Cash to Accrual Differences” in Ex. F4-4-1 Table 3, the share of total centrally-held costs attributed to the nuclear business declines slightly from 67.9% in 2013 to 67.2% in 2021.
Numbers may not add due to rounding.

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Notes:
1. As discussed in Ex. F4-4-1 and Ex. F4-3-2, the test period adjustment is included to reflect OPG's proposal to include cash amounts for pension and OPEB in the nuclear revenue requirement and defer the difference between accrual costs and cash amounts in the Pension & OPEB Cash to Accrual Differential Deferral Account pending the outcome of the EB-2015-0040 generic consultation, consistent with the EB-2013-0321 treatment. The difference between accrual costs and cash amounts is found in Ex. F4-3-2 Chart 3.
VECC Interrogatory #35

Issue Number: 6.8

Issue: Are the centrally held costs allocated to the nuclear business appropriate?

Interrogatory

Reference:
Reference: F4/T4/S1

a) Please explain how the increase of $11M in Nuclear Insurance was calculated for 2016 and forecast for 2017. Has the 2016 premium been paid and is the $19.0M an actual amount?

b) Please explain (briefly) what new provisions in the new Nuclear Liability and Compensation Act contain which caused this increase.

Response

a) and b):

The Nuclear Liability and Compensation Act (NLCA) increases statutory nuclear liability insurance limits for nuclear operators in Canada, from $75M to an initial $650M, with successive annual increases to $750M, $850M and $1B. The 2016-2018 Business Plan reflected in this application assumed that the NLCA and related regulations would come into force in 2016, with associated insurance premiums included in the plan (see L-6.1-8 GEC-057(a)). These amounts were based on a preliminary estimate received from OPG's lead insurer. Since the 2016-2018 Business Plan was finalized, the Governor General in Council fixed January 1, 2017 as the effective date for the NLCA and related regulations, as discussed in L-6.8-1 Staff-173. Therefore, the assumed $11M increase in premiums in 2016 was not realized and the increases expected in 2017-2019 will be delayed by a year. Accordingly, OPG's forecast nuclear insurance costs would be lower by approximately $2M in 2017, approximately $2M in 2018 and approximately $3M in 2019 based on the January 1, 2017 effective date. The 2020 and 2021 amounts included in evidence are unaffected.
Board Staff Interrogatory #174

Issue Number: 6.9
Issue: Is the proposed test period nuclear depreciation expense appropriate?

Interrogatory

Reference:
Ref: Exh F4-1-1 page 3

The DRC performs regular reviews of the service lives of generating stations and a selection of asset classes with the general objective of reviewing all significant asset classes for the regulated assets over a five-year cycle.

a) Has the process in which DRC performs its review changed since EB-2013-0321? If yes, please explain the change.

b) How does OPG determine which nuclear assets classes are considered significant and warrant a review?

c) Please quantify the amount of nuclear assets that are not considered significant for review. How much do these assets account for out of total regulated assets?

d) Please provide the 2014 DRC report.

Response

a) No, the process in which DRC performs its review has not changed since EB-2013-0321.

b) OPG determines the asset classes to be reviewed each year by selecting the higher value asset classes that have not been previously reviewed by the DRC as part of the current review cycle, as well as any asset classes identified by the business units as warranting review based on operational knowledge. Certain nuclear asset classes, such as asset retirement costs (ARC), have service lives that are directly tied to the overall station service lives and are considered to be reviewed each time the DRC reviews station end of life dates. By the end of the current review cycle in 2017, OPG anticipates that all nuclear asset classes greater than $5M will have been reviewed.

c) OPG estimates that assets that will not have been reviewed by the end of the current review cycle ending in 2017 have a December 31, 2015 net book value of approximately $17M, or less than 1% of the total non-ARC prescribed nuclear assets.

d) The 2014 DRC recommendations are provided in Attachment 1.
2014 Depreciation Review Committee Recommendations – Regulated Business

PURPOSE

This memorandum seeks approval for recommendations resulting from the 2014 Depreciation Review Committee ("DRC") review of the average asset service lives for the prescribed nuclear facilities, the previously regulated hydroelectric facilities, and the 48 hydroelectric stations prescribed effective July 1, 2014 ("newly regulated hydroelectric facilities") pursuant to an amendment to Ontario Regulation 53/05 made in November 2013. The memorandum also seeks approval of recommendations of average service lives for the Bruce A and Bruce B nuclear stations.

The 2014 DRC review does not recommend any changes at this time.

BACKGROUND

The DRC is convened annually to review the service lives for depreciation purposes of OPG’s major facilities and a selection of asset classes of those facilities with the general objective of reviewing all significant asset classes over a five year period. The focus of the work of the 2014 DRC was on obtaining an appropriate level of assurance over the average service lives of a selection of hydroelectric and nuclear asset classes, as well as the service lives of OPG’s nuclear stations.

In 2013, Gannett Fleming ULC ("GF"), an external consultant, performed an independent study to review the estimated average asset class lives and station service lives for the property, plant and equipment ("PP&E"), including intangible assets, of the prescribed facilities (including the newly regulated hydroelectric facilities), based on in-service balances as at December 31, 2012, as well as the Niagara Tunnel. Corporate PP&E directly assigned to the prescribed facilities and included in rate base and depreciation and amortization expense for these facilities were included in the scope of the study. GF provided their findings in a separate report dated November 29, 2013 that was filed as part of an update to OPG’s Ontario Energy Board evidence submission in the application for 2014/15 payment amounts (EB-2013-0321). The approved recommendations of the 2013 DRC with respect to the prescribed facilities reflected the recommendations of that report.

The prescribed facilities are:

- Sir Adam Beck I and II Hydroelectric Generating Stations;
- Sir Adam Beck Pump Generating Station;
- DeCew Falls I and II Hydroelectric Generating Stations;
- R.H. Saunders Hydroelectric Generating Station;
- Pickering Nuclear Generating Station;
- Darlington Nuclear Generating Station; and
- Newly Regulated Hydroelectric Facilities.
2014 Depreciation Review Committee Recommendations – Regulated Business

SCOPE OF 2014 DRC REVIEW

The DRC’s scope included a review of a selection of nuclear and hydroelectric asset classes that were not previously reviewed as part of the 2013 DRC, selected mainly based on their relatively large net book values as at December 31, 2013 and operational knowledge. The review focused on the following main areas:

- **Asset class review** – to review the assessments conducted by the business units on the longevity of assets within the class in order to determine the appropriateness of the depreciation period assigned. The review included noting any significant components within an asset class that should be disaggregated into a separate new or existing asset class; and
- **Nuclear station service lives review** – to assess whether there is any new information pertaining to nuclear station lives that would warrant changes based on the principle of high confidence.

The main sources of information considered by DRC in developing recommendations relating to asset classes included:

- reviews conducted primarily by technical staff at each of the nuclear and hydroelectric generating business units;
- information obtained from past DRC reviews; and
- industry benchmarking.

Excluding asset retirement costs, a total of approximately 11% of the in-service net book value of the asset classes of the regulated business (as at December 31, 2013) was covered by the DRC reviews in 2014.

SUMMARY OF RECOMMENDATIONS

Asset Class Review

The DRC determined that the currently approved average service life estimates for all reviewed asset classes remain appropriate. These recommendations were reviewed with, and endorsed by, business and technical staff responsible for overseeing the nuclear and hydroelectric assets. Below is a summary of conclusions for the reviewed asset classes.

**Hydroelectric:**

- Main Rotational Electrical Equipment less Windings – maintain present 75-year average service life
- Main Rotational Electrical Equipment – Windings – maintain present 40-year average service life
- Main Power and Station Service – Transmission – maintain present 50-year average service life
- Turbine Runners – maintain present 40-year average service life
- Control Boards and Switchboards – maintain present 25-year average service life
2014 Depreciation Review Committee Recommendations – Regulated Business

Nuclear:

- Service Water and Fire Protection System – maintain present 25-year average service life
- Electronic Site Security System – maintain present 15-year average service life
- Condenser Tubing – maintain present 30-year average service life
- Shutdown Cooling System Heat Exchangers – maintain present 25-year average service life for Pickering and 30-year average service life for Darlington
- Reactivity Control Units – maintain present 40-year average service life
- Reactor Vessels – maintain present 40-year average service life for Pickering and 55-year average service life for Darlington
- Tritium Removal Facility – maintain present 30-year average service life

As a result of the above conclusions, there is no impact to depreciation.

Nuclear Station Service Lives Review

Pickering Station

The 2014 DRC is recommending that the average station end-of-life dates for depreciation purposes for Pickering Units 1 and 4 and Pickering Units 5-8 continue to remain unchanged at December 31, 2020 and April 30, 2020, respectively.

As noted in OPG’s 2012 and 2013 DRC recommendations, in Q4 2012, the DRC had received confirmation of high confidence that Pickering Units 5-8 could be operated until at least 247,000 effective full power hours (“EFPH”) based primarily on the results of the Fuel Channel Life Management project. This led to the approved recommendation of the following end-of-life dates for depreciation purposes for Pickering Units 5-8:

- Unit 5 Q1 2020
- Unit 6 Q2 2019
- Unit 7 Q4 2020
- Unit 8 Q4 2020

The above resulted in a revised average station end-of-life date, for depreciation purposes, for Pickering Units 5-8 of April 30, 2020. Based on the 2012 DRC recommendations, the average station end-of-life date for each of Pickering Units 1 and 4 for depreciation purposes was adjusted to December 31, 2020, in order to align with the end-of-life date of the last two units of Pickering 5-8. The 2013 approved DRC recommendations were for these end-of-life dates to remain unchanged, as there were no major changes to OPG’s operational plans for the Pickering units or other developments that provided high confidence to change these dates.

OPG has launched the Fuel Channel Life Extension Project with the aim of achieving high confidence in operating Pickering 5-8 Units to at least 261,000 EFPH, which would allow Pickering Units 5 and 6 to operate to the end of 2020. The current expectation is that high confidence of operation to at least 261,000 EFPH will be achieved by 2016. Therefore, until the requisite high confidence is achieved, the
2014 Depreciation Review Committee Recommendations – Regulated Business

DRC is recommending that the average station end-of-life dates for depreciation purposes for Pickering Units 1 and 4 and Pickering Units 5-8 continue to remain unchanged at December 31, 2020 and April 30, 2020, respectively.

Darlington Station

The average station end-of-life date for Darlington was previously established at December 31, 2051 following the decision to proceed with the definition phase of the Darlington refurbishment. In 2012 and 2013, the DRC concluded that this end-of-life date remained appropriate. This recommendation remains unchanged.

Bruce A Station

Bruce Units 1 and 2

As noted in OPG’s 2012 and 2013 approved DRC recommendations, refurbishment work on Bruce A Units 1 and 2 was completed and both units were returned to service in the latter half of 2012. Therefore, based on an assumed nominal operating life of 30 calendar years for the replaced fuel channels, these units would be expected to reach their end-of-life in approximately 2042. The resulting recommended depreciation lives for Bruce Units 1 and 2 remain unchanged in the 2014 DRC review.

Bruce Units 3 and 4

The 2014 DRC is recommending the average station end-of-life date for depreciation purposes should remain unchanged, at December 31, 2054.

Bruce A Units 3 and 4 are currently operating with their original fuel channels. OPG assumes a post-refurbishment end-of-life date for these units, for depreciation purposes. The key evidence upon which OPG relies in assuming “post-refurbishment dates” for the service lives for depreciation purposes of these Bruce A units has been positive obligations on Bruce Power to refurbish Bruce Units 3 and 4 under the original Bruce Power Refurbishment Implementation Agreement (BPRIA), signed in October 2005, and the subsequent amendments to the BPRIA. As noted in the 2012 and 2013 approved DRC recommendations, publicly available information has supported the position that Bruce Power’s intent has been to operate these units into the early 2020s, at which time the units have been assumed by OPG to be refurbished and returned to service by nominally 2024, and operated for an additional 30 years. Therefore, the 2012 and 2013 DRC recommended an end-of-life date of December 31, 2054 for these units for depreciation purposes.

On December 3, 2013, the Ontario Government issued a revised version of the Long Term Energy Plan (LTEP II). The LTEP II provided new information about the potential timing of refurbishments of Bruce Units 3 and 4, i.e. in 2019 to 2022 and in 2016 to 2020, respectively. Given the potential timing indicated in LTEP II, applying a nominal 30 years of post-refurbishment life would result in revised depreciation lives for Bruce Units 3 and 4 to 2052 and 2050, respectively.

In 2013, the DRC recommended that the above revised unit lives not be adopted for depreciation purposes primarily based on the uncertainty which surrounded the refurbishment schedule for these units. In 2013, it was noted that OPG expected further details to be revealed in future which would facilitate a
2014 Depreciation Review Committee Recommendations – Regulated Business

more informed, high confidence decision on the timing of refurbishments for Bruce Units 3 and 4. It was also noted that there are several conditions in the LTEP II related to the refurbishment of Ontario’s fleet of nuclear units, including these statements:

“Final commitments on subsequent refurbishments will take into account the performance of the initial refurbishments with respect to budget and schedule by establishing appropriate off-ramps. The nuclear refurbishment sequence ….. will be implemented subject to processes designed to minimize risk to ratepayers and to government. For example, appropriate off-ramps will be implemented should operators be unable to deliver the projects on schedule and within the established project budget”.

