

CAPITAL PROJECTS – NUCLEAR OPERATION

1.0 PURPOSE

This evidence provides a project listing and the business case summaries that support the capital expenditures and the in-service amounts for the Nuclear business unit (excluding Darlington Refurbishment) during the test period. These capital expenditures reflect the nuclear capital budget presented in Ex. D2-1-2.

2.0 CAPITAL PROJECTS LISTING

A tiered reporting structure, consistent with the OEB's minimum filing guidelines, has been used to present the evidence for all capital projects that have budgeted expenditures in the test period, or in-service amounts during the bridge year or test period. Specifically:

- **Tier 1:** Individual projects with a total cost of \$20M or more. For these projects, summary level information is provided in Ex. D2-1-3, Table 1 and business case summaries ("BCS") are provided in Attachment 1. Attachment 1 also provides a summary of the project description and need for security-related projects for which business case summaries are not provided. There are 16 Tier 1 projects. Further information on these projects is provided in section 3.0. Three Tier 1 projects (31717 - DN Improve Maintenance Facilities, 33973 - DN Standby Generator Controls Replacement and 33977 - DN DCC Replacement/Refurbishment) have a final in-service date in the test period.
- **Tier 2:** Individual projects with a total cost of \$5M to \$20M, for which summary level information is provided in Ex. D2-1-3, Table 2a/2b. There are 61 Tier 2 projects.
- **Tier 3:** Individual projects with a total cost of less than \$5M, for which aggregated information is provided in Ex. D2-1-3, Table 3. There are 81 Tier 3 projects.

There are a further 101 projects in the Project Portfolio (Unallocated) category (as described in Ex. D2-1-2), which are projects in the project identification or project initiation phases. These projects are presented in Ex. D2-1-3, Tables 5a and 5b. OPG expects that during the test period, some of these projects (or other projects yet to be identified) will move from the project identification and initiation phases into the project definition or execution phase as

part of the ongoing portfolio management process. As indicated in the tables, preliminary forecasts indicate that three of these projects will have total project costs greater than \$20M.

3.0 PROJECT-SPECIFIC INFORMATION - TIER 1 PROJECTS

3.1 New Projects

There are only two new Tier 1 projects (see Ex. D2-1-3, Table 1) that have been approved since EB-2010-0008. Business case summaries ("BCS") are provided in Attachment 1.

The objective of Project #46634 (Pickering Fuel Handling Single Point of Vulnerability Equipment Reliability Improvement) is to improve fuel handling equipment reliability. The total project cost is \$27.0M with an initial partial release of \$14.6M with planned in-service dates in 2013 and 2014. Problems with the availability of Pickering's fuel handling equipment have previously resulted in forced generation losses and this project is designed to help OPG achieve its Forced Loss Rate (FLR) targets for the test period. In addition, improved fuel handling equipment reliability ensures that planned outages remain on schedule and the risk for Forced Extensions of Planned Outages is reduced.

Project #49285 (Pickering Modification/Replacement of Fiber Reinforced Plastic (FRP) Components during 2010 Vacuum Building Outage) began in 2009 with a scope consisting of partial replacements of the FRP components, but following engineering assessments, the scope was expanded to replace all FRP riser components. A superseding release of \$24.5M was approved to include the support activities for the expanded scope of work. Actual project costs of \$17.8M were incurred and the in-service date is pre test period. The objective of this project was to demonstrate the vacuum building FRP components will remain fit for service to 2024, precluding the need for another station wide outage before the planned end of life.

3.2 Completed Projects

Six Tier 1 projects have been completed since EB-2010-0008 Exhibit D2-1-3, Table 1 further indicates that of these six projects, five were completed on or under budget (#46537, Pickering Reactor Structures – Calandria Vault Inspection; #25905, Security Monitoring

Room; #25909, Security Water Side Detection; #31718, Darlington New Change Room Facility; and the P2/P3 Isolation Project). One (#49270, Inter-Station Transfer Bus Cabling Permanent Modifications) exceeded budget by more than 10 per cent (see Section 3.4).

3.3 Deferred/Cancelled Projects

One Tier 1 project has been deferred (#62568, Feeder Repair by Weld Overlay) and one project has been cancelled (#49251, Pickering Site D2O Storage Facility) since EB-2010-0008. The Feeder Repair by Weld Overlay Project was deferred in May 2010. Development of advanced analytical techniques to resolve some feeder integrity issues reduced the originally estimated number of feeders requiring repair or replacement, deferring the need to make this investment. . Additional feeder inspections will be conducted during each planned outage in 2010 - 2013 and based on results, the project will be reassessed and potentially cancelled.

The Pickering Site D2O Storage Facility Project was cancelled in July 2011 as a result of OPG identifying a more cost-effective means to meet its D2O storage requirements. Approval documents and justification for these changes are provided in Attachment 1.

