OUTAGE OM&A – NUCLEAR

1.0 PURPOSE

This evidence presents the methodology for the derivation of the nuclear outage OM&A budget. It also presents the actual and forecast outage OM&A costs for the period 2007 - 2012.

2.0 OVERVIEW

The nuclear outage OM&A expense for 2007 - 2012 is provided in Ex. F2-T4-S1 Table 1. The test period outage OM&A expense of $214.8M in 2011 and $201.1M in 2012 forms part of the OM&A expense in the nuclear revenue requirement.

Nuclear planned outages are necessary to execute inspection and maintenance work on systems and equipment where access is not possible under normal operating conditions. Outage work activities generally fall into two categories: a) inspection and maintenance work related to effective asset management and regulatory requirements; and, b) project work. Planned outages also give OPG an opportunity to perform systems and equipment upgrades, configuration changes, and other improvements and modifications.

Completion of specific outages requires both base work program resources and incremental resources. Base work program resource costs, including the cost of regular labour, are captured within nuclear base OM&A (see Ex. F2-T2-S1). Incremental resource costs over and above the base work program resources are captured in outage OM&A. Outage OM&A costs include incremental short-term labour to meet expected non-regular staffing needs for peak work periods, materials, and the costs for specialized services such as inspection and maintenance work (e.g., feeder piping, fuel channel, and steam generator inspections) provided by Inspection, Maintenance and Commercial Services (“IM&CS”). Accordingly, the total costs of an outage are divided between nuclear base OM&A and outage OM&A.

The costs associated with the completion of projects undertaken during an outage are captured in either project OM&A or capital, as applicable.
The key consideration in assessing the need for incremental short term labour resources
during an outage is the ability to optimize available base work resources and skills. For
example, the availability of regular maintenance staff for outage work has to be assessed
relative to: a) the demand for regular staff to meet the ongoing maintenance requirements of
the running units; and, b) the peak staff resources required to complete the outage scope
within the outage schedule. The forecast of outage OM&A is focused on the need for, and
cost of, the incremental labour resources (e.g., temporary staff and external contractors)
required over and above regular base staff to execute the outage as per the outage
schedule.

OPG uses incremental staffing for peak labour needs because it is more cost effective to
bring on incremental resources as needed than to maintain permanent outage staff. It also
allows OPG to obtain the specialized skills that are needed (given the highly specialized
nature of outage inspection and maintenance, specialized skills are required from IM&CS or
external contractors). In addition, in some cases, the nature of the maintenance activity
mandates the use of external, original equipment manufacturer expertise. OPG’s use of
incremental staffing resources to complete outage work activities provides it with important
resource flexibility and is consistent with industry practice.

3.0 DEVELOPING THE OUTAGE OM&A BUDGET

The nuclear outage OM&A budget is established through the business planning process (see
Ex. F2-T1-S1). Each station prepares its own five year outage OM&A budget. The nuclear
support groups also prepare five year outage OM&A budgets to reflect the cost of their
required contribution to the planned outages.

The nuclear outage OM&A budget is derived in conjunction with the development of the
approved generation plans and outage schedule for each station as part of the five year
Integrated Plan, which is discussed in detail at Ex. E2-T1-S1.

The first two years of the Integrated Plan are subject to the most detailed reviews. In
particular, identification of the major work scope to be completed in a planned outage is
finalized, the do-ability within the scheduled timeframe is reviewed, resources are assessed
and economic justification of discretionary activities is analyzed within the constraints of the
business plan. This establishes the approved scope, duration, and outage cost. The last
three years of the Integrated Plan are subject to lesser scrutiny, given that during the five
year cycle, the outage scope, duration, and costs of these later years will be subject to
additional assessments (e.g., due to emergent issues or changes in life cycle management
processes, or regulatory requirement changes that impact scope) as they come closer to the
year of execution.