The 2014 DRC noted that further details on the timing and/or other terms and conditions related to the refurbishment of Bruce Units 3 and 4 (as well as Bruce Units 5 to 8 – see below) have not yet been announced. As such, the DRC believes that its 2013 recommendation remains appropriate and that the Bruce Units 3 and 4 average end-of-life date of December 31, 2054 for depreciation purposes should remain unchanged at this time.

In summary, the 2014 DRC review has concluded that the average station end-of-life date for depreciation purposes for the four-unit Bruce A station should remain at December 31, 2048.

Bruce B Station

The 2014 DRC recommends that the average station end-of-life date for depreciation purposes for Bruce B remain unchanged, at December 31, 2019.

As noted in OPG's 2012 and 2013 DRC recommendations, a change to the end-of-life date for depreciation purposes from December 31, 2014 to December 31, 2019 for the Bruce B station was recommended and adopted in 2012. This change was based on the substantial completion of the Fuel Channel Life Management project, based on which OPG had concluded, similar to OPG's conclusion for Pickering Units 5 - 8, that high confidence had been obtained that the condition of the fuel channels for each of the four units at Bruce B should allow these units to operate until approximately 2020.

The LTEP II includes an indicative schedule for refurbishing the four Bruce B units in the period from 2022 to 2031, following the refurbishment of Bruce Units 3 and 4. However, as discussed above, there remains notable uncertainty regarding the refurbishment of the remaining Bruce units, including the timing of those refurbishments. Specifically, OPG is not aware if formal agreements are in place between Bruce Power and the Ontario Power Authority or the Ontario Government regarding the refurbishment of these units. Also, for similar reasons provided above under the Bruce A Units 3 and 4 discussion, the schedule for refurbishing the Bruce B units provided in the LTEP II is inherently uncertain and many conditions would need to be met (including contracts being negotiated and let) before firm commitments could be established to carry out these refurbishments.

Based on the above, the 2014 DRC does not recommend any changes to the average depreciation life of the Bruce B station at this time. The DRC recommends that the average station end-of-life date for depreciation purposes for Bruce B remain at December 31, 2019.
2014 Depreciation Review Committee Recommendations – Regulated Business

DRC MEMBERS AND APPROVALS COMMITTEE

The DRC includes representatives from the operating business units as well as representatives having experience in finance and accounting, investment planning, and rate regulation.

The Approvals Committee is responsible for approving the DRC recommendations and is comprised of:

- Mike Martelli, Senior Vice President, Hydro Thermal Operations
- Glenn Jager, Chief Nuclear Officer
- Bruce Boland, Senior Vice President, Commercial Operations and Environment
- Beth Summers, Chief Financial Officer

The DRC is comprised of the following members:

- Dennis Dodo, Vice President, Shared Financial Services
- John Mauti, Vice President, Business Planning and Reporting
- Jay Scrinko, Vice President, Hydro Thermal Operations Finance
- Carla Carmichael, Vice President, Nuclear Finance
- Mario Mazza, Vice President, Strategy & Business Support (Hydro Thermal)
- Randy Pugh, Director, Ontario Regulatory Affairs
- Alex Kogan, Director, Business Planning and Regulatory Finance
- Stephen Rogers, Director, Asset Planning and Integration
- Alec Cheng, Director, External Reporting and Accounting Policy
- Dwight Zerkee, Senior Manager, Investment Management (Nuclear)
- Dave Bell, Senior Manager, Accounting and Reporting
Board Staff Interrogatory #175

Issue Number: 6.9

Issue: Is the proposed test period nuclear depreciation expense appropriate?

Interrogatory

Reference:
Ref: Exh F4-1-1 page 4

OPG states that as the EB-2013-0321 Depreciation study, which was based on December 31, 2012 asset net book values was conducted less than five years ago, OPG has not commissioned a new independent review of service life estimates for the regulated assets:

a) Please indicate when OPG is planning on commissioning a new independent review of the service life estimates.

b) If there are material changes as a result of such an independent study, how does OPG plan to address the changes and its impact to depreciation?

Response

a) OPG’s last independent review of service life estimates was conducted in 2013, based on December 31, 2012 asset net book values and the Niagara Tunnel project capital placed in service in March 2013. The findings of the review were accepted by the OEB in setting the payment amounts in EB-2013-0321. At page I-11, the November 2013 report on the results of the independent review (see EB-2013-0321 Ex. F5-3-1) recommended that “[e]ach account should be subjected to a complete depreciation study which re-evaluates its average service life estimates periodically”, noting that the “practice of OPG to review its various asset accounts and depreciation service lives over an approximate five-year cycle meets this common depreciation practice.” Based on this recommendation, in EB-2013-0321 (Ex. F4-1-1 p. 5, lines 18-20) and EB-2016-0152 (Ex. F4-1-1, p.3 line 20 to p. 4, line 2), OPG noted that it has adopted a process to conduct an independent asset service life review every five years.

Strict adherence to the above process would require the next independent review to be conducted in 2018 based on December 31, 2017 asset net book values. However, OPG believes that it would be more meaningful and more efficient to conduct the next independent study after refurbished Darlington Unit 2 is scheduled to return to service in February 2020. This would allow the study to review the substantial in-service addition associated with the Unit 2 return to service, as well as provide overall more recent information to the rate-setting process for OPG’s next IR term starting in 2022. As such,
OPG plans to conduct the next independent review of service life estimates in 2021 based on December 31, 2020 asset net book values, with the results of the study considered by the Depreciation Review Committee for implementation effective January 1, 2022.

b) As discussed in part (a), OPG expects the results of the next independent study to be implemented effective January 1, 2022 and therefore reflected in OPG’s payment amounts application for the next IR term starting in 2022. If, for some reason, material changes to service life estimates are required by generally accepted accounting principles to be implemented in OPG’s accounting records in advance of OPG’s next IR term, OPG would consider whether an accounting order application is required. In particular, OPG would apply for an accounting order in accordance with the requirements set out in EB-2012-0002 and EB-2013-0321 decisions and orders, which require such an application if, subject to a $10M annualized revenue requirement materiality threshold, OPG proposes the following:

i) An accounting change (including a change in asset useful lives for depreciation or amortization purposes) impacting the calculation of OPG’s nuclear liabilities, other than as a result of an ONFA Reference Plan update, which results in a revenue requirement impact for the prescribed facilities;¹ or

ii) A change in the end-of-life dates of OPG’s prescribed nuclear facilities, for depreciation and amortization purposes, which results in a non-asset retirement cost revenue requirement impact for the prescribed facilities.²

These requirements apply when the revenue requirement impact of the change is neither reflected in the current or proposed payment amounts nor recorded in an authorized deferral or variance account.

¹ EB-2013-0321 Decision with Reasons (p. 127); the requirement was originally established in the EB-2012-0002 Payment Amounts Order (p. 7)
² EB-2013-0321 Payment Amounts Order (pp. 9-10)
Board Staff Interrogatory #176

Issue Number: 6.9
Issue: Is the proposed test period nuclear depreciation expense appropriate?

Interrogatory

Reference:
Ref: Exh F4-1-1 page 5
It’s stated that the Province’s announcement and the execution of the ARBPRIA provided OPG with the necessary evidence to align the Bruce EOL dates for accounting purposes with the ARBPRIA effective, December 31, 2015.

a) Was OPG involved in establishing the end of life date as set out in the ARBPRIA? If yes, please explain OPG’s role.

b) Has OPG assessed if the end of life dates set out in the ARPRIA are reasonable?
   i. If yes, please explain the assessment OPG performed.
   ii. If no, please explain why not and why OPG has chosen to align the Bruce EOL date with the date per the ARPRIA.

Response

a) No, OPG was not involved in establishing the end of life dates as set out in ARBPRIA.

b) i) and ii)

As noted in OPG’s previous evidence (see for example, EB-2013-0321 Ex. L-6.11-1 Staff-142), the key information that OPG relies upon in assuming post-refurbishment dates for the Bruce units for depreciation purposes has been the refurbishment agreement between Bruce Power L.P. (Bruce Power) and the IESO. OPG is not in a position to conduct a detailed technical analysis of Bruce Power’s refurbishment plans or the expected post-refurbishment operating life of the Bruce units. OPG is also not a party to the Amended and Restated Bruce Power Refurbishment Implementation Agreement (ARBPIRA) or the original refurbishment agreement.

In basing the assumed end of life (EOL) dates on the unit EOL dates published in the ARBPRIA, OPG noted that the implied post-refurbishment unit operating lives range from 30 to 35 years. As this is generally comparable to OPG’s post-refurbishment operating life assumption of 30 years for the Darlington units, OPG was satisfied that the ARBPRIA dates were reasonable for accounting purposes. OPG also understands that the IESO, as the counterparty to the ARBPRIA, conducted due diligence and technical reviews that included a review of nuclear operational assumptions.
The station EOL dates resulting from the ARBPRIA information were reflected in OPG’s 2015 audited financial statements prepared in accordance with US GAAP, and OPG’s external auditors have not raised any concerns with these dates.
Board Staff Interrogatory #177

Issue Number: 6.9

Issue: Is the proposed test period nuclear depreciation expense appropriate?

Interrogatory

Reference:
Ref: Exh F4-1-1 page 6, page 3 of Attachment 1, Table 2 and Exh B3-4-1, Table 2 OPG proposes the EOL date for Pickering station to be December 31, 2020.

a) Pickering Units 5 to 8 EOL was extended by 8 months due to the confidence that was achieved through work on the Fuel Channel Life Extension Project and execution of inspection and technical work programs. Please provide further details and explain the factors that led OPG to conclude on the level of confidence achieved.

b) In Attachment 1, the 2015 DRC Report, it is indicated that all four units are expected to be technically fit to safely operate until at least December 31, 2020 based on the Fuel Channel Life Extension project.
   i. Based on the project, what is the furthest date that all four units are expected to be technically fit to safely operate?
   ii. Please explain why OPG proposes December 31, 2020 as the EOL date and not any date further in the future.

c) In Table 2, depreciation and amortization expense increases from $127.5M in 2013 to $233.3M in 2020, then drops to $53.1M in 2021.
   i. Please explain whether the decrease in depreciation from 2020 to 2021 is entirely due to the EOL of Pickering Units 1,4 and 5 to 8.
   ii. Pickering station is at EOL by December 31, 2020. From Exh B3, there is $53.1M depreciation and amortization expense in 2021 that is mainly for newly in-service additions. Please explain why there is newly in-service depreciation in 2021 and what this depreciation pertains to.

d) Please explain OPG’s treatment of gains and losses in relation to the Pickering station assets that have reached EOL at the end of 2020.
   i. Have any gains or losses been identified?
   ii. If yes, please quantify the gains and losses and indicate where they are included in OPG’s application.

Response

a) Please see L-6.1-1 Staff-93
b) i) and ii)

As described in Ex. L-6.1-1 Staff-93, OPG is highly confident of continued safe operation of Pickering fuel channels for operation to the target service life of December 2020. As such, OPG has adopted December 31, 2020 as the accounting EOL date for the units. OPG has increasing confidence through work being completed as part of the Fuel Channel Life Extension project and Extended Operations program that fuel channels can safely operate to 2024 but the project to determine the final end of life dates for Pickering is still ongoing. As required by the Pickering Reactor Operating Licence, the final end of life dates will be determined and submitted with the CNSC licence application in 2017. OPG will reassess the accounting EOL date when further technical work confirms, with the necessary high confidence, the units’ ability to operate beyond 2020, recognizing that CNSC approval is required.

c) i) Yes, the referenced decrease in depreciation is due to the EOL dates of Pickering Units 1 and 4 and Units 5-8, as all Pickering fixed assets (other than minor fixed assets assumed to be transferrable to other parts of OPG’s regulated operations) would be fully depreciated by the units’ EOL dates of December 31, 2020.

ii) The in-service additions forecast of $53.5M shown for Pickering in 2021 at Ex. B3-3-1 Table 2, line 31, col. (b) was developed on the basis of planned capital expenditures presented in Ex. D2-1-2 and Ex. D2-1-3. These expenditures, along with all other operational aspects of OPG’s 2016-2018 Business Plan, were developed on the assumption that OPG will be successful in extending the safe operation of Pickering to 2022/2024 (as noted in Ex. A2-2-1 p. 2 lines 22-24). A portion of these expenditures is expected to be placed in service in 2021. As OPG does not yet have the necessary high confidence to extend the accounting EOL date for Pickering beyond 2020, the full amount of these 2021 in-service additions (other than minor fixed assets assumed to be transferrable to other parts of OPG’s regulated operations) was assumed in the plan to be fully depreciated in 2021 (Ex. F4-1-1, page 7, footnote 9 and Ex. B3-4-1 Table 2, Note 2).

