

K5.2

Numbers may not add due to rounding

Filed: 2010-05-26
 EB-2010-0008
 Exhibit D2
 Tab 1
 Schedule 2
 Table 1b

Table 1b
 Capital Project Listing - Nuclear Operations Facility Projects
 Projects > \$10M Total Project Cost¹

Line No.	Facility	Project Name	Project Number	In-Service 2010 (\$M)	In-Service 2011 (\$M)	In-Service 2012 (\$M)	2007 Actual (\$M)	2008 Actual (\$M)	2009 Actual (\$M)	2010 Budget (\$M)	2011 Plan (\$M)	2012 Plan (\$M)
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
ONGOING PROJECTS FROM EB-2007-0905												
1	DN	OLC Modifications - Simulator Based Training	28453	2.9	0.0	0.0	0.4	6.6	4.6	0.0	0.0	0.0
2	DN	Fuel Handling Power Track Improvement	31438	0.0	7.3	9.1	0.7	3.2	3.7	4.4	2.8	1.7
3	DN	Improve Maintenance Facilities at Darlington	31717	0.0	0.0	39.9	0.4	2.6	1.7	13.7	15.4	10.5
4	DN	New Change Room Facility	31718	5.2	0.0	0.0	0.5	12.5	9.8	2.0	0.0	0.0
5	DN	Chiller Replacement to Reduce CFC Emissions	33631	4.0	6.0	1.3	0.8	1.0	3.4	4.0	1.9	0.0
6	DN	FH Computer Replacement	33815	2.5	1.6	3.8	0.6	1.1	1.0	1.5	2.6	2.3
7	DN	Shutdown System Computer Aging Management	33955	0.0	0.0	3.9	0.2	1.0	0.7	3.2	4.9	2.7
8	DN	DN SG Controls Replacement	33973	0.0	2.6	5.6	0.4	0.3	0.6	0.9	3.0	6.0
9	DN	DN DCC Replacement / Refurbishment / Upgrades	33977	14.0	0.0	2.9	2.8	2.7	2.9	3.2	2.9	0.0
10	PA	Reactor Structures-Calandria Vault Inspection	46537	13.5	2.3	0.0	9.0	1.5	6.6	2.8	0.1	0.0
11	PA	PA Unit 2/3 D2O Storage Tanks	46576	0.2	0.0	0.0	3.4	4.3	7.6	0.0	0.0	0.0
12	PA	New Redundant Calandria Vault Dryer	49252	0.0	0.0	0.0	0.7	4.1	5.5	0.1	0.0	0.0
13	PA	Switchyard Relay Building Cable Replacement	49266	1.1	0.0	0.0	9.5	2.0	2.2	1.2	0.2	0.0
14	PA	P2/P3 Isolation Project	Various	39.5	0.0	0.0	9.3	5.7	14.1	8.8	0.0	0.0
15	PB	Emergency Power Generator Control Upgrade	49110	11.1	0.2	0.0	0.4	0.9	3.1	6.5	0.2	0.0
16	PB	Chemistry Standards (CH-002) at PB	79147	0.0	0.0	0.0	1.1	0.9	0.4	0.1	0.0	0.0
17	NPT	Physical Barrier System	25609	6.4	0.0	0.0	18.5	19.3	5.6	1.1	0.0	0.0
18	NPT	Security Hardening Project	25901	1.8	8.0	2.0	0.2	2.2	1.7	3.6	8.0	0.0
19	NPT	Controlled Area Improvements	25902	0.0	0.0	9.8	1.0	0.2	0.0	0.5	3.3	9.4
20	NPT	Security Monitoring Room	25905	2.4	0.3	0.0	6.7	5.4	1.2	1.2	0.0	0.0
