OUTAGE OM&A – NUCLEAR

1.0 PURPOSE

The purpose of this evidence is to present, in summary form, the methodology for the derivation of Nuclear outage OM&A budget and present actual outage OM&A costs for 2005 - 2007 and a forecast of outage OM&A costs for the period 2008 - 2009.

2.0 NUCLEAR OUTAGE OM&A: OVERVIEW

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 generally recurring at various time intervals of a plant life cycle and b) project work. Outages also give OPG the 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 (Ex. F2-T2-S1). Incremental costs over and above the base work program required to perform the outage per the approved outage schedule are captured in outage OM&A. Accordingly, the total costs of an outage are accounted for in both Nuclear base OM&A and outage OM&A. Incremental outage OM&A costs, as discussed below, are such costs as incremental short-term labour to meet expected non-regular staffing needs for peak work periods, materials, or the costs for specialized services such as inspection and maintenance work by Inspection and Maintenance Services (“IMS”).

The costs associated with the completion of projects undertaken during an outage are captured in either project OM&A or capital, as applicable.

Nuclear outage OM&A is established through the business planning process (see Ex. A2-T2-S1). Each station prepares its own five year outage OM&A budget. The nuclear support groups
also prepare five year outage OM&A budgets at the same time as the stations to reflect the cost of their required contribution to the planned outages.

The main input into OPG’s nuclear outage OM&A budget is the five year integrated nuclear outage and generation plan, which is discussed in detail at Ex. E2-T1-S1. The forecast Nuclear outage OM&A budget is derived by reference to, and in parallel with, the development of the approved generation plans and outage schedule for each station. The first two years of the five year plan (in particular the first year) are subject to the most detailed scope reviews of the planned outage. In particular, identification of the major work scope to be completed is finalized, do-ability within the scheduled timeframe reviewed, resources assessed and economic justification of discretionary activities analyzed within the constraints of the business plan. This establishes a target for all outage stakeholders to deliver on the approved scope, duration, and cost. The “three outer years” of the five year 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 renewed assessment as they come closer to the year of execution.

The key consideration in assessing the need for incremental 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) demand for regular staff for the ongoing maintenance requirements of the running units and b) peak staff resources required to complete the bulk of the outage scope within the outage maintenance window timeframe. Relative to Nuclear base OM&A, the Nuclear outage OM&A forecast focuses on the need 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. The Nuclear outage OM&A budget is approved as one component of the business plan process as described at Ex. A2-T2-S1.

3.0 DEVELOPING THE OUTAGE OM&A BUDGET

3.1 Resource Types

As shown in Ex. F2-T4-S1 Tables 3 - 9, outage OM&A for each station and related nuclear support service group is budgeted on the basis of the resource types as described below:
• Regular Labour: These are the costs of regular staff of OPG’s IMS division. All other regular OPG staff costs are included in base OM&A.

• Non-Regular Labour: The cost of temporary labour on OPG’s payroll and directly supervised by OPG staff, usually construction (e.g., laborers) and trade workers (e.g., electricians) and co-op students.

• Overtime: The cost of overtime incurred by regular, non-regular labour, and augmented staff during the outage. Regular labour refers to OPG nuclear full time staff. While overtime costs for regular staff working on an outage is budgeted to outage OM&A, remaining costs for regular labour, with one exception, is budgeted as base OM&A. The one exception is IMS labour, as discussed below.

• Augmented Staff: The cost of non-regular staff for peak work periods, i.e., temporary additions to staff complements directly supervised by OPG staff but not on OPG’s payroll, usually in the form of professional staff (e.g., engineers, assessors, operation procedure writers or analyst work).

• Materials: The cost of the various materials and supplies used in the outage.

• Other Purchased Services: The cost of outside contractors, who are not on OPG payroll and where the employees of the contractor are under the supervision of the contractor. In addition, other purchased services includes charges by OPG’s IMS division. The main function of the IMS division is to provide specialized inspection and maintenance services (e.g., feeder piping, fuel channel, and steam generator inspections) during an outage. Further discussion of IMS services can be found at Ex. G2-T1-S1. Outage OM&A may also include the costs, whether internal or externally driven, of major equipment refurbishments.

OPG uses incremental staffing 1) for peak labour needs because it is more cost effective and flexible to bring on incremental resources, as needed, for the outage than to maintain permanent staffing, 2) to obtain specialized skill capabilities (given the highly specialized nature of outage inspection and maintenance, specialized skills are required from IMS or external contractors), and 3) because the nature of the maintenance activity mandates the use of original equipment manufacturer expertise. The use of incremental staffing resources to complete outage work activities is consistent with industry practice.
3.2 Costing of Required Resource Types

For the resource types referenced above, the forecast of outage OM&A costs are developed through an iterative process by considering the following:

• The work load in an outage is analyzed with respect to the work orders, sequencing and the skills and resources required.

• Work orders are examined for type and number of activities and tasks involved in completing the work order.

• Tasks are segregated into blocks of activities, either natural complementary groupings or 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 order), a time budget is established, and by considering type of skilled resources required to execute the work (job classification) a cost estimate can be derived for regular labour, which is a component of base OM&A. Consideration of outage duration, outage schedule and historical statistical information (overtime hours per work order/task) allows for identification of 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 as to specific parts or materials for the outage. Information referenced from past outage and risk assessment (e.g., materials/work order of a specific type) is used to estimate supplies (e.g., consumables such as work gloves and radiation protection) and contingency material needs. Contingency material needs refers to the practice of ordering certain parts or materials, due to the lead times required, in anticipation of a need for the part or material not specifically identified during work planning as part of outage scope.