As noted at Ex. F4-1-1, p. 6, lines 21-24, OPG will seek the OEB’s approval of an accounting order related to any future changes to the Pickering EOL date under the same requirements that underpinned OPG’s EB-2015-0374 application. Through this process, the revenue requirement impact of 2021 in-service additions would be adjusted to reflect the extension of the Pickering EOL date.

d) i) and ii) No gains or losses have been identified in relation to the Pickering station assets reaching their accounting EOL date at the end of 2020, as the asset values (other than minor fixed assets assumed to be transferrable to other parts of OPG’s regulated operations) are planned to be fully depreciated by that date.
Board Staff Interrogatory #178

Issue Number: 6.9
Issue: Is the proposed test period nuclear depreciation expense appropriate?

Interrogatory

Reference:
Ref: Exh F4-1-1 page 6
OPG is undertaking initiatives to extend Pickering operating beyond 2020.

a) Has OPG capitalized projects relating to the extension of Pickering operations? If yes, how much is the related depreciation expense over the test period?

b) OPG will seek OEB’s approval of an accounting order related to any future changes to the Pickering EOL date. If OPG is able to extend operations, please explain how this will impact depreciation and amortization expense as well as any gains and losses recognized in the application.

c) If OPG is unable to extend operations, please explain how this will impact depreciation and amortization expense as well as any gains and losses recognized in the application and how OPG plans to address the impacts to rates.

d) How will the Capacity Refurbishment Variance Account or any of the other existing DVAs be impacted, if it is impacted?

Response

a) No, OPG has not and does not expect to capitalize any costs to enable the extension of Pickering operations beyond 2020, as discussed further in Ex. L-6.4-1 Staff-119 b).

However, as noted in Ex. F2-2-3, section 3.3 and Ex. L-6.5-1 Staff-118 g), OPG’s forecasts for the IR term include restoration of project portfolio capital expenditures to levels needed to operate the plant (as opposed to the reduced levels that would have been anticipated based on shut down at year-end 2020). Projected depreciation expense related to these expenditures is nil in each of 2017, 2018 and 2019, $8.1M in 2020, and $50.4M in 2021, based on the December 31, 2020 EOL date as discussed in Ex. L-6.9-1 Staff-177.

b) If OPG is able to extend Pickering operations beyond 2020, OPG would extend the accounting end of life (EOL) dates based on high confidence information supporting the extended life. In accordance with generally accepted accounting principles, OPG would then calculate the revised depreciation and amortization expense as of the effective date of the new EOL date. OPG would do this by dividing the remaining net book value of the

Witness Panel: Finance, D&V Accounts, Nuclear Liabilities, Cost of Capital
Pickering assets by the remaining life to the new EOL date. All else equal, this would reduce depreciation and amortization expense relative to the forecast in this application for periods beginning on the effective date of the EOL extension. There also may be an impact on depreciation expense resulting from an associated change in the nuclear liabilities. Any such change is expected to be recorded on the effective date of the EOL extension.

Assuming the resulting revenue requirement impact meets the materiality threshold specified in the previously established accounting order requirements related to changes in station service lives and nuclear liabilities, OPG would file an accounting order application. This application would propose that the revenue requirement impact be recorded in a new deferral account similar to the treatment authorized for the Impact Resulting from Changes in Station End-of-Life (December 31, 2015) Deferral Account approved in EB-2014-0370.

There would be no impact on gains or losses if OPG is able to extend the Pickering EOL date. Whatever final EOL date is established, all Pickering assets (other than minor fixed assets transferrable to other parts of OPG’s regulated operations) would be fully depreciated by that date. The transferrable minor fixed assets would continue to be depreciated based on their standalone services lives.

c) If OPG is unable to extend Pickering operations beyond 2020, and absent any new information that would require a reassessment of the Pickering EOL dates, OPG would retain the December 31, 2020 EOL date and fully depreciate all Pickering fixed assets (other than transferrable minor fixed assets) by those dates. Since, as discussed in Ex. L-6.9-1 Staff-177, this rate application is based on the December 31, 2020 EOL date, OPG does not anticipate any impact to depreciation and amortization expense or any gains and losses arising from the inability to extend Pickering operations beyond 2020, other than as a result of any differences between actual and forecast in-service additions related to the restoration of project portfolio capital expenditures to normal levels discussed in part a).

Differences related to the restoration of normal levels of project portfolio capital expenditure would not be captured within the scope of the Capacity Refurbishment Variance Account. Pursuant to O.Reg. 53/05, section 6(2)4, this account is defined to include only those expenditures made to increase the output of, refurbish or add operating capacity to a prescribed generation facility. Capital expenditures necessary to restore the project portfolio to normal operational levels do not meet this definition. As such, any differences in these expenditures would be treated like any other variance resulting from forecast risk that is not subject to true up (see Ex. L-06.1-1Staff-98 (b)).

OPG expects that the Capacity Refurbishment Variance Account would capture differences between actual and forecast non-capital costs incurred to enable Pickering extended operations, including the Fuel Channel Life Assurance project. The enabling costs are described in Ex. F2-2-3 section 3.3. This approach was previously approved by the OEB for Pickering Continued Operations costs (for example, see EB-2014-0370, Ex. H1-1-1, pp.11-
12). OPG does not expect that any other existing variance or deferral accounts (or any of the accounts proposed by OPG in this application) will be impacted.
Board Staff Interrogatory #179

Issue Number: 6.9
Issue: Is the proposed test period nuclear depreciation expense appropriate?

Interrogatory

Reference:
Ref: Exh F4-1-1 Attachment 1, page 3 and Exh D2-2-1 page 2

Per Attachment 1, the 2015 DRC Report, Darlington EOL date was extended a year to December 31, 2052 based on the approved refurbishment outage schedule and target return to service dates for each unit and continuing to assume a 30-year post refurbishment operating life. However, per Exh D2, all four Darlington units will be under refurbishment until February 2026, except unit 2 until February 2020. Please explain how the proposed EOL date of 2052 reconciles with the 30-year post refurbishment date.

Response

The question incorrectly states that the last three Darlington units to be refurbished are scheduled to be returned to service in February 2026. OPG’s evidence is that only the last unit is scheduled to be returned to service by that date, with the remaining units returning to service at earlier dates.

The average station end of life date of December 31, 2052 was established by adding 30 years to the return-to-service dates of each unit shown at Ex. D2-2-8 Attachment 1 page 7 and then computing an average of the resulting four dates.
Board Staff Interrogatory #180

Issue Number: 6.9
Issue: Is the proposed test period nuclear depreciation expense appropriate?

Interrogatory

Reference:
Ref: Exh F4-1-1, page 4 and Table 2
Depreciation for the Darlington Refurbishment Program increases significantly in 2020 to $159.1M and 2021 to $177.6M per Table 2. The 2014 and 2015 DRC report recommended no changes to asset classes.

a) Please provide a listing of 2020 and 2021 DRP in-service addition asset classes and their corresponding values for asset classes with service lives that are newly established (i.e. the asset class has never been previously reviewed by the DRC or any independent study).

b) Please explain how the asset service lives for these assets were determined and what steps were taken to ensure that the asset lives are appropriate.

Response

a) and b)

Per the business plan, OPG’s application reflects a simplifying assumption that the 2020 and 2021 DRP in-service amounts would be depreciated to the Darlington station end of life date of December 31, 2052. This assumption recognizes that a fundamental purpose of the DRP is to replace life limiting components that would enable the units to operate to the end of the post refurbishment life. OPG expects to complete a detailed asset class review of the 2020 DRP in-service additions and associated service lives before the assets are placed in service. These service lives would be subject to OPG’s depreciation review process described in Ex. F4-1-1, section 3.1, including as part of an independent depreciation study as discussed in Ex. L-6.9-1 Staff 175. Differences between forecast DRP depreciation expense reflected in the approved nuclear revenue requirement and such actual expense will continue to be subject to the Capacity Refurbishment Variance Account.
Board Staff Interrogatory #181

Issue Number: 6.9

Issue: Is the proposed test period nuclear depreciation expense appropriate?

Interrogatory

Reference:
Ref: Exh F4-1-1 Table 2
For ARC depreciation and amortization:

a) In 2021, depreciation decreases from $50.3M to $18.7M. Please explain the reasons for the decrease.

b) Please explain whether there have been any changes to ARC depreciation due to the Darlington Refurbishment Program.
   i. If yes, please quantify the amount.
   ii. If no, please explain why not.

Response

a) The $31.6M decrease in ARC depreciation expense stems from the accounting end of life date for Pickering of December 31, 2020 reflected in the application and discussed further at Ex. F4-1-1 p. 6, lines 3-24 and Ex. L-6.9-1 Staff-177. Based on this end of life date, the Pickering ARC will be fully depreciated by the end of 2020, resulting in a lower ARC depreciation expense in 2021.

b) i) As noted at Ex. F4-1-1 p. 7, lines 1-9, the annual ARC depreciation for Darlington is approximately $1M lower starting in 2016, compared to 2015, as a result of the extension of the average station end of life date to December 31, 2052 effective December 31, 2015. In addition, the OEB’s decision in EB-2010-0008 included the impact of the Darlington Refurbishment Program and associated extended service life of Darlington on ARC depreciation.
   ii) Not applicable
Board Staff Interrogatory #182

Issue Number: 6.9

Issue: Is the proposed test period nuclear depreciation expense appropriate?

Interrogatory

Reference:
Ref: Exh A2-1-1, Attachment 5, page 23 and Exh F4-1-1 Table 2

The 2015 depreciation expense is $428M per Note 4 of the 2015 prescribed financial statements. Actual depreciation expense is $298M per Table 2 in the rate application. Please reconcile and explain the difference between the two depreciation numbers.

Response

The requested reconciliation is as follows ($M):

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depreciation per Note 4 to prescribed facilities’ financial statements (PFS)</td>
<td>428</td>
</tr>
<tr>
<td>Less: Regulated hydroelectric depreciation included in PFS Note 4 depreciation</td>
<td>138</td>
</tr>
<tr>
<td>Add: Nuclear amortization of intangible assets presented separately in Note 4 to PFS, which is included in Ex. F4-1-1 Table 2</td>
<td>5</td>
</tr>
<tr>
<td>Add: Losses on retirements at Ex. F4-1-1 Table 2, line 6, col. (c), which are reported in the Other loss income statement line in the PFS</td>
<td>5</td>
</tr>
<tr>
<td>Rounding and other reconciling items</td>
<td>2</td>
</tr>
<tr>
<td>Depreciation and amortization per Ex. F4-1-1 Table 2</td>
<td>298</td>
</tr>
</tbody>
</table>

Witness Panel: Finance, D&V Accounts, Nuclear Liabilities, Cost of Capital
**Board Staff Interrogatory #183**

**Issue Number: 6.9**

**Issue:** Is the proposed test period nuclear depreciation expense appropriate?

**Interrogatory**

**Reference:**
Ref: Exh D2-1-3, page 12 and Table 4, and Exh B3-3-1, Table 1

In-service additions are presented in Table 4 and Table 1. Table 4 includes a breakdown for Supplemental In-Service Forecast, which represents undefined projects and late completion projects. The undefined projects are unallocated.

a) Table 1 shows in-service additions by prescribed facility. Please reconcile Tables 1 and 4.

b) Please explain how the Supplemental in-service forecast amounts in Table 4 were allocated to the prescribed facilities in Table 1.

c) Please explain how depreciation expense is forecasted for undefined projects.

d) Please quantify the depreciation expense associated with the undefined projects over the test period.