21	NPT	Security Doors Upgrade	25908	1.9	0.8	0.0	2.2	3.9	2.7	3.4	0.4	0.0
22		Subtotal		106.5	31.2	78.3						
COMPLETED/DEFERRED FROM EB-2007-0905												
23	DN	Second Darlington Full Scope Simulator	28452	0.5	0.0	0.0	3.8	7.7	3.4	0.5	0.0	0.0
24	DN	Main Control Room HVAC	33293	0.0	0.0	0.0	0.6	1.3	0.2	0.0	0.0	0.0
25	DN	Used Fuel Dry Storage In Station Modifications	33925	1.5	0.0	0.0	15.0	12.0	2.2	0.0	0.0	0.0
26	DN	DND Feeder Replacement ALARA/Optimization	34008	2.9	0.0	0.0	6.5	4.1	1.7	0.0	0.0	0.0
27	DN	Fire Protection Upgrade Program Phase 3	79148	0.0	0.0	0.0	1.9	0.8	0.2	0.0	0.0	0.0
28	PB	CFC Replacement (Freon Removal)	40543	5.0	0.0	0.0	3.2	5.0	4.7	0.6	0.0	0.0
29	PB	Auxiliary Power System for PB	49104	5.1	0.0	0.0	36.3	1.7	1.0	0.0	0.0	0.0
30	PB	Standby Generator Governor Upgrade	49109	0.5	0.0	0.0	0.1	2.8	0.3	0.1	0.0	0.0
31	PB	Fire Protection Phase 2	79016	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0
32	ENG	Additional Feeder Cut and Weld Tooling	62567	0.0	0.0	0.0	2.3	7.6	0.9	0.0	0.0	0.0
33	NPT	Security Optimization (Capital)	62558	2.1	0.0	0.0	7.3	1.1	0.4	0.0	0.0	0.0
34	DN	D2O Storage Facility	31555	0.0	0.0	0.0	1.5	0.3	0.0	0.0	0.0	0.0
35	DN	Auxiliary Heating System	34000	0.0	0.0	17.2	0.5	0.1	0.0	3.6	2.9	10.5
36	PA	PA Site - D2O Storage Facility	49251	0.0	0.0	0.0	0.4	0.0	0.1	0.0	0.0	0.0
37		Subtotal		17.6	0.0	17.2						
PROJECTS NOT IN EB-2007-0905												
38	DN	Vacuum Building Outage Recurring Alterations	34012	0.0	0.0	0.0	0.0	0.0	11.4	0.0	0.0	0.0
39	PA	Replacement of Standby Boilers	49267	0.0	0.0	12.1	0.0	0.0	0.8	1.3	10.0	0.8
40	PA	PA ISTB Cabling Permanent Modification	49270	15.2	0.7	0.0	0.1	1.3	13.9	3.0	0.2	0.0
41	ENG	Feeder Repair by Weld Overlay	62568	0.0	40.3	0.0	0.0	0.0	0.0	34.4	2.4	0.0
42	IMS	Upper Feeder Cabinet Inspection Robot	66266	0.0	10.0	0.0	0.3	0.6	0.3	3.5	2.6	0.0
43	NPT	Security Project F	25909	2.9	1.2	0.0	0.0	8.5	10.3	10.0	0.3	0.0
44		Subtotal		18.1	52.2	12.1						
45		Total		142.2	83.4	107.6						
DIVISION TOTALS												
46		Darlington		33.4	19.6	83.7						
47		Pickering A		69.5	3.0	12.1						
48		Pickering B		21.7	0.2	0.0						
49		Nuclear Support Divisions		17.6	60.6	11.8						
50		Total		142.2	83.4	107.6						