• Work planning also provides information regarding preparation requirements, pre-requisites, associated execution requirements (e.g., radiation protection services and specific staffing/skills/equipment required), and 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.

• Inspection and Maintenance Services provides services to both internal and external customers. Inspection and Maintenance Services derives a cost for each OPG outage, in accordance with the work, time and resources required. Inspection and Maintenance Services then recovers its costs consistent with market negotiated services to third parties such as Bruce Power (as described at Ex. G2-T1-S1).

4.0 OUTAGE OM&A VARIANCES

Each of the components that drive the outage OM&A budget (duration, scope, and resources) can change from forecast. OPG repeatedly updates its forecast of future planned outages, work activity, and related costs through the five year integrated nuclear outage and generation plan cycle reviews and through its tri-annual planning 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 changes that can cause updates to the five year outage OM&A plan include:

• The results of ongoing OPG outage inspection and maintenance work could impact the scope of work planned for future outages, even if the future outages are at a different unit or station.
• New Canadian Nuclear Safety Commission regulatory requirements may add to outage scope and outage costs.
• The nuclear industry traditionally shares operational information thereby providing OPG with awareness of potential emerging issues from other nuclear industry operations. This can result in additional scope and costs to future outages, i.e., inspections would assess the extent the emergent issue impacts, if at all, on 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 and materials.
• OPG may curtail the scope of an outage resulting in additional work/additional scope being added to a future outage, or conversely drag scope from a future outage into a current outage.

• In some cases scope of work activity 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.

• Subject to IESO market rules, circumstances may allow OPG to defer outages for later periods, e.g., if the majority of the planned outage scope could be undertaken during a forced outage, the remaining scope of the planned outage could be deferred to a future period.

All changes of this nature are approved by senior executive management.

5.0 OUTAGE CATEGORIES
The outage OM&A forecast is derived solely by costing the planned outages in the integrated nuclear outage and generation plan (Ex. E2-T1-S1). Outage OM&A costs, if any, for planned derates would be incorporated in the base OM&A budget, although such costs tend to be modest. Also, as discussed in Ex. E2-T1-S1, the integrated nuclear outage and generation plan includes a forecast of forced loss rate equivalent outage days (forced outages or forced derates) but the cost consequences of such events are not recognized as incremental outage OM&A. Rather it is assumed that regular base OM&A work resources can complete the required work.

Actual outage OM&A will reflect actual incremental costs of the planned outages. In addition, as described in Ex. F2-T4-S1 Table 2, actual outage OM&A will include unbudgeted costs due to the forced extension to a planned outage, planned outage extension, or unbudgeted planned outage. Generally, the incremental unit cost of an extension tends to be lower compared to the unit cost of a planned outage. All costs incurred due to forced outages, planned derates or forced derates, which could include overtime costs for regular base staff, are recorded in base OM&A.
6.0 OUTAGE OM&A 2005 - 2009

The Nuclear outage OM&A forecast for 2008, and 2009 is shown in Ex. F2-T4-S1 Table 1, along with comparable historic figures for 2005, 2006 and 2007. In Ex. F2-T4-S1 Table 1, the cost of IMS outage work for OPG is captured as a component of the station’s outage OM&A costs and therefore there are no outage OM&A costs shown directly under IMS.

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). As shown in Ex. F2-T4-S1 Table 1, the trend in outage OM&A over the period 2005 – 2009 for the combined nuclear fleet is for outage OM&A to increase year-over-year from 2005, peaking in 2007, followed by a decline in 2008. There is an increase in outage OM&A for the combined nuclear fleet in 2009, primarily due to an increase in the level of outage activities at Pickering A.

For 2006, the number of forced extensions of planned outages in 2006 was a major driver to actual 2006 outage OM&A costs and largely explains the variances between actual and planned 2006 outage OM&A costs at the stations.

The variance in nuclear programs and training between 2005 and 2006 as shown in Ex. F2-T4-S1 Table 1 relates to reallocation in 2006 of approximately $2.0M of outage OM&A costs related to radiation protection services from nuclear programs and training to Darlington.

In 2007, outage OM&A costs peak, largely driven by increased activity at Darlington as two units were on outage in 2007 for a total of 131 days, and there was an unbudgeted planned outage at Darlington Unit 3. The Darlington outage OM&A costs in 2007 also reflect the additional work completed as the three year outage cycle is implemented.

There is a decline in forecast outage OM&A in 2008 for the combined nuclear fleet primarily because of Darlington, where only one unit is on planned outage for a total of 75 days. This is as a result of the transition to a three year outage cycle for the Darlington units, the benefits of which will be a reduction in the number of planned outage days (with a corresponding increase
in production) over a number of outage cycles, as described in Ex E2-T1-S1. Material costs are
forecast to be higher in 2008 versus 2007 at Darlington, even though the number of outage
days is lower in 2008 compared to 2007, due to differences in outage scope.

Another driver to the forecast of reduced outage OM&A for the combined nuclear fleet in 2008
(and 2009) are shorter planned outage durations at Pickering B, reflecting improvements made
in plant material condition, and other initiatives discussed in Ex. E2-T1-S1.

In 2009, outage OM&A for the combined nuclear fleet is forecast to increase relative to 2008,
primarily driven by outage activity at Pickering A which will be undertaking additional feeder
replacement and turbine blade replacement.

In addition, both Pickering A and B have additional outage OM&A expenditures in 2009 for
advanced preparation for a 2010 vacuum building outage (VBO) at the site.

Explanations of all outage OM&A variances are more fully described in Ex. F2-T4-S2.