**Response**

a) See Attachment 1, Table 1.

b) The supplemental in-service forecast is determined for each of Pickering and Darlington as a percentage of each station’s estimated construction-in-progress balances using a historical average capital in-service rate, less forecast in-service amounts identified for specific projects. The construction-in-progress balances for each station are projected based on each station’s capital spending plans.

c) Once the supplemental in-service forecast for each nuclear station has been determined as discussed in part (b), depreciation expense for these amounts is forecast assuming the corresponding station’s remaining service life as the asset life.

d) Chart 1 provides the forecast depreciation expense associated with the 2016-2021 supplemental in-service forecast shown in Ex. D2-1-3 Table 4 is as follows for the IR term:

*Witness Panel: Finance, D&V Accounts, Nuclear Liabilities, Cost of Capital*
<table>
<thead>
<tr>
<th>Supplemental In-Service Forecast Depreciation</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darlington</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>Pickering</td>
<td>1</td>
<td>12</td>
<td>21</td>
<td>28</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>14</td>
<td>25</td>
<td>36</td>
<td>63</td>
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</table>
### Table 1
Nuclear In-Service Capital Additions

<table>
<thead>
<tr>
<th>Reference</th>
<th>Actual Reference</th>
<th>Actual</th>
<th>Forecast</th>
<th>Actual</th>
<th>Forecast</th>
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</thead>
<tbody>
<tr>
<td>Nuclear Operations Capital Projects²</td>
<td>Ex. D2-1-3 T4, lines 8, 17 &amp; 26</td>
<td>212.6</td>
<td>148.6</td>
<td>204.1</td>
<td>497.0</td>
<td>389.0</td>
<td>315.2</td>
<td>239.3</td>
<td>300.4</td>
<td>215.6</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Darlington Refurbishment Program</td>
<td>Ex. D2-2-10 T5, lines 6,12 &amp; 17</td>
<td>99.2</td>
<td>43.5</td>
<td>147.1</td>
<td>350.4</td>
<td>374.4</td>
<td>8.9</td>
<td>0.00</td>
<td>4,809.2</td>
<td>0.4</td>
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</tr>
<tr>
<td>Support Services Capital Projects Entering Rate Base</td>
<td>Nuclear Portion of Ex. D3-1-2 T5, lines 1,3,7,9,13 &amp; 15</td>
<td>3.4</td>
<td>1.8</td>
<td>2.9</td>
<td>10.5</td>
<td>8.1</td>
<td>18.0</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
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</tr>
<tr>
<td><strong>Total Nuclear In-Service Additions, excluding ARC</strong></td>
<td></td>
<td>315.2</td>
<td>193.8</td>
<td>354.1</td>
<td>857.9</td>
<td>771.5</td>
<td>342.1</td>
<td>244.3</td>
<td>5,114.6</td>
<td>221.0</td>
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</tbody>
</table>

Reconciling Items
Ex. L-6.9-1 Staff-007
1.0  (8.7)  7.1  0.0  0.0  0.0  0.0  0.0  0.0

**Total Rate Base Nuclear In-Service Additions, excluding ARC**
Ex. B3-3-1 Table 1 & 2, col. (b) 316.1  185.1  361.2  857.9  771.5  342.1  244.3  5,114.6  221.0

Notes:
1. As shown in Ex. B1-1-1 Chart 1
2. 2013 is as shown in EB-2013-0321 Ex. L4.7-17 SEC-50 Attachment 1, line 16.
**CCC Interrogatory #36**

**Issue Number: 6.9**

**Issue:** Is the proposed test period nuclear depreciation expense appropriate?

**Interrogatory**

**Reference:**
- Ex. F4/T1/S1

Has OPG undertaken any independent depreciation studies specifically related to the DRP?
If not, why not? If so, provide those studies.

**Response**

No, OPG has not undertaken an independent depreciation study specifically related to the Darlington Refurbishment Program (“DRP”), for the reasons discussed below.

First, the independent depreciation study by Gannett Fleming Canada ULC (Gannett Fleming), filed in EB-2013-0321 (Ex. F5-3-1), reviewed service life estimates for OPG's nuclear asset classes as at December 31, 2012, including existing in service assets related to the Darlington station, as well as nuclear station end-of-life (EOL) dates. Gannett Fleming did not recommend any changes to the nuclear asset class service lives and specifically concluded that the average station EOL date for the Darlington station was reasonable.\(^1\)

The OEB accepted the results of the depreciation study in setting the EB-2013-0321 payment amounts.

Second, the majority of DRP capital has not been placed in service at this time, with the substantial portion of $4.8 billion scheduled to be placed in service in February 2020. As discussed in Ex. L-6.9-1 Staff-175, OPG plans to conduct the next comprehensive independent depreciation study using December 31, 2020 asset values, inclusive of the actual DRP in service amounts to date. The results of the study would be reflected in OPG's payment amounts application for the next IR term starting in 2022.

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\(^1\) EB-2013-0321 Ex. F4-1-1 Att. 1, p. I-6 and II-12; EB-2013-0321 Ex. F5-3-1 p. I-9, I-10, II-14 and II-15

\(^2\) As discussed at EB-2010-0008 Ex. F4-1-1, pp. 5-6, the December 31, 2051 EOL date for the Darlington station in effect at the time of the Gannett Fleming review was established effective in 2010, taking into account OPG's expectations with respect to the DRP.

Witness Panel: Finance, D&V Accounts, Nuclear Liabilities, Cost of Capital
SEP Interrogatory #16

Issue Number: 6.9

Issue: Is the proposed test period nuclear depreciation expense appropriate?

Interrogatory

Reference:
Ref. Exh. C2-1-1 p.5 “This addition to net book value is known as ARC. ARC represents a substantial portion of the net book value of the Pickering, Darlington and Bruce nuclear facilities. Like other capital costs, the ARC is amortized over the useful life of these assets. This amortization gives rise to depreciation expense.”

(a) With specific reference to Pickering NGS A & B (EOLs Dec. 31, 2020), please confirm that any debit entry resulting from future estimate changes affecting the ARC for periods past the station’s end of life (EOL) date is initially to be made to current operations and not to depreciable capital (before any potential deferral in a regulatory account).

(b) Please comment on how station-level ARC adjustments will be handled once only one or two units of a multi-unit station are left in service at a particular date. For example, if only one unit is left in service, will the whole station ARC adjustment be attributed to that single unit’s undepreciated capital value?

(c) At what point would OPG no longer treat ARC adjustments as capital adjustments given a PNGS EOL of 2020? For example, would OPG increase or decrease capital value in 2020 if an estimate change occurred in that year?

(d) Please confirm whether a new or existing deferral or variance account would be used to capture qualifying potential future adjustments to the PNGS ARCs in the post-EOL period.

Response

(a) Not confirmed.

OPG agrees that, as a general accounting matter, changes in the asset retirement obligation (ARO) estimates directly related to an asset after it has been fully depreciated typically would be charged to current operations (as a debit if the ARO increases or a credit if the ARO decreases). However; OPG has not conducted an accounting analysis of how changes in its own ARO estimate (i.e., nuclear decommissioning and nuclear waste and used fuel management liability) would be treated during periods after the Pickering station is shut down, during the last year of the station’s operation or in a hypothetical scenario of only one or two Pickering units operating. As such, OPG is not in...
a position to confirm or comment on the accounting treatment put forward in part (a), as well parts (b) and (c) of the question as it relates specifically to Pickering.

OPG has not conducted the analysis related to the scenarios posed in parts (a) and (c) of the question because, as noted at Ex. F4-1-1, p. 6, lines 18-24, it expects to extend the Pickering End-of-Life (EOL) date beyond December 31, 2020 once it has the necessary high confidence for accounting purposes that the units will operate beyond 2020 (i.e., to 2022/2024). Therefore, these scenarios are not expected to become applicable until the station ends commercial operations in 2024 as planned, which is beyond the current IR term.

OPG is not considering the accounting treatment related to the scenario posed in part (b) of the question because it is speculative. It is not OPG’s plan to operate the station with only one or two operational units. As discussed in Ex. F2-2-3, OPG’s plan is to shut down two Pickering units at the end of 2022 and the remaining four Pickering units in 2024.

(b) See response to part (a)

(c) See response to part (a)

(d) Confirmed.

Ontario Regulation 53/05, s. 6(2)8 requires the OEB to ensure that OPG recovers the revenue requirement impact of its nuclear decommissioning and nuclear used fuel and waste management liability arising from the current approved ONFA reference plan. As it relates to the prescribed facilities, the OEB has approved the Nuclear Liability Deferral Account to meet this requirement. The requirement is neither limited to the period during which the Pickering station is in operation nor dependent on the number of operational Pickering units or their shutdown sequence. As such, the OEB is required to ensure that OPG recovers any revenue requirement impact associated with qualifying changes in these liabilities to the extent they are not already reflected in payment amounts in effect.
SEP Interrogatory #17

Issue Number: 6.9

Issue: Is the proposed test period nuclear depreciation expense appropriate?

Interrogatory

Reference:
Exh. F4-1-1 p.2 “Depreciation and amortization rates for the various classes of OPG’s in-service fixed and intangible assets continue to be based on their estimated service lives. The service life of an asset class is limited by the service life of the station(s) to which it relates. An average end of-life (“EOL”) date is established for depreciation purposes for all units at a particular station, which is typically based on estimated EOL dates for each operating unit of the station.

a) Please comment on the appropriateness of continuing to depreciate nuclear assets based on a station EOL assumption when stations are approaching EOL.

b) Has OPG considered transitioning to unit-specific EOLs for depreciation purposes in such circumstances?

Response

a) and b)
As discussed below, the circumstances have not changed to warrant a modification to OPG’s use of a single average EOL date to determine nuclear station service life estimates for accounting purposes, and the average station EOL method remains appropriate at this time.

As noted in EB-2013-0321 Ex. L-6.12-1 Staff-159, OPG has used a single, average EOL date for each nuclear station since its formation, following the practice of Ontario Hydro. This approach has been reflected in OPG’s audited financial statements prepared in accordance with generally accepted accounting principles. The independent depreciation study by Gannett Fleming Canada ULC (Gannett Fleming), filed in EB-2013-0321 (Ex. F5-3-1), reviewed the average station EOL dates adopted by OPG and concluded that the average station EOL date for the Pickering and Darlington stations were reasonable. Gannett Fleming also concluded that “the factors considered and methods used by the Depreciation Review Committee (“DRC”) in the assessment of life span dates remain appropriate and consistent with common regulatory practices and should continue to be used in future reviews.” The results of this depreciation study were accepted by the OEB in setting payment amounts in EB-2013-0321. Gannett Fleming also informed OPG that a site based

1 EB-2013-0321 Ex. F5-3-1, pp. II-14 and II-15
2 EB-2013-0321 Ex. F5-3-1, p. II-14

Witness Panel: Finance, D&V Accounts, Nuclear Liabilities, Cost of Capital
end-of-life date that encompasses all of the units within a station is used by almost all nuclear operators in Canada and the United States.\(^3\)

With respect to the Pickering station, OPG notes that it continues to maintain separate average EOL dates for Pickering Units 1&4 (formerly Pickering A) and Units 5-8 (formerly Pickering B) and that, currently, the unit-specific EOL dates for each of the six operating units and therefore the average EOL dates for Units 5-8 and Units 1&4 are all at December 31, 2020. Upon future reassessment of the EOL dates based on achievement of high confidence for accounting purpose that the units are fit to operate beyond 2020, OPG would seek OEB’s approval of an accounting order related to any changes in EOL dates based on the same requirements that underpinned OPG’s EB-2015-0374 application (see Ex. L-6.9-1 Staff-178 b).

\(^3\) EB-2013-0321 Ex. L-6.12-1 Staff-159

Witness Panel: Finance, D&V Accounts, Nuclear Liabilities, Cost of Capital
Board Staff Interrogatory #184

Issue Number: 6.10
Issue: Are the amounts proposed to be included in the test period nuclear revenue requirement for income and property taxes appropriate?

Interrogatory

Reference:
Ref: Exh F4-2-1

Please provide the 2015 income tax returns and a reconciliation of the consolidated taxable income to the regulatory taxable income for the prescribed facilities.

Response

OPG’s income tax returns for 2015 are provided, as confidential material, in Attachment 1.

Attachment 2 provides a reconciliation of the tax returns to the regulatory tax calculation for 2015 in the form provided in Ex. F4-2-1 Table 4.
L-6.10-1 STAFF 184 ATTACHMENT 1

IS CONFIDENTIAL IN ITS ENTIRETY
### Table 1
Reconciliation of Tax Return to Regulatory Tax Calculation ($M)
Year Ending December 31, 2015