Notes:

1 Projects with expenditures during Test Period OR In-Service Amounts in Bridge or Test Period, AND Completed/Deferred Projects (from EB-2007-0905 or subsequent).

BUSINESS CASE SUMMARY
Weld Overlay Project 10 - 62568 Capital 10 - 62435 OM&A
Full Release Business Case Summary N - BCS - 30751 - 10002 - R000
1/ RECOMMENDATION:

Approval is requested for the Full Release of \$53.2M Capital (including contingency) and \$1.5M OM&A (specific contingency) to proceed with the next stage of the Weld Overlay Project which will design and manufacture weld overlay tooling for those Darlington outlet feeders that are life-limited by pipe wall thinning caused by Flow Accelerated Corrosion (FAC). This brings the total costs to \$71M.

The business objective of this project is to reduce the cost of managing life-limiting feeder thinning by developing a repair alternative to the current exclusive use of Cut and Weld tooling for replacing thinned feeders. It is estimated that using weld overlay repair technology in conjunction with Cut & Weld tooling (as necessary), will provide a financial benefit in the range of approximately \$38M - \$143M (NPV) with a 19% - 45% IRR. (See Alternative Section for details). This estimate is based primarily on the assumptions:

- Less overall time required to repair a feeder during a Darlington outage
- Lower execution costs per feeder repair

To date, there has been four partial releases for Weld Overlay under project # 62435 (OM&A): \$1.5M in 2005-2006 for the Definition stage (Proof-of-Concept); \$700K in 2006-2007 for the Pre-Tool Development phase, \$3.7M in 2007 for Stage I (Preliminary Design of Tool and process) and; \$10.6M in 2008 to complete Stage I which is in progress. The project is currently managing Stage I Preliminary Design contracts with two separate vendors in an effort to maximize the probability of project success.

A 2011 Darlington Spring Outage In-service date for this process and tool significantly increases its economic benefits, which necessitates seamless transition into Stage II of the Weld Overlay Project. For this reason, this request for Capital funding approval is being made prior to the completion of Stage I, and prior to estimates being provided by the vendors. The budgetary estimates included in this request are based on costing experience with the similar Cut and Weld tooling, and are considered conservative. Also, a large amount of contingency has been assigned in this BCS to account for the uncertainty.

At the end of Stage I, a revised BCS will be prepared with updated project costs within the value of this release request, and updated risks to reflect the work completed in Stage I. The project team will present the technical and business case as a formal recommendation in a decision meeting, chaired by the CNE (see Attachment D). This revised BCS will be presented for signature during this decision meeting with the CNE, and follow up meetings with the CNO, COO, and CEO. If approved, only the value in the revised BCS will be released.

At this time, outage savings will be quantified for 2010 - 2014 business planning - Release.

100% (incl contingency)	Funding	Type	LTD 2008	2009	2010	2011	2012	Later	Total
Currently Released	Partial	OM&A	3,647	12,887					16,534
		Capital							
Requested Now	Full	OM&A			1,000				1,000
		Capital		5,050	45,060	3,084			53,194
Future Funding Req'd	N/A	OM&A							
		Capital							
Total Project Costs			3,647	17,937	46,060	3,084			70,728
Other Costs									
Ongoing Costs									
Grand Total			3,647	17,937	46,060	3,084			70,728
Investment Type			Class		NPV		IRR		Discounted Payback
Value Enhancing			Capital & OM&A		38M - 143.4M		19% - 45.5%		5 - 3 Years

Submitted By:

 T. Mitchell
 Chief Nuclear Officer

Date:

Finance Approval:

 D. Hanbidge
 S.V.P. & Chief Financial Officer

Date:

Line Approval (Per OAR Element 1.1 Project in Budget):

 J. Hankinson
 President & Chief Executive Officer

Date:

May 15/09

Board Staff Interrogatory #032

Ref: Ex. D2-T1-S2, Attachment 1, Tab 32

Issue Number: 4.5

Issue: Are the capital budgets and/or financial commitments for 2011 and 2012 for the nuclear business appropriate and supported by business cases?

Interrogatory

The BCS for the Feeder Repair by Weld Overlay project states that "At the conclusion of Stage I, an updated economic analysis and revised BCS will be prepared using vendor provided budgetary estimates for Stage II, and a formal decision meeting will be held to determine whether to recommend proceeding with weld overlay tool detailed design and manufacture. The basis for the decision meeting may be found in Attachment D."

Please provide a status update with respect to the following:

- a) Has Stage I been completed in the meantime?
- b) If Stage I has been completed, what were the technical results? Based on these results, has a recommendation and/or decision been made to proceed with Stage II or to cancel the project?
- c) If Stage II is to proceed, has a revised BCS with updated economic analysis been prepared and what is its status?

Response

- a) Stage I is not yet complete. The first vendor completed the scope of work successfully. However, technical issues with the welds of the second vendor have required some additional effort. Because of the fixed price nature of the contracts, there was no benefit to OPG cancelling the second vendor's work when it was partially completed.
- b) Although Stage I work by the second vendor continues, OPG was able to assess whether to proceed with Stage II based on: the successful results of the first vendor; an economic assessment incorporating the Stage II quotes; and, an updated estimate of the number of feeder repairs required. This assessment showed a low economic return and a moderate risk. As a result, a decision was made to defer Stage II of the Weld Overlay project.