3.1 Resource Types

As shown in Ex. F2-T4-S1 Tables 2 - 10, outage OM&A for each station and related nuclear
support services are budgeted on the basis of the resource types described below:

- Non-Regular Labour: The cost for temporary labour. These staff are on OPG’s payroll
  and are directly supervised by OPG employees. They are usually comprised of
  construction labourers and trade workers (e.g., electricians) and co-op students.
- Overtime: The cost of overtime incurred by regular labour, non-regular labour, and
  augmented staff during the outage. While overtime costs for regular staff working on an
  outage is budgeted to outage OM&A, regular labour costs, with the exception of IM&CS
  regular labour, is budgeted as base OM&A.
- Augmented Staff: The cost of non-regular staff for peak work periods. These temporary
  additions to staff complements are directly supervised by OPG staff but are not on OPG’s
  payroll. They are usually professional staff such as engineers, assessors, operation
  procedure writers or analysts.
- Materials: The cost of materials and supplies used for the outage.
- Other Purchased Services: The cost of outside contractors and their employees. These
  contractors and employees are not on OPG’s payroll and the employees are under the
  supervision of the contractor. In addition, other purchased services include charges by
  OPG’s IM&CS division. Further discussion of IM&CS services can be found at Ex. G2-T1-
  S1. Other purchased services may also include the costs of major equipment
  refurbishments.
3.2 Costing of Required Resource Types

For the resource types referenced above, the forecast of outage OM&A costs are developed by each station through the iterative process described below:

- The work load is analyzed with respect to the work orders, sequencing and the skills and resources required.
- Work orders are examined for the type and number of tasks involved to complete the work orders.
- Tasks are grouped into blocks of activities, either by complementary groupings or by those attached to specific equipment. These blocks are placed in “windows” for execution purposes.
- Using productivity information from past outages (such as total hours per day, total hours per work order/task, and number of tasks/work orders), a time budget is established. By considering the type of skilled resources required to execute the work, a cost estimate can be developed for regular labour, which is included in base OM&A. The outage duration and schedule along with historical statistical information (overtime hours per work order/task) allows OPG to identify the incremental labour required. For example, the outage’s duration and schedule establish “do-ability constraints” (e.g., congested work areas and operational constraints) thereby delineating needs for incremental peak labour and overtime.
- Work planning yields information on the specific parts and/or materials needed for the outage. Information referenced from past outage and risk assessments is used to estimate the supplies required and the contingency materials needed. Contingency materials are those parts or materials that are ordered, due to the lead times required, in anticipation of a need for the part or material potentially arising during the outage even though it was not specifically identified as being part of the outage scope.
- Work planning also provides information regarding preparation requirements, pre-requisites, and associated execution requirements. The cost of this additional support work is estimated in a manner similar to direct work.
- For contractor services, OPG’s outage OM&A budgets are based on historical unit hourly rates charged by the contractors (adjusted for inflation) or on actual tender quotes.
(depending upon the timeframe of the planned outage), multiplied by the level of planned work activity.

- IM&CS direct costs for each OPG outage are derived based on the work, time and resources required. These IM&CS direct costs are then allocated to each station for inclusion in each station’s business plans.

OPG continues to be engaged in multi-year outage improvement initiatives focused on improving outage performance and costs. As discussed in more detail at Ex. F2-T1-S1 and Ex. E2-T1-S1, OPG is pursuing an Outage Improvement Strategy initiative developed during the Phase 2 Benchmarking. It has been incorporated into the 2010 - 2014 Business Plan and is expected to impact outage costs.

The Outage Improvement Strategy is designed to allow OPG to pursue opportunities to reduce outage costs, as well as improve reliability and generation performance across the company’s nuclear fleet. For example, by improving fleet contractor management procedures, OPG is targeting improved contractor productivity/efficiency by increasing the amount of work done each day by external contractors. The objective of this fleet-wide initiative is to reduce the duration and the cost of outages at OPG. Improved scheduling of outages will result in a more effective utilization of resources resulting in less demand for external purchased services and overtime. Improved scope determination will result in an ability to reduce material requirements in inventory as well as better plan for securing purchased services.