<table>
<thead>
<tr>
<th>Line No.</th>
<th>Particulars</th>
<th>2015 Tax Return</th>
<th>Adjustments</th>
<th>(h) - (f) - (g)</th>
<th>Regulatory Tax Calc'n</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>OPG Inc.</td>
<td>Subsidiaries</td>
<td>(a) + (b)</td>
<td>Totalc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(a)</td>
<td>(b)</td>
<td>(c)</td>
<td>(d)</td>
</tr>
<tr>
<td>1</td>
<td>Additions for Tax Purposes:</td>
<td>596.5</td>
<td>(90.4)</td>
<td>506.0</td>
<td>90.7</td>
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<td>2</td>
<td>Depreciation and Amortization</td>
<td>481.1</td>
<td>103.3</td>
<td>584.4</td>
<td>47.6</td>
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<tr>
<td>3</td>
<td>Nuclear Waste Management Expenses (incl Accretion Expense)</td>
<td>1,014.0</td>
<td>0.0</td>
<td>1,014.0</td>
<td>0.0</td>
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<tr>
<td>4</td>
<td>Receipts from Nuclear Segregated Funds</td>
<td>75.7</td>
<td>0.0</td>
<td>75.7</td>
<td>0.0</td>
</tr>
<tr>
<td>5</td>
<td>Pension and OPEB/SPP Accrual</td>
<td>775.7</td>
<td>0.0</td>
<td>775.7</td>
<td>90.0</td>
</tr>
<tr>
<td>6</td>
<td>Regulatory Asset Amortization - Nuclear Liability Deferral Account</td>
<td>95.2</td>
<td>0.0</td>
<td>95.2</td>
<td>0.0</td>
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<tr>
<td>7</td>
<td>Regulatory Asset Amortization - Bruce Lease Net Revenues Variance Account</td>
<td>71.6</td>
<td>0.0</td>
<td>71.6</td>
<td>0.0</td>
</tr>
<tr>
<td>8</td>
<td>Regulatory Liability Amortization - Income and Other Taxes Variance Account</td>
<td>(4.4)</td>
<td>0.0</td>
<td>(4.4)</td>
<td>0.0</td>
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<tr>
<td>9</td>
<td>Regulatory Asset Amortization - Capacity Refurbishment Variance Accounts</td>
<td>124.3</td>
<td>0.0</td>
<td>124.3</td>
<td>0.0</td>
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<tr>
<td>10</td>
<td>Regulatory Asset and Liability Amortization - Other Deferral and Variance Accounts</td>
<td>176.3</td>
<td>0.0</td>
<td>176.3</td>
<td>0.0</td>
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<td>11</td>
<td>Reversal of Bruce Lease Net Revenues Variance Account Additions</td>
<td>196.6</td>
<td>0.0</td>
<td>196.6</td>
<td>0.0</td>
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<tr>
<td>12</td>
<td>Adjustment Related to Financing Cost for Nuclear Liabilities</td>
<td>50.0</td>
<td>0.0</td>
<td>50.0</td>
<td>0.0</td>
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<td>13</td>
<td>Taxable SR&amp;ED Investment Tax Credits</td>
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<td>0.0</td>
<td>86.7</td>
<td>3.3</td>
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<tr>
<td>14</td>
<td>Unallowance of Niagara Tunnel Project Expenditures</td>
<td>2.1</td>
<td>0.0</td>
<td>2.1</td>
<td>0.0</td>
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<td>15</td>
<td>Utility</td>
<td>124.3</td>
<td>0.0</td>
<td>124.3</td>
<td>43.9</td>
</tr>
<tr>
<td>16</td>
<td>Total Additions</td>
<td>3,251.3</td>
<td>103.3</td>
<td>3,354.6</td>
<td>154.9</td>
</tr>
<tr>
<td></td>
<td>Deductions for Tax Purposes:</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>17</td>
<td>CCA</td>
<td>544.6</td>
<td>4.8</td>
<td>549.4</td>
<td>120.8</td>
</tr>
<tr>
<td>18</td>
<td>Cash Expenditures for Nuclear Waste &amp; Decommissioning and Facilities Removal</td>
<td>214.7</td>
<td>0.0</td>
<td>214.7</td>
<td>0.0</td>
</tr>
<tr>
<td>19</td>
<td>Contributions to and Earnings on Nuclear Segregated Funds</td>
<td>833.9</td>
<td>0.0</td>
<td>833.9</td>
<td>0.0</td>
</tr>
<tr>
<td>20</td>
<td>Pension Plan Contributions</td>
<td>399.3</td>
<td>0.0</td>
<td>399.3</td>
<td>28.0</td>
</tr>
<tr>
<td>21</td>
<td>OPEB/SPP Payments</td>
<td>117.5</td>
<td>0.0</td>
<td>117.5</td>
<td>9.2</td>
</tr>
<tr>
<td>22</td>
<td>Reversal of Pension &amp; OPEB Deferral and Variance Account Additions</td>
<td>300.6</td>
<td>0.0</td>
<td>300.6</td>
<td>0.0</td>
</tr>
<tr>
<td>23</td>
<td>Reversal of Other Deferral and Variance Account Additions</td>
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<td>0.0</td>
<td>85.6</td>
<td>0.0</td>
</tr>
<tr>
<td>24</td>
<td>Reversal of Return on Rate Base Recorded in Capacity Refurbishment Variance Account</td>
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<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>25</td>
<td>Deductible SR&amp;ED Qualifying Expenditures</td>
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<td>0.0</td>
<td>160.8</td>
<td>3.1</td>
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<tr>
<td>26</td>
<td>Construction Progress Interest Capitalized</td>
<td>126.5</td>
<td>0.0</td>
<td>126.5</td>
<td>3.3</td>
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<tr>
<td>27</td>
<td>Other (including Changes in Bruce Derivatives)</td>
<td>470.2</td>
<td>0.0</td>
<td>470.2</td>
<td>147.6</td>
</tr>
<tr>
<td>28</td>
<td>Total Deductions</td>
<td>3,176.4</td>
<td>4.8</td>
<td>3,181.2</td>
<td>312.1</td>
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<tr>
<td>29</td>
<td>Taxable Income (line 1 + line 18 - line 33)</td>
<td>674.5</td>
<td>8.1</td>
<td>682.5</td>
<td>(66.4)</td>
</tr>
</tbody>
</table>

### Notes:
1. Represents the consolidated OPG amounts. Earnings Before Tax at line 1 are as reported in OPG’s 2015 audited consolidated financial statements and found at Ex. A2-1-1 Att. 1, p. 114.
2. Represents amounts for OPG’s “regulated” segments as reported in accordance with generally accepted accounting principles in OPG’s audited consolidated financial statements.
3. Represents Bruce Lease net revenues included in col. (e). Bruce Lease earnings before tax at line 1 are as per Ex. G2-2-1 Table 7, col. (c), line 1 and taxable income at line 34 as per Ex. G2-2-1 Table 7, col. (c), line 17.
4. Represents items of income and expense reflected in OPG’s income tax returns that do not form part of the regulatory income tax calculations as per OEB-approved methodology, and vice versa, as well as as line item presentation differences between the tax returns and the regulatory income tax calculation that do not impact taxable income.
Board Staff Interrogatory #185

Issue Number: 6.10

Issue: Are the amounts proposed to be included in the test period nuclear revenue requirement for income and property taxes appropriate?

Interrogatory

Reference:
Ref: Exh F4-2-1, page 1

OPG is seeking approval for nuclear income tax expense of ($18.4)M, ($18.4)M, ($18.4)M, $51.2M, and $51.7M from 2017 to 2021 respectively.

The ($18.4)M for 2017 to 2019 appears to be entirely as a result of SR&ED ITCs. Please explain why OPG is proposing negative taxes instead of carrying the SR&ED ITCs forward to be used in a future test year.

Response

As explained in Ex. L-6.10-1 Staff-187, the Scientific Research and Experimental Development Income Tax Credit (“SR&ED ITCs”) reported in a given year’s regulatory income tax calculation include the regulated portion of SR&ED ITCs utilized (or projected to be utilized) to reduce OPG’s corporate income taxes payable for that year. The forecasted earned SR&ED ITCs of $18.4M for each of 2017 to 2019 are expected to be earned and utilized to reduce OPG’s income taxes payable in those years, and therefore are reflected in the regulatory income tax calculations for those years.
Board Staff Interrogatory #186

Issue Number: 6.10

Issue: Are the amounts proposed to be included in the test period nuclear revenue requirement for income and property taxes appropriate?

Interrogatory

Reference:
Ref: Exh F4-2-1, page 2
ITCs for SR&ED expenditures are recognized in the calculation of regulatory income taxes.

a) Please indicate if there is any other ITCs OPG qualifies for.

b) If yes, please identify and quantify the ITCs.

c) Please indicate whether they are recognized in the calculation of regulatory income taxes. If they are not, please explain why not.

Response

(a)-(c) There are no other Investment Tax Credits (ITCs) for which OPG qualifies.
Board Staff Interrogatory #187

Issue Number: 6.10

Issue: Are the amounts proposed to be included in the test period nuclear revenue requirement for income and property taxes appropriate?

Interrogatory

Reference:
Ref: Exh F4-2-1, page 10, and Table 3

Per page 10, OPG can claim a non-refundable ITC for SR&ED. In Table 3, 2014 regulatory income taxes were ($56.0M) mainly as a result of a $61.7M SR&ED ITC.

a) Please confirm that OPG did not receive a refund for the $61.7M SR&ED ITC.

b) Please explain the treatment of the $61.7M SR&ED ITC and whether it was carried forward and applied to the calculation of regulatory income taxes in 2015 or future years.

Response

a) & b)

The $61.7M SR&ED ITC does not constitute a refund and has not been carried forward to future years as explained below.

SR&ED ITCs reported in a given year’s regulatory income tax calculation are comprised of two items:

1) Regulated Portion of Utilized SR&ED ITCs: The regulated portion of SR&ED ITCs utilized to reduce OPG’s actual corporate income taxes payable for the year, using a 75 percent recognition percentage for taxation years subject to audit. As discussed in Ex. F4-2-1, section 3.4, the 75 percent recognition factor is applied in accordance with generally accepted accounting principles and is based on an assessment of the likelihood of the credits ultimately being allowed. Amounts of SR&ED ITCs utilized in the year include SR&ED ITCs earned in the year as well as any amounts carried over to/from a different year in line with OPG’s corporate income tax calculations.

2) Tax Audit Results: Upon resolution of a prior year income tax audit, the regulated portion of the difference between the final amount of actual SR&ED ITCs allowed for that year and the amount previously recognized (i.e. at 75 percent).
The breakdown of the $61.7M is detailed in Ex. L-6.10-1 Staff-188, Attachment 1, Table 1, col. (b). It shows that the recognized portion of utilized SD&ED ITCs was $50.0M for nuclear and $0.2M for regulated hydroelectric, with the remaining $11.5M on account of income tax audit results.

OPG notes that, of the $61.7M, approximately $12M was recorded as a ratepayer credit in the Income and Other Taxes Variance Account in 2014 upon resolution of prior taxation year audits. Other variances between actual reported and forecast SR&ED ITCs, which predominantly relate to differences between actual and forecast levels of underlying qualifying expenditures, are not within the scope of the Income and Other Taxes Variance Account, and the associated forecast risk is borne by the shareholder.

---

1 The credit entry into the Income and Other Taxes Variance Account is explained at EB-2014-0370 Ex. H1-1-1, p. 8, lines 19-22 and p. 9, lines 5-10, and EB-2014-0370 Ex. H1-1-2, section 3.6. The credit entry is shown as $9.0M at EB-2014-0370 Ex. H1-1-2, Table 6, line 17, col. (l), which is net of taxes payable on the ITCs.
Board Staff Interrogatory #188

Issue Number: 6.10

Issue: Are the amounts proposed to be included in the test period nuclear revenue requirement for income and property taxes appropriate?

Interrogatory

Reference:
Ref: Exh F4-2-1, Table 3 and Exh I1-2-1, Table 2a

a) The 2015 Nuclear SR&ED ITC included in the EB-2013-0321 Payment Amount Order is $9.4M as seen in Table 2a. Please confirm that there will be no true up to the actual 2015 SR&ED ITC of $31.9M (i.e. it will not be included in the Income and Other Taxes Variance Account).

b) Please provide a continuity schedule of the SR&ED credits available, used against regulatory income tax, carried forward or back from 2013 to 2021.

Response

a) Confirmed.

Exhibit L-6.10-1 Staff-187 explains the two items reported as the SR&ED ITC amount in a given year’s regulatory income tax calculation. The regulated portion of utilized SR&ED ITCs of $26.0M for nuclear and $0.1M for regulated hydroelectric and $5.8M related to income tax audits comprise the $31.9M SR&ED ITC amount for 2015, as detailed in Attachment 1, Table 1, col. (c). Of the $31.9M, approximately $5M was recorded as a ratepayer credit in the Income and Other Taxes Variance Account in 2015 upon resolution of a prior year taxation year audit.¹ No other variances between the $31.9M amount and the 2015 OEB-approved amount of $9.4M have or are expected to be recorded in the Income and Other Taxes Variance Account, as these variances relate to differences between actual and forecast underlying qualifying expenditure levels. Such variances are not within the scope of the Income and Other Taxes Variance Account and are borne by (or accrue to) the shareholder.

b) Attachment 1 provides a 2013-2021 continuity schedule of SR&ED ITCs attributed to the regulated business and reported in the regulatory income tax calculations in the pre-filed evidence.

¹ The credit entry into the Income and Other Taxes Variance Account is explained at Ex. H1-1-1, p. 12, lines 17-24 and is shown as $4.2M at Ex. H1-1-1, Table 6, line 13, col. (c), which is net of taxes payable on the ITCs.