The deferral period is three years. During this time the business needs will be monitored and if there are other factors influencing the feeder repair requirements, the project will be reconsidered. If OPG decides to proceed with Stage II, a revised business case summary will be prepared.

Witness Panel: Nuclear Projects

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EB-2010-0008
Issue 4.5
Exhibit L
Tab 1
Schedule 032
Page 2 of 2

- 1
- 2 c) No. As noted above, Stage II is not proceeding at this time.

DNGS Maintenance Facility 16 - 31717**Partial Release Business Case Summary D-BCS-28200-10003-R000****1/ RECOMMENDATION:**

Approval is requested for this Partial Release of \$6,935K capital (including contingency) to facilitate the demolition of the Power House Annex (PHA), FE Calibration Shop, Bldg 6 Security Change Room, & ERT Offices at Darlington as well as to complete the design for the relocation of buried services and to start the Preliminary Engineering portion only for the new Maintenance Facility. At this stage, present estimated total project cost is \$44.6M (\$57.7M including contingency) \$1,600K of which is required for building demolition. A Full Release BCS is scheduled for May 2009.

The objective of this project is to provide new permanent shops and office space for DNGS maintenance staff with a safe and effective work environment. Failure to implement this improvement would leave the station vulnerable to decreases in maintenance productivity and effectiveness, potential increase of industrial accidents, and potential outage extensions due to lack of facilities for rehearsal space for RM and IMS.

The (PHA), FE Calibration Shop, Bldg 6 Security Change Room, & ERT Offices are in the footprint of the proposed new site of the Maintenance Facility and must be removed as a pre-requisite. These buildings are vacant and life-expired and will require removal regardless of whether the new Maintenance Facility goes forward as a Project.

This Partial Release BCS strategy has been adopted to facilitate removal of the PHA in 2008 and to facilitate timely engagement of engineering activities to minimize cost and schedule risks of the overall Maintenance Facility Project by obtaining a clearly defined scope of work for the buried services relocation and building plant and service tie-ins prior to the issuance of the EPC contract

Specifically, this Partial Release will complete:

- Decommissioning and removal of the existing DNGS PHA, Security Change Room, FE Calibration Shop & ERT Offices.
- Detailed Engineering of the Buried Services relocation and Tie-Ins required at the proposed site of the new Maintenance Facility.
- Issue Request for Proposal (RFP) and evaluate bids for a contract to install Tie-Ins and Buried Services relocations.
- Issue an RFP and complete bid evaluations for a Commercial Engineer, Procure, and Construct (EPC) contract for the new Maintenance Facility.
- Preparation of PO for the Preliminary Design portion for the Maintenance Facility to start design work for the new maintenance facility.
- Prepare a Full Release BCS.

Acres Sargent & Lundy (ASL) was commissioned to perform a study and develop several alternatives based on the priority of needs specified by the sponsor. The option selected by management is a new 2 story 60,000+ sq. ft building which meets all the needs identified except a welding shop.

This project will be executed between 2007 and 2011:

- 2007 - Preliminary Design for the PHA removal. (complete)
- 2008 - Removal of the PHA and associated buildings.
 - Complete Detailed Engineering for the Buried Services relocations and Tie-Ins at the proposed site.
 - Issue an RFP for a Commercial EPC contract for the proposed new Maintenance Facility, receive & evaluate bids.
- 2008/09 - Preliminary and detailed design of the Maintenance Facility.
- 2010/11 - Construction and turnover of the Maintenance facility to OPG Operations and Maintenance.
- 2012 - Close-out

Note that this project estimate does not include costs for moving existing maintenance equipment, purchase of new maintenance equipment, purchase of radiation monitoring equipment.

Full project cost estimates are conceptual at this time (+60% / -25%) and include approximately [REDACTED] contingency. Before requesting full funding release, detailed estimates will be completed and independently validated by a third party vendor.