3.4 Project Variance Explanations

There are three Tier 1 projects (#25609, Security – Physical Barrier System; #49270, Inter-Station Transfer Bus Cabling Permanent Modifications and #49285, Pickering Modification/Replacement of Fiber Reinforced Plastic Components during 2010 Vacuum Building Outage) for which total actual or forecast project cost variances exceed 10 per cent, two of which have been completed (#49270, Inter-Station Transfer Bus Cabling Permanent Modifications and #49285, Pickering Modification/Replacement of Fiber Reinforced Plastic Components during 2010 Vacuum Building Outage).

Increased costs (+\$7.4M) for project #25609, Security – Physical Barrier System were primarily the result of more complex design issues and adverse weather conditions which resulted in significant execution delays (labour, contractor costs and interest charges).

Increased costs (+\$20.9M) for project #49270, Pickering Inter-Station Transfer Bus Capacity were the result of a need to proceed with the project prior to completion of the engineering design and the installation which was driven by the need to have the Inter-station Transfer Bus modifications completed by Q2 2010 to fulfill a commitment to the CNSC. A multi unit outage would be required to complete the execution of the modifications and the Vacuum Building Outage (VBO) in Q2 2010 provided the only scheduled multi-unit shutdown required to achieve that milestone. The tight timeline resulted in the project being approved to proceed in the spring of 2009 when the project was at the Project Definition phase. This was a deviation from OPG's project management process where a project is generally not approved to proceed until sufficient project engineering, scope definition and planning is completed to provide a more reliable cost estimate. Proceeding with the project at the Project Definition phase of the planning efforts led to an underestimation of installation scope and costs (\$12.9M) due to unforeseen physical interferences; overtime and shift premiums to meet the tight installation window (\$2.5M), design delay and quality issues (\$3.4M) and some rework (\$0.8M).

For project #49285, (Pickering Modification/Replacement of Fiber Reinforced Plastic Components during 2010 Vacuum Building Outage), the as-found condition of these inaccessible components during inspections, while acceptable for near term operation, was significantly worse than expected and not suitable to last until the end of the original assumed station life of 2014-2016. A superseding release of \$24.5M was approved to reflect the increased scope of work (initial full release was \$12.8M). As described in section 3.2 actual costs of \$17.8M were incurred to complete the project during the station Vacuum Building Outage.

Superseding business case summaries for these three projects are provided in Attachment 1.

4.0 CAPITAL PROJECT IN-SERVICE INFORMATION

OPG's actual and forecast in-service capital additions for the period 2010 - 2015 are summarized in Ex. D2-1-3 Table 4. The forecast in-service amounts in the bridge year and

test year represent a combination of projected in-service amounts for specific (Tier 1, 2 and 3) projects as presented in Ex. D2-1-3 Tables 1, 2a/b and 3, and a supplemental in-service amount.

The supplemental in-service amount is a forecast (see Ex. D2-1-3 Table 4) of in-service declarations that can be expected in the test year consisting of

- Undefined projects: the supplemental in-service amounts is primarily a forecast of in-service amounts for those presently undefined projects that make up the Portfolio Projects (Unallocated) portion of capital expenditures.
- Contingency: The project-specific in-service forecast amounts for (Tier 1, 2 and 3) exclude any approved project contingency amounts. Therefore, the supplemental in-service forecast amount assumes contingency when project-specific forecasts are exceeded.
- Early completion: The timing of in-service project-specific (Tier 1, 2 and 3) forecast amounts could change as completed work packages for specific projects may be deemed ready for service earlier than forecast. Therefore, the supplemental in-service forecast amount includes potential early project completion for project specific in-service amounts.

Exhibit D2-1-3 Table 4 includes actual to forecast variance analysis for 2010, 2011 and 2012, which are discussed in section 4.1 below. For completeness, Table 4 also includes planned minor fixed asset expenditures, which are placed in-service in the year of acquisition.

4.1 In-Service Amount Variance Explanations

Accurate forecasting of in-service amounts is challenging due to numerous factors that affect both the amount of the in-service declaration and its timing. In-service amounts will vary year-over-year, driven by the level of capital expenditures and the timing of project installations which are frequently tied to specific unit or station outages.

Actual in-service cost is also directly affected by project cancellation decisions. After a project is cancelled, alternative replacement projects will be pursued but it isn't always

possible to advance an alternative project to the installation stage (e.g. if the work requires a specific outage for execution). Even if alternative capital projects can be fast-tracked, the in-service date may ultimately be at a later, post test period, date.