Witness Panel: Finance, D&V Accounts, Nuclear Liabilities, Cost of Capital
### Table 1
Continuity Schedule of Scientific Research & Experimental Development Investment Tax Credits (SR&ED ITCs) ($M)

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Nuclear:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Amounts Utilized for OPG's Corporate Income Tax Purposes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 Earned in the Year</td>
<td>(a)</td>
<td>(b)</td>
<td>(c)</td>
<td>(d)</td>
<td>(e)</td>
<td>(f)</td>
<td>(g)</td>
<td>(h)</td>
<td>(i)</td>
</tr>
<tr>
<td></td>
<td>2 2012 ITCs Brought Forward and Other Adjustments</td>
<td>35.5</td>
<td>33.0</td>
<td>19.3</td>
<td>18.7</td>
<td>18.4</td>
<td>18.4</td>
<td>18.4</td>
<td>18.4</td>
<td>18.4</td>
</tr>
<tr>
<td></td>
<td>3 2013 ITCs (Carried Forward) / Brought Forward</td>
<td>8.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>4 2014 ITCs (Carried Forward) / Brought Forward</td>
<td>(23.7)</td>
<td>23.7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>5 Total Amount Utilized for Corporate Income Tax Purposes</td>
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<td>50.0</td>
<td>26.0</td>
<td>18.7</td>
<td>18.4</td>
<td>18.4</td>
<td>18.4</td>
<td>18.4</td>
<td>18.4</td>
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<td></td>
<td><strong>Previously Unrecognized Amounts Recognized upon Resolution of Tax Audit</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 2008 Tax Audit (for April to December)</td>
<td>3.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td></td>
<td>7 2009 Tax Audit</td>
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<td>5.7</td>
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<td>-</td>
<td>-</td>
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<tr>
<td></td>
<td>8 2010 Tax Audit</td>
<td>-</td>
<td>5.9</td>
<td>-</td>
<td>-</td>
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<tr>
<td></td>
<td>9 2011 Tax Audit</td>
<td>-</td>
<td>-</td>
<td>5.8</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td></td>
<td>10 Total Amount Related to Prior Year Income Tax Audits</td>
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<td>11.5</td>
<td>5.8</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td></td>
<td>11 Total Nuclear SR&amp;ED ITCs Reported in Regulatory Income Taxes</td>
<td>23.4</td>
<td>61.5</td>
<td>31.8</td>
<td>18.7</td>
<td>18.4</td>
<td>18.4</td>
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<td>18.4</td>
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<td><strong>Regulated Hydroelectric:</strong></td>
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<td><strong>Amounts Utilized for OPG's Corporate Income Tax Purposes</strong></td>
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<td></td>
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<tr>
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<td>12 Earned in the Year</td>
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<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
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<td>13 2012 ITCs Brought Forward and Other Adjustments</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>14 2013 ITCs (Carried Forward) / Brought Forward</td>
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<td>0.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>15 2014 ITCs (Carried Forward) / Brought Forward</td>
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<td>0.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
</tr>
<tr>
<td></td>
<td>16 Total Amount Utilized for Corporate Income Tax Purposes</td>
<td>0.2</td>
<td>0.2</td>
<td>0.1</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td><strong>Previously Unrecognized Amounts Recognized upon Resolution of Tax Audit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17 2008 Tax Audit (for April to December)</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>18 2009 Tax Audit</td>
<td>-</td>
<td>0.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>19 2010 Tax Audit</td>
<td>-</td>
<td>0.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>20 2011 Tax Audit</td>
<td>-</td>
<td>-</td>
<td>0.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>21 Total Amount Related to Prior Year Income Tax Audits</td>
<td>0.1</td>
<td>0.0</td>
<td>0.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>22 Total Regulated Hydro SR&amp;ED ITCs Reported in Regulatory Income Taxes</td>
<td>0.2</td>
<td>0.2</td>
<td>0.1</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td><strong>Total SR&amp;ED ITCs Reported at Ex. F4-2-1 Table 3 Line 27</strong></td>
<td>23.6</td>
<td>61.7</td>
<td>31.9</td>
<td>18.8</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td><strong>Total SR&amp;ED ITCs Reported at Ex. F4-2-1 Table 3 Line 25</strong></td>
<td>23.6</td>
<td>61.7</td>
<td>31.9</td>
<td>18.8</td>
<td>18.4</td>
<td>18.4</td>
<td>18.4</td>
<td>18.4</td>
<td>18.4</td>
</tr>
</tbody>
</table>

**Note:**
1 Amounts are presented at 75% to reflect percentage of recognition in accordance with generally accepted accounting principles.
Board Staff Interrogatory #189

Issue Number: 6.10
Issue: Are the amounts proposed to be included in the test period nuclear revenue requirement for income and property taxes appropriate?

Interrogatory

Reference:
Ref: Exh F4-2-1, page 10, Table 3a and Exh H1-1-1, pages 11-12

Page 10 indicates that OPG recognizes 75% of the estimated ITCs for taxation years that are subject to audit. To the extent the ultimate percentage of recognition for SR&ED ITCs differs from that applied in reducing regulatory income tax expense reflected in approved payment amounts, OPG records the difference in the Income and Other Taxes Variance Account.

a) Please confirm that the variance account is only to true up the 75% to the percentage of recognition resulting from a tax audit and is not a true up to the actual SR&ED credit claimed.

b) Please indicate how often SR&ED audits occur.

c) OPG has forecasted SR&ED ITCs to be $18.4M for each year from 2017 to 2021.
   i. Is this amount 75% of the total estimated SR&ED ITC?
   ii. Please explain how the $18.4M SR&ED ITC was derived and why OPG proposes that it be the same amount each year from 2017 to 2021.

d) Please provide a comparison of forecasted and actual SR&ED from 2013 to 2015.

e) OPG has forecasted additions for Taxable SR&ED ITCs to be $18.4M each year from 2017 to 2021 and deductions for SR&ED Qualifying Expenditures to be $27.7M each year from 2017 to 2021.
   i. Please explain how these amounts were derived and why OPG proposes it to be the same amount each year from 2017 to 2021.
   ii. Please explain the correlation between the forecasted additions, deductions and ITC amounts relating to SR&ED in Table 3a.

Response

a) Confirmed
b) OPG’s income tax returns, which include SR&ED ITC claims, are audited by the Ontario Ministry of Finance for each taxation year.

Witness Panel: Finance, D&V Accounts, Nuclear Liabilities, Cost of Capital
c) Yes, $18.4M represents 75 percent of total estimated SR&ED ITC amounts attributed to the nuclear operations.

ii. For business planning purposes, OPG estimates future SR&ED ITCs based on actual SR&ED ITCs of a recurring nature earned in the last taxation year for which tax returns have been filed at the time the estimate is prepared, plus forecast amounts of a non-recurring nature (if any) provided by technical personnel for certain identified work. OPG does not rely on historical actuals as the basis for the non-recurring amounts given that the nature and volume of this type of work can change significantly year over year.

The last year for which tax returns were filed at the time OPG developed the estimate reflected in this application was 2014. Actual ITCs of a recurring nature for 2014 (as attributed to the nuclear operations and subject to the 75 percent recognition) were $19.2M. No amounts of a non-recurring nature were identified by technical personnel in the nuclear business unit. Therefore, the amount of $19.2M, as adjusted to $18.4M for the reduction in the Ontario ITC rate from 4.5% to 3.5% effective June 1, 2016 (see Ex. F4-2-1, section 3.4, lines 4-6), was used as the estimate for all years of the IR term.

Since the filing of its application on May 27, 2016, OPG developed an updated estimate of the 2017-2021 SR&ED ITCs as part of the 2017-2019 Business Plan. The updated estimate was developed based on the 2015 tax return, in the same manner as described above. As requested by OEB Staff at the Technical Conference, Day 3 (Tr. p. 72, lines 23-27), OPG is providing this updated estimate.

A comparison of the forecasted SR&ED ITCs and actual SR&ED ITCs earned for 2013 to 2015 for the nuclear operations is as follows (pre-tax):¹

<table>
<thead>
<tr>
<th>Year</th>
<th>Forecasted ITCs ($M)</th>
<th>Actual ITCs Earned ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>14.1³</td>
<td>35.5</td>
</tr>
<tr>
<td>2014</td>
<td>9.4⁴</td>
<td>33.0</td>
</tr>
<tr>
<td>2015</td>
<td>9.4⁵</td>
<td>31.9</td>
</tr>
</tbody>
</table>

e) (i) & (ii)
As discussed at Ex. F4-2-1, section 3.4, OPG is subject to federal and provincial tax on SR&ED ITCs. As such, the Taxable SR&ED ITCs addition to earnings before tax is included in the calculation of regulatory taxable income. The forecasted amount of Taxable SR&ED ITCs reflects the forecasted amount of SR&ED ITCs for the corresponding years. Specifically, the Taxable SR&ED ITCs at Ex. F4-2-1, Table 3a, line 9 were determined by including the Ontario ITCs earned in the current year and the federal ITC utilized in the previous year, and therefore are correlated to the SR&ED ITC amounts at Ex. F4-2-1, Table 3a, line 25. The derivation of the $18.4M in forecast SR&ED ITCs is explained in part (c).

The deduction for SR&ED Qualifying Expenditures is on account of SR&ED qualifying expenditures of a current nature that are capitalized for accounting purposes but are deductible for income tax purposes. These amounts are estimated for business planning purposes based on actual historical expenditures of a recurring nature, plus forecast amounts of a non-recurring nature (if any) identified by technical personnel in the nuclear business unit. No amounts of a non-recurring nature were identified as part of the 2016-2018 business planning cycle. The above approach yielded a forecast of $27.7M per year for the IR term. These expenditures, along with qualifying expenditures of a current nature expensed for accounting purposes, are the underlying expenditures giving rise to the SR&ED ITCs.

¹ As discussed at Ex. F4-2-1 section 3.4 and in part (e) of this interrogatory, SR&ED ITCs are taxable. Therefore, the full effect of SR&ED ITC variances on income tax expense would be net of tax on amounts shown in part (d).
² For 2013 and 2014, Attachment 1, Table 1, line 1 of Ex. L-6.10-1 Staff-188. The 2015 value is based on the 2015 income tax return which was completed subsequent to the filing of this application.
³ Nuclear portion of EB-2013-0321 Ex. F4-2-1, Table 5, line 24, col. (a).
⁴ EB-2013-0321 Ex. L-6.13-1 Staff-165, Att. 1, Table 1, line 24, col. (c).
⁵ EB-2013-0321 Ex. L-6.13-1 Staff-165, Att. 1, Table 2, line 24, col. (c).
Board Staff Interrogatory #190

Issue Number: 6.10

Issue: Are the amounts proposed to be included in the test period nuclear revenue requirement for income and property taxes appropriate?

Interrogatory

Reference:
Ref: Exh F4-2-1, page 8 and Table 4

Page 8 states that amounts recognized for accounting purposes as regulatory assets or liabilities in the period are reversed from regulatory earnings before tax in determining OPG’s actual taxable income. An example of this is in Table 4, lines 21-23, column A. However, column A represents OPG’s 2014 tax return and lines 21-23 include amounts for regulatory assets or liabilities. These amounts are adjusted to $0 in the regulatory tax calculation.

Please clarify whether the amounts recognized for regulatory assets or liabilities are included in OPG’s 2014 taxable income of $392.4M.

Response

Amounts at Ex. F4-2-1 Table 4, lines 21-23, column A represent reversing adjustments made to OPG’s earnings before tax of $793.3M (line 1) to arrive at OPG’s 2014 actual taxable income of $392.4M (line 29). Earnings before tax include amounts recognized as regulatory assets and liabilities for accounting purposes. As a result of the above adjustments to earnings before tax, amounts recognized as regulatory assets and liabilities are not included in OPG’s 2014 taxable income of $392.4M.
Board Staff Interrogatory #191

Issue Number: 6.10

Issue: Are the amounts proposed to be included in the test period nuclear revenue requirement for income and property taxes appropriate?

Interrogatory

Reference:

Ref: Exh F4-2-1, page 12 and Table 3a

Page 12 states that the decrease in 2021 of regulatory taxable income before the application of losses is largely attributable to lower depreciation and amortization expense related to the Pickering station, which is assumed to be close to fully depreciated by the end of 2020. Table 3a shows the addition of depreciation and amortization expense to decrease from $524.9M in 2020 to $338.1M in 2021. CCA deductions are relatively consistent from $594.8M in 2020 to $597.0M in 2021.

a) How much UCC is remaining for the Pickering station by the end of 2020?

b) When does OPG expect to claim the remaining CCA deductions pertaining to the Pickering station?

Response

a) For income tax return purposes, in accordance with the Income Tax Act (Canada), OPG determines Undepreciated Capital Cost (UCC) and Capital Cost Allowance (CCA) amounts at an asset class level on a legal entity basis (i.e., OPG Inc.). Asset classes are prescribed by regulations and generally represent different types or categories of assets, not physical facilities or geographic locations. For rate regulation purposes, OPG undertakes to attribute this information to the nuclear business and regulated hydroelectric operations (e.g., Ex. F4-2-1 Tables 5-12). As UCC and CCA information is not tied to a specific facility or its useful life, it has not been necessary and would not be meaningful for OPG to maintain this information at the nuclear station level, and OPG has not done so.

b) See response to a) above.
Board Staff Interrogatory #192

Issue Number: 6.10

Issue: Are the amounts proposed to be included in the test period nuclear revenue requirement for income and property taxes appropriate?

Interrogatory

Reference:
Ref: Exh F4-2-1, Tables 3a and 3b
Table 3b calculates regulatory earnings before tax. The calculation includes line 13a for the reduction in total regulatory income taxes due to loss carry-over, which is based on the tax loss carry-over calculated in Table 3a. The starting point of Table 3a is regulatory earnings before tax, which is calculated from Table 3b.

Please explain how the calculations pertaining to the tax loss carry-over in tables 3a and 3b are calculated and whether the calculation is circular.