An Executive Control limit of \$50 Million has been placed on the project as a whole; expenditure beyond this limit must receive formal approval by the Chief Nuclear Officer and the Chief Operating Officer prior to expenditure or cost commitment.

BUSINESS CASE SUMMARY

2007's (prior contingency)	Funding	LTD 2007	2008	2009	2010	2011	2012	Later	T
Currently Released	Developmental	1,369	234						
Requested Now	Partial	(861)	3,960	3,836					6,935
Future Funding Req'd	Full			15,096	19,985	13,599	521		49,201
Total Project Costs		508	4,194	18,932	19,985	13,599	521	-	57,739
Other Costs									
Ongoing Costs									
Grand Total		508	4,194	18,932	19,985	13,599	521	-	57,739
Investment Type	Class	(EV) Impact on E2 Value		IRR	Discounted Payback				
Switching	Capital	\$1,484		13.4%	N/A				

Submitted By:

Tom Mitchell May 08, 2008
Tom Mitchell Date:
CNO

Finance Approval:

Donn Hanbidge
Donn Hanbidge Date:
SVP & CFO

Line Approval (Per OAR Element 1.1 Project in Budget):

Jim Hankinson May 26/08
Jim Hankinson Date:
President & CEO

Board Staff Interrogatory #025
(NON-CONFIDENTIAL VERSION)

Ref: Ex. D2-T1-S2, Attachment 1, Tab 3

Issue Number: 4.5

Issue: Are the capital budgets and/or financial commitments for 2011 and 2012 for the nuclear business appropriate and supported by business cases?

Interrogatory

- a) The (Partial Release) BCS for the Improve Maintenance Facilities project indicates that the Full Release BCS was scheduled for May 2009.
- i) Has this occurred? If not, please elaborate on the cause for the delay and what the new target date is for the Full Release BCS.
- ii) If yes, please provide a copy of the Full Release BCS.
- b) On page 9 of the BCS it is stated:

In the Full Release BCS the following items will be included as per Nuclear Oversight Committee/Board of Directors specific request:

- Analysis of existing space currently used by Maintenance staff for the various functions and an explanation of why each function must be moved to the new location (e.g. tabulate: function/space currently used for the function/why the function must be moved to a new location).
- Detailed benchmarking data for similar building construction on a cost-per-square foot basis.

Please provide the aforementioned information.

Response

- a) The full release business case summary ("BCS") scheduled for May 2009 did not occur. The information contained in the partial release BCS referenced above was based on a strategy to build the maintenance facility inside the protected area. In May 2009, a revised project charter was approved to move the proposed maintenance facility outside the protected area. As a result, instead of the originally planned full release BCS, a further partial release BCS for the revised maintenance facility project (outside the protected area) was approved by the OPG Board of Directors in May 2010 with the full release BCS targeted for April 2012.

A redacted copy of the partial release BCS approved May 2010 is attached as Attachment 1. OPG is seeking confidential treatment of the redacted portions of this

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EB-2010-0008
Issue 4.5
Exhibit L
Tab 1
Schedule 025
Page 2 of 2

1 partial release BCS. An unredacted copy of the partial release BCS approved May 2010
2 has been filed in accordance with the OEB's Practice Direction on Confidential Filings.
3 b) As noted above, the full release BCS was not prepared and, as a result, the type of
4 analysis contemplated in the initial partial release BCS was not completed. To respond in
5 part, however, please refer to the attached May 2010 partial release BCS (redacted). On
6 page 2 of 27, in the paragraph beginning "For the past few years..." the shortfalls with
7 respect to the existing maintenance workspace are summarized. Additionally, beginning
8 on page 4 of 27, the section entitled "Computer Development Facility" summarizes the
9 need for new computer development facilities. Beginning on page 7 of 27, Table 4,
10 entitled "Building Layout and Use Concept", itemizes the area required for each function,
11 the number of personnel within each function and the reason for staff relocation.