Beginning in 2010, a new fleet-wide approach has been implemented for improving the forecast of outage costs through the introduction of Functional Outage Groupings. The implementation of Functional Outage Groupings will facilitate OPG’s ability to analyze fleet-wide outage costs by station and by outage. This will assist OPG in identifying and implementing fleet-wide best practices.
4.0 OUTAGE OM&A VARIANCES

Each of the components that drive the outage OM&A budget (duration, scope, and resources) can vary from the forecast. OPG updates its forecast of future planned outages, work activity, and related costs through the Integrated Plan review process. Consequently, scope definition is more precise for near-term outages compared to the later years of the five year outage planning cycle.

Some of the variables that can give rise to changes in the five year outage OM&A plan include:

- The results from ongoing OPG outage inspection and maintenance work, which could impact the scope of work planned for future outages, even if the future outages are at a different unit or station.
- New CNSC regulatory requirements may add to outage scope and costs.
- Operational information shared within the nuclear industry that provides OPG with information about potential emerging issues from other nuclear industry operators. Information about these emergent issues can result in additional scope and costs in future OPG outages (i.e., inspections would assess the extent to which the emergent issue impacts, if at all, OPG’s nuclear units thereby potentially resulting in additional scope and costs in future outages).
- The impact of collective bargaining agreements, internal and external, on labour costs.
- The impact of inflation or vendor issues on material costs.
- A decision by OPG to curtail the scope of an outage resulting in additional work/additional scope being added to a future outage, or conversely, a decision to advance scope from a future outage into a current outage.
- In some cases the scope of work can be increased without impacting outage duration (but increasing outage OM&A costs) if the work can be performed in parallel with other critical path activities.
5.0 OUTAGE CATEGORIES

5.1 Forecast Outage OM&A

The outage OM&A forecast is derived from the incremental costs associated with planned outages in the Integrated Plan (see Ex. E2-T1-S1). As noted previously, the outage OM&A forecast focuses on the need for and cost of the incremental labour resources (e.g., temporary staff and external contractors, overtime) required over and above regular base staff to execute planned outages, along with the various materials and suppliers required.

OPG does not forecast incremental outage costs for forced outages or forced derates, as OPG typically does not use incremental non-regular labour or augmented staff for these events. This is because OPG will re-prioritize base work during a forced outage or forced derate to allow regular base OM&A work resources to focus on fixing the cause of the forced outage so that OPG can return the unit to operation as quickly as possible. A consequence of diverting base resources from routine maintenance work during forced outages is to delay OPG’s efforts towards reducing elective and corrective maintenance backlogs and implementing improvement strategies.

5.2 Actual Outage OM&A

Actual outage OM&A will include the actual incremental costs of the planned outages. In addition, the actual outage OM&A will include unbudgeted costs due to forced extensions of planned outages, planned outage extensions, or unbudgeted planned outages. Generally, the incremental unit cost of an outage extension tends to be lower compared to the unit cost of a planned outage.

All actual costs incurred due to forced outages, planned derates or forced derates, that could include overtime costs for regular base staff, are recorded in the base OM&A.

6.0 OUTAGE OM&A 2007 - 2012

The main drivers to outage OM&A variances (year-over-year and actual to budget) are the number of outages, scope, planned duration, and actual duration (i.e., extensions of planned
outages in a year). The most significant drivers of outage OM&A costs over the period 2007 - 2012 are:

- A four unit vacuum building outage at Darlington in 2009.
- A six unit vacuum building outage at Pickering in 2010.
- Two outages at Darlington in 2010 compared to one in each of 2011 and 2012 consistent with the 36-month outage cycle.
- Additional planned outage days at Pickering B during 2010 - 2012 as a result of the Continued Operations initiative. The need for the Pickering B Continued Operations initiative is discussed in greater detail at Ex. F2-T2-S3.

More detailed explanations of the various factors that have, or are expected to contribute to the year-over-year outage OM&A variances during the period 2007 - 2012 are provided in Ex. F2-T4-S2.