Response

No, the calculation is not circular and can be re-performed independently of line 21 of Ex. F4-2-1 Table 3a. The descriptions of these independent calculations, without referencing line 21, are provided below for lines 7a, 8a, 11a and 12a of Ex. F4-2-1 Table 3b in the form of an excerpt in Chart 1.
<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(e)</td>
<td>(f)</td>
<td>(g)</td>
<td>(h)</td>
<td>(i)</td>
<td></td>
</tr>
<tr>
<td>7a</td>
<td>Regulatory Income Taxes - Federal</td>
<td>Cols. (e) to (g): (lines 6a + 25) x line 27 Col. (h): ((lines 6a + 25 - sum of cols (e) to (g) on line 13a)) x line 27 / (1 - line 29) Col. (i): (lines 6a + 25) x line 27 / (1 - line 29)</td>
<td>2.9</td>
<td>(6.8)</td>
<td>(23.4)</td>
<td>69.1</td>
<td>42.0</td>
</tr>
<tr>
<td>8a</td>
<td>Regulatory Income Taxes - Provincial</td>
<td>Cols. (e) to (g): (lines 6a + 25) x line 28 Col. (h): ((lines 6a + 25 - sum of cols (e) to (g) on line 13a)) x line 28 / (1 - line 29) Col. (i): (lines 6a + 25) x line 28 / (1 - line 29)</td>
<td>1.9</td>
<td>(4.5)</td>
<td>(15.6)</td>
<td>46.1</td>
<td>28.0</td>
</tr>
<tr>
<td>9a</td>
<td>Regulatory Income Taxes - SR&amp;ED Investment Tax Credit</td>
<td>line 25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(18.4)</td>
<td>(18.4)</td>
<td>(18.4)</td>
<td>(18.4)</td>
<td>(18.4)</td>
</tr>
<tr>
<td>10a</td>
<td>Total Regulatory Income Taxes Before Loss Carry-Over</td>
<td>line 7a + line 8a + line 9a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(13.6)</td>
<td>(29.8)</td>
<td>(57.4)</td>
<td>96.8</td>
<td>51.7</td>
</tr>
<tr>
<td>11a</td>
<td>Decrease in Regulatory Income Taxes Due to Tax Loss Carry-Over - Federal</td>
<td>Cols. (e) to (g): line 7a x (-1) Col. (h): sum of cols (e) to (g) on line 11a x (-1) Col. (i): nil</td>
<td>(2.9)</td>
<td>6.8</td>
<td>23.4</td>
<td>(27.3)</td>
<td>0.0</td>
</tr>
<tr>
<td>12a</td>
<td>Decrease in Regulatory Income Taxes Due to Tax Loss Carry-Over - Provincial</td>
<td>Cols. (e) to (g): line 8a x (-1) Col. (h): sum of cols (e) to (g) on line 12a x (-1) Col. (i): nil</td>
<td>(1.9)</td>
<td>4.6</td>
<td>15.6</td>
<td>(18.2)</td>
<td>0.0</td>
</tr>
<tr>
<td>13a</td>
<td>Reduction in Total Regulatory Income Taxes Due to Loss Carry-Over</td>
<td>line 11a + line 12a</td>
<td>(4.8)</td>
<td>11.4</td>
<td>39.0</td>
<td>(45.6)</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Numbers may not add due to rounding.

Witness Panel: Finance, D&V Accounts, Nuclear Liabilities, Cost of Capital
**Board Staff Interrogatory #193**

**Issue Number: 6.10**

**Issue:** Are the amounts proposed to be included in the test period nuclear revenue requirement for income and property taxes appropriate?

**Interrogatory**

**Reference:**
Ref: Exh F4-2-1, Tables 3a and 3b

In Table 3, there is a deduction for the reversal of return on rate base recorded in deferral and variance accounts for 2013 to 2016. There is no such deduction in Table 3a for 2017 to 2021.

Please explain what this deduction is for and why it is only applicable to 2013 to 2016.

**Response**

The reversal of return on rate base amounts in the Capacity Refurbishment Variance Account is referenced at Ex. F4-2-1, p. 3, lines 2-5 and is more fully explained below.

Non-income tax additions recorded in deferral and variance accounts in a particular period are reflected in regulatory earnings before tax in the same period. When these amounts are settled with customers, as noted at Ex. F4-2-1, p. 8, lines 16-19, they are reflected in regulated revenues in the period of recovery (or refund) through rate riders. The regulatory income tax calculation is intended to reflect the tax cost (or tax credit) to ratepayers of these incremental revenues to OPG (positive or negative) in the period over which they are authorized to be recovered (or refunded).

To avoid double-counting of the tax cost (or tax credit) arising from the recovery (or refund) of the deferral and variance account amounts both in the period these amounts are recorded as additions to the accounts and in the period of recovery (or refund), the account additions are reversed from regulatory earnings before tax in the former period. For example, as noted at Ex. F4-2-1, p. 3, lines 2-5 such amounts are reversed by being netted against other additions or deductions to regulatory earnings before tax presented at Ex. F4-2-1 Table 3a (for example, the depreciation addition is presented net of additions to the Nuclear Liability Deferral Account, the Capacity Refurbishment Variance Account (CRVA) and other accounts, as noted at Ex. F4-2-1 p.3, lines 22-28). The return on rate base addition recorded or projected to be recorded in the CRVA over 2013 to 2016 is reversed for the same reason, but as a separate line item referenced in the question. The adjustment does not appear in the calculation of regulatory income taxes for the 2017-2021 period as no return on rate base additions to the CRVA for the nuclear assets are projected for those years.

Witness Panel: Finance, D&V Accounts, Nuclear Liabilities, Cost of Capital
Board Staff Interrogatory #194

Issue Number: 6.10

Issue: Are the amounts proposed to be included in the test period nuclear revenue requirement for income and property taxes appropriate?

Interrogatory

Reference:

Ref: Exh F4-2-1, Tables 3b, 5 - 12
For the CCA tables:

a) Please explain what the assets subject to the “rolling start” rule pertain to and whether they relate to the Darlington Refurbishment Program accelerated CCA referenced in Table 3b, Note 3.

b) Per Table 3b, Note 3, for the Darlington Refurbishment Program accelerated CCA:
   i. It is indicated that the accelerated CCA election was noted in EB-2013-0321. Please provide the specific reference that discusses this election in EB-2013-0321.
   ii. Please explain if the same election was made in OPG’s tax filings.
   iii. Please approximate the impact to CCA if the accelerated CCA election was not made for 2017 to 2021.

c) For amounts in the Cost of Acquisition column:
   i. Please explain how the amounts are derived
   ii. Please reconcile the amounts with in-service addition amounts presented Exhibit B3, Tab 3, Schedule1, Table 2.

Response

a) The “rolling start” rule allows CCA to be claimed on property acquired two years ago that has not been placed in service. The assets subject to the “rolling start” rule shown in the correspondingly labeled CCA classes at Ex. F4-2-1 Tables 5-12 are predominantly for the Darlington Refurbishment Program (DRP). The DRP “rolling start” CCA amounts are included in the total DRP CCA amounts shown at Ex. F4-2-1 Table 3b, Note 3 and considered by OPG to be a form of “early CCA”. The “rolling start” rule does not require an election.

   The other form of “early CCA” for the DRP included in the total DRP CCA amounts requires an election under the “long-term project” rule. This election permits property acquired after the second year of a long-term project to become eligible for CCA...
deductions earlier than it otherwise would under the “rolling start” rule, subject to certain thresholds.

b) i. The reference to the “early CCA” election (i.e. the “long-term project” rule) in EB-2013-0321 is found in footnote 2 on p. 29 of Ex. D2-2-1.

ii. Yes, OPG made the election under the “long-term project” rule in its tax return filings.

iii. If the election under the “long-term project” rule is not made with respect to the DRP for 2017 to 2021, the estimated reduction in forecast CCA in each of the respective years would be as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>CCA per EB-2016-0152</th>
<th>CCA without LTP election</th>
<th>Reduction in CCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>183</td>
<td>156</td>
<td>(27)</td>
</tr>
<tr>
<td>2018</td>
<td>284</td>
<td>189</td>
<td>(95)</td>
</tr>
<tr>
<td>2019</td>
<td>354</td>
<td>250</td>
<td>(104)</td>
</tr>
<tr>
<td>2020</td>
<td>381</td>
<td>343</td>
<td>(38)</td>
</tr>
<tr>
<td>2021</td>
<td>383</td>
<td>354</td>
<td>(29)</td>
</tr>
</tbody>
</table>

c) i. The amounts in the Cost of Acquisition column in Ex. F4-2-1 Tables 5-12 were derived based on the accounting capital in-service additions, as adjusted for differences between accounting and tax treatment of certain items. These differences relate to amounts previously included in the tax Undepreciated Capital Cost under the “early CCA” rules described above, items expensed or charged to nuclear decommissioning and nuclear waste management liabilities for accounting purposes that are capitalized for tax purposes, and items capitalized for accounting purposes that are deducted in the current year for tax purposes.

ii. The requested reconciliation is provided in Attachment 1.
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>In-Service Additions per Ex. B3-3-1 Table 2, col. (b)</td>
<td>771.5</td>
<td>342.1</td>
<td>244.3</td>
<td>5,114.7</td>
<td>221.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reconciling Items:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Long Term Project Early CCA Election - Darlington Refurbishment (net of capitalized interest)</td>
<td>640.6</td>
<td>1,152.9</td>
<td>545.5</td>
<td>803.7</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rolling Start Early CCA - Darlington Refurbishment (net of capitalized interest)</td>
<td>1</td>
<td>350.3</td>
<td>613.6</td>
<td>311.8</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>4</td>
<td>Darlington Refurbishment In-Service Additions Previously Subject to Early CCA</td>
<td>(374.4)</td>
<td>(8.9)</td>
<td>0.0</td>
<td>(4,809.2)</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>&quot;Rolling Start&quot; Early CCA - Other Capital Spending (net of capitalized interest)</td>
<td>1</td>
<td>0.0</td>
<td>0.0</td>
<td>1.4</td>
<td>0.3</td>
<td>0.0</td>
</tr>
<tr>
<td>6</td>
<td>Other Capital In-Service Additions Previously Subject to Early CCA</td>
<td>0.0</td>
<td>0.0</td>
<td>(28.0)</td>
<td>(6.7)</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Tax Capital Items Expensed for Accounting Purposes</td>
<td>12.1</td>
<td>12.5</td>
<td>12.5</td>
<td>12.5</td>
<td>12.5</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>In-Service Nuclear Waste Management &amp; Decom. Projects Deemed Capital for Tax Purposes</td>
<td>4.8</td>
<td>52.1</td>
<td>1.8</td>
<td>1.5</td>
<td>3.8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Deductible SR&amp;ED Qualifying Expenditures (Ex. F4-2-1, Table 3a, line 17)</td>
<td>(27.7)</td>
<td>(27.7)</td>
<td>(27.7)</td>
<td>(27.7)</td>
<td>(27.7)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Interest Capitalized for Accounting Purposes in the Year for Projects Not Subject to Early CCA</td>
<td>(6.8)</td>
<td>(5.9)</td>
<td>(4.6)</td>
<td>(4.3)</td>
<td>(11.1)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Darlington New Fuel Capitalized for Accounting Purposes (Ex. D2-1-3 Table 4, line 24)</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>(15.3)</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Other</td>
<td>0.2</td>
<td>0.9</td>
<td>2.0</td>
<td>2.0</td>
<td>1.9</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Cost of Acquisitions per Ex. F4-2-1 Tables 8 - 12, col. (b)</td>
<td>1,370.6</td>
<td>2,131.5</td>
<td>1,059.1</td>
<td>1,071.6</td>
<td>200.5</td>
<td></td>
</tr>
</tbody>
</table>
Board Staff Interrogatory #195

Issue Number: 6.10

Issue: Are the amounts proposed to be included in the test period nuclear revenue requirement for income and property taxes appropriate?

Interrogatory

Reference:
Ref: Exh F4-2-1, Table 4 and Attachment 1

The breakdown of line items for additions and deductions as shown in Table 4 is different than that as shown in the 2014 tax return. Please explain why a different breakdown of line items for additions and deductions is used in the calculation of regulatory taxable income.

Response

The presentation of additions and deductions at Ex. F4-2-1 Table 4 is aligned with the presentation of the regulatory tax calculation at Ex. F4-2-1 Table 3a and Table 3b and is based on how OPG tracks and analyzes tax information for accounting and internal reporting purposes. This presentation is consistent with that used in OPG’s previous applications and therefore allows for comparability across time periods. OPG has adopted this presentation with the goal of clearly outlining the major substantive drivers of the tax calculation, whereas the tax return presentation reflects specific tax form requirements.

1 See EB-2013-0321 Ex. F4-2-1 Tables 4-6, and EB-2010-0008 Ex. F4-2-1 Tables 5-6 and Tables 10-12.

Witness Panel: Finance, D&V Accounts, Nuclear Liabilities, Cost of Capital
Board Staff Interrogatory #196

Issue Number: 6.10

Issue: Are the amounts proposed to be included in the test period nuclear revenue requirement for income and property taxes appropriate?