With respect to project timing, if a project that is forecast for completion in a particular year is delayed by even a month or two such that it carries into the following year, it has a significant impact on in-service amounts for both years. Resolution of final project acceptance issues may also result in in-service delays. A review of Ex. D2-1-3 Table 4 indicates that 2010 in-service amounts were over budget (\$57.5M), 2011 amounts were under budget (-\$72.3M), and 2012 amounts were under the approved amount (-\$55.6M). Further details are provided here:

2010 Actual versus 2010 Budget:

In-service amounts are greater than planned (+\$57.5M) primarily due to schedule advancement for 25909 – Security Project F (+\$21.1M); a new project 49285 – PN Modify/Replace Fiber Reinforced Plastic Components in Vacuum Building (+\$16.5M), which had to be completed during the 2010 Vacuum Building Outage as discussed above; and, 49270 – PN ISTB Cabling Permanent Modification (+\$19.6M) due to greater than forecast costs, as also discussed above.

2011 Actual versus 2011 Board Approved:

In-service amounts are less than planned (-\$72.3M) primarily due to: the deferral of 62568, Feeder Repair by Weld Overlay (-\$40.3M) as indicated in EB-2010-0008; the cancellation of 25901, Security Hardening Project (-\$6.1M), and lower than planned Minor Fixed Asset expenditures (-\$6.8M). The balance of the under expenditure is the cumulative result of timing and cost variances across a large number of projects.

2012 Actual versus 2012 Board Approved:

In-service amounts are less than the Board Approved (-\$56.7M) as the result of a number of project changes. At Darlington these variances include delays in 33973, Standby Generator Replacement due to new station-related work that prevented the project installation (-

1 \$12.0M), work restrictions regarding 33258, Replacement of EPS Uninterruptable Power
2 Supply (-\$4.8M), the late delivery of major equipment impacting 33621, Secondary Control
3 Area Air Conditioning Unit Replacement (-\$3.5M), and procurement issues regarding 36002,
4 the Main Output Transformer Capital Spare (-\$3.8M). Changes at Pickering include the
5 impact on in-service amounts due to the deferral of 49267, Replacement of Standby Boilers
6 (-\$5.8M) as an alternative lower cost solution was identified.

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Exhibit D2
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Schedule 3
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LIST OF ATTACHMENTS

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Attachment 1: Business Case Summaries and Supporting Information

ATTACHMENT 1

Business Case Summaries and Supporting Information

1.0 BUSINESS CASE SUMMARIES (“BCS”)

Section 3.0 provides a list of capital projects with a Total Project Cost (actual or forecast) of \$20M or greater. The business case summaries of twelve are attached¹. The business case summaries are provided for all projects, with the exception of Security projects as discussed in Section 2.0.

2.0 SECURITY PROJECT DESCRIPTION AND NEED

This section provides a brief project description of the previously-named security-classified nuclear projects, for which BCS are not provided.

In all cases, the need is the requirement to meet Canadian Nuclear Safety Commission (“CNSC”) security requirements, which are common to both Pickering and Darlington.

- Project 25609, Physical Barrier System (was previously referred to as the Security Fence Project): Install improved perimeter fencing system at Pickering and Darlington, including lighting, perimeter monitoring, and other required functions.
- Project 25905, Security Monitoring Room: Replace security monitoring rooms at Pickering and Darlington to meet current requirements.
- Project 25909, Security Project F: For security reasons, OPG is not providing descriptions for new security projects. Security project descriptions that were provided in previous filings (as included above) will be provided for continuity.

¹: OPG has requested confidential treatment of certain business case summaries under the OEB’s Practice Direction for Confidential Information.

3.0 NUCLEAR BUSINESS CASE SUMMARY INDEX

Tab No.	Facility	Business Case Summary (BCS) Title	Project Number	BCS Approval Date
	(a)	(b)	(c)	(d)
		ONGOING PROJECTS FROM EB-2010-0008		
1	DN	Improve Maintenance Facilities at Darlington	31717	Apr-10
2	DN	Chiller Replacement to Reduce CFC Emissions	33631	Sep-10
3	DN	Standby Generator Controls Replacement	33973	Sep-11
4	DN	DCC Replacement / Refurbishment / Upgrades	33977	Jun-06
5	PN	Standby Generator Governor Upgrade	49109	Mar-07
		COMPLETED/DEFERRED/CANCELLED FROM EB-2010-0008		
6	DN	New Change Room Facility	31718	Mar-09
7	PN	Reactor Structures-Calandria Vault Inspection	46537	Aug-09
8	PN	Site - D2O Storage Facility	49251	Aug-11
9	PN	ISTB Cabling Permanent Modification	49270	Feb-11
10	ENG	Feeder Repair by Weld Overlay	62568	May-09
		PROJECTS NOT IN EB-2010-0008		
11	PN	Fuel Handling Single Point of Vulnerability Equipment Reliability Improvement	46634	Feb-11
12	PN	PA Mod/Replace FRP Components During 2010 VBO	49285	Apr-10