Interrogatory

Reference:
Ref: Exh F4-2-1, Table 4

In the reconciliation of OPG’s tax return to regulatory income tax for prescribed facilities, the deduction for Construction in Progress Interest Capitalized of $61M in the tax return is removed as a deduction in the regulatory tax calculation (column h). Please explain why the deduction in the tax return is not included as a deduction for regulatory taxes even though capitalized interest is eventually included in rate base.

Response

The regulated portion of the deduction for capitalized interest reflected in the tax return is included in the calculation of regulatory income taxes by virtue of being deducted in the calculation of regulatory earnings before tax, rather than as a separate adjustment line item in arriving at regulatory taxable income. Therefore, the value of the separate adjustment appears as nil in Ex. F4-2-1 Table 4, line 26, col. (h).

Specifically, the deemed interest cost determined on the basis of the OEB-approved capital structure and deducted in the determination of regulatory earnings before tax reflects all of OPG’s actual interest cost (as attributed to the regulated operations), inclusive of amounts capitalized and therefore excluded from OPG’s earnings before tax for financial accounting purposes. Including an additional deduction for capitalized interest in the regulatory tax calculation would effectively result in a double-counting of the deduction available to OPG.

To illustrate, Ex. C1-1-1, Table 8, col. (d) shows the amount of total deemed interest of $263.7M for 2014 at line 4, which includes interest of $159.5M on existing long-term debt at line 2 (as attributed to regulated operations) and additional interest on the other long-term debt provision of $100.6M at line 3. The $159.5M interest cost is inclusive of the interest capitalized by OPG to construction in progress \(^1\) because it reflects the total cost on all of OPG’s existing debt (as attributed to regulated operations), whether expensed or capitalized for accounting purposes. As the amount of $263.7M is deducted in determining the 2014 regulatory earnings before tax of $271.6M (Ex. F4-2-1 Table 4, line 1, col. (h)), the deduction

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\(^1\) The portion of interest capitalized to construction in progress for the regulated operations is $54.3M for 2014, as shown at Ex. F4-2-1 Table 4, line 26, col. (e).

Witness Panel: Finance, D&V Accounts, Nuclear Liabilities, Cost of Capital
1 for the capitalized interest is reflected in the regulatory taxable income of $22.7M for 2014
2 (Ex. F4-2-1 Table 4, line 29, col. (h)).
Board Staff Interrogatory #197

Issue Number: 6.11

Issue: Are the asset service fee amounts charged to the nuclear businesses appropriate?

Interrogatory

Reference:
Ref: Exh F3-2-1

At the above reference it is noted that pursuant to a Shareholder Declaration and Resolution, OPG has decided to sell its head office at 700 University Avenue, Toronto. OPG also states that the Shareholder Declaration and Resolution also requires that OPG transfer the portion of the proceeds from the sale equal to the after-tax accounting gain on sale, net of transaction costs.

a) Please confirm that asset service fees previously charged in relation to 700 University Avenue have been replaced with lease payments and are considered a Real Estate Service cost.

b) Please provide the Shareholder Declaration and Resolution that is referenced above.

c) What is the current status of the sale and when is the sale expected to be completed?

d) Is OEB staff correct in understanding that OPG is not proposing to use any portion of the proceeds to offset the increase in test-year payment amounts?

e) How does OPG propose to recover the transaction costs, including all tax implications, related to the sale? If OPG is proposing to recover these costs from rate payers, please explain the reasons for the approach.

Response

a) Yes, the asset service fees previously charged in relation to 700 University Avenue have been replaced with lease payments that are a Real Estate Service cost.

b) Attachment 1 to this response is a copy of the Shareholder Declaration and Resolution for the sale of OPG’s head office at 700 University Avenue, Toronto.

c) OPG’s Head Office was listed for sale and placed on the market on October 11, 2016. OPG does not have an estimate of the completion date for this sale.

d) Yes. OPG’s Head Office is not a prescribed facility and has never been included in OPG’s rate base. Pursuant to the Shareholder Declaration and Resolution, the portion of
the proceeds from the sale equal to the after-tax accounting gain on sale, net of transaction costs, will be transferred to the Province.

e) OPG is not proposing to recover the transaction costs or tax implications from rate payers. Pursuant to the Shareholder Declaration and Resolution, the portion of the proceeds from the sale equal to the after-tax accounting gain on sale, net of transaction costs, will be transferred to the Province.
ONTARIO POWER GENERATION INC.

RESOLUTION OF THE SOLE SHAREHOLDER ("RESOLUTION") EXERCISING THE
RESTRICTED POWERS OF THE DIRECTORS UNDER A UNANIMOUS
SHAREHOLDER AGREEMENT REGARDING THE SALE OF THE CORPORATION’S
HEAD OFFICE such resolution being made as of the 14th day of December, 2015 (the
"Effective Date").

WHEREAS Her Majesty the Queen in right of the Province of Ontario, as represented
by the Minister of Energy (the "Shareholder") is the registered holder of all the issued
shares of Ontario Power Generation Inc (the "Corporation");

AND WHEREAS the Shareholder recognizes that the Corporation is the owner of the
title to the premises comprising the Corporation’s head office located at 700 University
Avenue, and 40 Murray Street, Toronto, Ontario, (the "Head Office");

AND WHEREAS the Shareholder executed a unanimous shareholder agreement (the
"Shareholder Agreement") dated as of the 14th day of December, 2015, regarding the
sale, disposition or divestment of the Corporation’s interest in the Head Office (the
"Transaction");

AND WHEREAS paragraph 3 of the Shareholder Agreement removed from the
Directors of the Corporation (the "Directors") all of their rights, powers and duties in
relation to:

1. Whether, how and when to proceed with the Transaction.

2. Whether, how and when to determine and allocate the proceeds of disposition
received by the Corporation in respect of the Transaction, and whether and
when to distribute such proceeds to the Shareholder in such specific manner
as may be directed by the Shareholder.

3. Whether and when to take steps or perform any duties, functions or
operations required for, or relevant to, the Transaction or in support of the
Transaction.

4. Whether and when to make an expenditure or reimbursement of any cost or
expenditure associated with the Transaction incurred on or after the Effective
Date from the proceeds of disposition.
5. Whether and when to take all necessary steps to provide any and all information, assistance, personnel and resources needed by Her Majesty the Queen in Right of the Province of Ontario (the "Government"), and/or the Government's advisors and consultants, as and when any of them may request in respect of the Transaction.

AND WHEREAS the Shareholder wishes to exercise its rights and powers under the Shareholder Agreement.

NOW THEREFORE BE IT RESOLVED AS A RESOLUTION OF THE SOLE SHAREHOLDER OF THE CORPORATION THAT:

1. The Corporation shall take all necessary steps, including the issuance of any requisite resolutions, to proceed with the Transaction in the manner determined by the Shareholder and its advisors.

2. The Corporation shall take all necessary steps, including the issuance of any requisite resolutions, to provide information, assistance, personnel and resources needed by the Government and/or the Government's advisors and consultants, as and when any of them may request in respect of the Transaction.

3. The Corporation shall, as soon as is reasonably practical, pay all reasonable costs related to the Transaction and recover all expenditures associated with the Transaction incurred before, on or after the Effective Date including the costs of any advisors and consultants retained or engaged by the Government with respect to the Transaction (the "Transaction Costs").

4. The Corporation shall transfer that portion of the proceeds of the Transaction (net of Transaction Costs) received by the Corporation, representing the amount equivalent to the after-tax accounting gain derived from the sale, relative to the depreciated and amortized value of the assets recorded on the Corporation's balance sheet, to the Government in accordance with any direction of the Shareholder.

5. The Corporation shall ensure that this resolution is carried out in accordance with all applicable laws, all applicable licences, and in accordance with the Independent Electricity System Operator's Market Rules, as applicable.
IN WITNESS WHEREOF the Shareholder has duly executed this Resolution as of the Effective Date.

HER MAJESTY THE QUEEN IN RIGHT OF ONTARIO, AS REPRESENTED BY THE MINISTER OF ENERGY

By: ____________________________

Bob Chiarelli
Minister of Energy
ONTARIO POWER GENERATION INC.

DECLARATION OF THE SOLE SHAREHOLDER

REGARDING THE SALE OF THE CORPORATION’S HEAD OFFICE.

WHEREAS HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF ONTARIO AS REPRESENTED BY THE MINISTER OF ENERGY (the “Shareholder”) is the registered and beneficial owner of all the issued and outstanding shares of Ontario Power Generation Inc. (the “Corporation”);

AND WHEREAS the Shareholder has determined that it is appropriate and desirable to require the Corporation to sell, dispose of or divest its interests in the premises, including all interests in the building and lands, which comprise the Corporation's head office located at 700 University Avenue, and 40 Murray Street, Toronto, Ontario, (the “Transaction”);

AND WHEREAS the Shareholder finds it necessary to assume decision-making power and authority over certain distinct aspects of the business operations of the Corporation, and in particular, in regards to certain decision-making authority that the Corporation has with respect to any decisions or activities in respect of the Transaction;

AND WHEREAS the Shareholder makes the following declaration pursuant to subsection 108(3) of the Business Corporations Act (Ontario) (the “Act”) intending the same to be deemed to be a Unanimous Shareholder Agreement within the meaning of the Act.

NOW THEREFORE it is hereby declared that:

1. This Declaration and the restriction of the powers of the Directors of the Corporation (the “Directors”) herein contained shall not affect any action, step, resolution or by-law duly taken, made, passed or consented to by the Directors prior to the date that this Declaration is signed (the “Effective Date”).

2. For greater certainty, the Restricted Powers as defined in paragraph 4 do not restrict the duties and liabilities of the Directors to manage, or supervise the management of, the business and affairs of the Corporation relating to the actual implementation of any decision made by the Shareholder pursuant to paragraph 3, including:

(i) duties stemming from the Corporation’s licence conditions and all applicable instruments, codes and orders of the Ontario Energy Board, as well as the regulations and legislation and any instruments issued pursuant thereto;
(ii) duties and liabilities associated with the safe, reliable, prudent and cost-efficient operation by the Corporation of all of its generation facilities;

(iii) duties to take appropriate decisions, actions or steps to implement this Declaration and any Resolution of the Shareholder made pursuant to this Declaration.

3. The rights, powers and duties of the Directors of the Corporation to manage, or supervise the management of, the business and affairs of the Corporation, whether such rights, powers or duties arise under the Act, the articles of amalgamation of the Corporation or the by-laws of the Corporation, as and when amended, or otherwise, are forthwith restricted with regard to any decisions regarding:

(i) Whether, how and when to proceed with the Transaction.

(ii) Whether, how and when to determine and allocate the proceeds of disposition received by the Corporation in respect of the Transaction, and whether and when to distribute such proceeds to the Shareholder in such specific manner as may be directed by the Shareholder.

(iii) Whether and when to take steps or perform any duties, functions or operations required for, or relevant to, the Transaction or in support of the Transaction.

(iv) Whether and when to make an expenditure or reimbursement of any cost or expenditure associated with the Transaction incurred before, on or after the Effective Date from the proceeds of disposition.

(v) Whether and when to take all necessary steps to provide any and all information, assistance, personnel and resources needed by Her Majesty the Queen in Right of the Province of Ontario (the “Government”), and/or the Government’s advisors and consultants, as and when any of them may request in respect of the Transaction.

4. The rights, powers, duties and liabilities of the Directors as set out in paragraph 3 are hereby assumed by the Shareholder and no longer reside with the Board of Directors or any members thereof, from the Effective Date, until this Declaration is amended or revoked. (collectively, the “Restricted Powers”).
5. The Shareholder assumes all the rights, powers, duties and liabilities of the Directors to manage or supervise the management of the business and affairs of the Corporation in connection with the Restricted Powers and, pursuant to subsection 108(5) of the Act, the Directors are thereby relieved of their duties and liabilities, including any liabilities under section 131, to the same extent.

IN WITNESS WHEREOF the Shareholder has duly executed this Declaration as of the 14th Day of December, 2015 ("the Effective Date").

HER MAJESTY THE QUEEN IN
RIGHT OF ONTARIO, AS
REPRESENTED BY THE MINISTER
OF ENERGY

By:
Bob Chiarelli
Minister of Energy
Board Staff Interrogatory #198

Issue Number: 6.11
Issue: Are the asset service fee amounts charged to the nuclear businesses appropriate?

Interrogatory

Reference:
Ref: Exh F3-2-1 Table 2 Ref: Exh F3-2-2

The evidence states that the asset service fee for 700 University has been discontinued and replaced with a lease payment under real estate costs under support services. The evidence also states that 2015 asset service fees are higher than 2014 by $9.6M due to expenses related to the Enterprise System Consolidation Program.

Please explain the high level of asset service fees in the 2016-2019 period vs the 2014 actual asset service fees.

Response

The increase of asset service fees in the 2016-2019 period relative to the 2014 actual asset service fees is mainly due to higher IT depreciation expense and tax adjusted return for IT assets such as the Microsoft Windows server upgrade, SAP upgrade, integration costs for the mainframe and storage, ROMS replatforming and refreshing the Trade/Risk Management tool.