BUSINESS CASE SUMMARY

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 L-01-025
 Attachment 1

Darlington New Maintenance Facility 16 - 31717
Partial Release Business Case Summary D - BCS - 28200 - 10005 - R000
1/ RECOMMENDATION:

Approval of \$5.0 M capital funding is requested for a total release of \$13.55M (including contingency) to complete the preliminary and detailed engineering, procurement of long lead equipment and components, and site preparation for a new maintenance and computer development facility outside the protected area at the Darlington Nuclear Generating Station (DNGS). The forecast to complete the project is \$49.8M (including contingency)

This sustaining project has several business objectives:

- Replace the maintenance work areas that have been or will have to be removed due to nuclear safety and fire code compliance requirements as well as station requirement for the control of transient material.
- Provide replacement facilities for those to be removed for implementation of the station Refurbishment project.
- Provide adequate and improved working space for maintenance staff to improve productivity and morale by addressing the following needs:
 - increased space requirements because of a change in maintenance strategy to day shift from a shift (24/7) operation
 - the implementation of new maintenance management technologies and computerized planning and reporting
 - adequate space requirements for Pre/Post Job Briefings to improve Human Performance results and also for rehearsals and mock-ups for on-line and outage maintenance support.
- Replace the existing computer support buildings which are to be demolished as part of the station Campus Plan and provide a home for the Shut-Down Systems computer support facility currently located in leased off-site facility.

For the past few years, the challenges introduced by the shortfalls in maintenance workspace have been met by use of empty spaces in equipment rooms, hallways etc and with various temporary/permanent offices or shops inside and outside of the Powerhouse. Such provisions can no longer be continued due to various drivers for removal of the workstations and facilities. The table below shows the number of maintenance work station that are affected by various drivers/problems, resulting in the need to relocate maintenance work and staff.

Table 1: Number of Maintenance & Computer Staff Affected

Reason for Relocation of maintenance workstation	Number of affected mtce workers
Health and Safety and code issues (regulatory)	28
Facilities to be dismantled to make room for Refurbishment (sustaining)	50
Life-expired Computer facilities to be demolished as per Campus Plan	14
Cost saving opportunity (value enhancing)	
Part of Strategic Consideration and integration for office space and relocating unavailable off site facilities (sustaining)	12
Part of strategic consideration and integration of office space for managing maintenance work. Facilitate Improvements (sustaining)	16
Total	120

In the previous partial release (May 2008) the project had recommended a New Maintenance Facility (NMF) inside the protected area. Since then, further engineering and cost estimations, including the lessons learned from the Darlington Construction Change Room project, has determined that the proposed facility could not be built inside the protected area within the funding limit of \$50M set by the Board of Directors. The current estimate for the NMF inside the

BUSINESS CASE SUMMARY

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EB-2010-0008

L-01-025

Attachment 1

protected area is about \$83M including contingency. The decision was made to relocate the facility outside the protected area to reduce costs and to stay within the funding limit. The \$50M estimate for this project includes the cost of the engineering and demolition of the abandoned Powerhouse Annex (\$~~50M~~), estimated cost of computer development portion (\$~~50M~~) and overall contingency (\$~~50M~~). The estimated cost of the maintenance facility before addition of the computer development scope, demolition of Powerhouse Annex is therefore \$40M which includes \$~~50M~~ contingency.

A project scope change since the previous partial release BCS has been to include the needed replacement computer support facilities within the NMF instead of as a stand-alone building. This results in cost savings to OPG of \$3M. The computer development facility was originally part of the station Campus Plan.

A Full release BCS is scheduled for the first quarter of 2012, following the retention of an Engineering/ Procurement/ Construction (EPC) contractor and completion of detailed engineering and release quality estimates. The NMF is scheduled to be in service in 2013, just in time to free up space within the protected area required by the station refurbishment project.

Table 2: Release Summary and Cash Flow

\$000's (incl contingency)	Type	LTD 2009	2010	2011	2012	2013	2014	Later	Total
Currently Released	Partial	8,538							8,538
Requested Now	Partial	(3,810)	1,640	4,280	2,900				5,010
Future Funding Req'd	Full				26,828	9,438			36,266
Total Project Costs		4,728	1,640	4,280	29,728	9,438			49,814
Non Project Costs									
Grand Total		4,728	1,640	4,280	29,728	9,438			49,814
Investment Type	Class	NPV		IRR		Discounted Payback			
Sustaining	Capital	\$6,826k		NA		37			

Submitted By:

 Wayne Robbins
CNO

 2010-04-16
Date

Finance Approval:

 Line Approval (Per
OAR Element 1.1 Project in Budget)

 Don Hanbidge
SVP & CFO
Apr. 17 / 10
Date

 Tom Mitchell
President & CEO
2010-Apr-28
Date

2/ BACKGROUND & ISSUES

The need for additional maintenance space has been in the business plan for years due to removal of office and structures from the station as a result of nuclear and fire assessment reasons, a change in maintenance strategy (day shift vs 24/7), emphasis on human performance and the station Event Free Tools which results in increased frequency of Post and Pre-job briefs as well as life-expired buildings and code compliance

This project was started in 2005 while the station maintenance management and staff were being continuously challenged by the shortage or inadequacy of the space for conducting day to day maintenance work resulting in management and worker frustrations. Building this facility will demonstrate management's commitment for making adequate provisions for the station maintenance activities.

In May of 2008 a partial release BCS was approved for a new maintenance facility to undertake the following activities

- Removal and de-commissioning of the building on the selected site within the protected area,
- Design for the tie-ins and/or relocation of the tie-ins,
- Contract procurement process for the building and approval of a full release BCS.

Upon further engineering and cost estimation, including incorporation of lessons-learned in the Construction Change Room project, we are now recommending a facility outside the protected area that will be a better value for money and will meet the stations needs and include a computer development facility. The following are some of the activities that were undertaken to arrive at the recommended approach:

- Completed an initial Value Engineering (VE) workshop to evaluate alternatives using commercial standards with modified layouts, reduced footprint, and a self sustained stand alone Maintenance Facility inside the protected area. The cost of the alternatives ranged from \$51M to \$90M.
- Conducted a benchmarking exercise with other North American Nuclear utilities to obtain cost information for similar buildings inside the protected area and compare with OPG cost estimates. Although other buildings for security purposes were constructed by other utilities, no building comparable to a maintenance facility building had been built inside the protected areas since the events of September 11, 2001
- The cost of the 19000 sq ft Construction Change Room (CCR) inside the protected area in Darlington amounted to approximately \$24M, or about \$1.3k/sq ft. The CCR did not include some major equipment or features such as overhead crane, overhead doors, loading bays, offices or IT and LAN services therefore, allowances were included in the estimate for the maintenance facility which resulted in a total estimate of some \$83M which included 20% contingency.

Based on the above findings the project team concluded that providing a maintenance facility within the approved limit of \$50M could not be met.

In May 2009 a Project Charter was approved for considering a maintenance facility outside the protected area that could house adequate workspace for station maintenance and the computer development facilities which were earmarked for relocation by the Darlington Campus Plan due to aging of the existing computer buildings

Strategic Considerations:

The plan for building a new maintenance facility outside the protected area expanded the project considerations to some other OPG initiatives and long terms plans such as Campus Plan, Darlington Refurbishment and Operations Support Building Retrofit. The summary of such considerations are discussed in the following sections

Computer Development Facility

Several projects have recently been approved to replace or upgrade the existing computerized systems of the station

Down Systems (SDS), Fuel Handling (FH) and Digital Control Computers (DCC). The computer development and laboratories supporting these computerized stations systems are currently located in three locations (two on site and one off-site). The on-site facilities are life expired and targeted for demolition as part of Campus Plan and the off-site facility needs to be returned to the owner. These facilities are now integrated into the Maintenance Facility Project with a cost savings to OPG of approximately \$3M.

Campus Plan

The Darlington Campus Plan was approved in May 2009. The Darlington Campus Plan – funded by refurbishment project – will replace all the life-expired facilities at Darlington and build new facilities strategically located around the station on OPG land for long term support of DNGD. At the same time that the Campus Plan was being approved, the decision was made to relocate the NMF outside the protected area and to incorporate the Computer Development Facility into this project (within funding limit of \$50M) as an opportunity for cost saving.

All other proposed facilities in the Campus Plan are proposed for specific usage at various locations on site and on nearby OPG land. Additional integration with the NMF will not result in further cost savings to OPG. For example, a Facility Services Building is planned for 2016 at a location north of the station. Consolidation of this building into the proposed NMF will not be possible or cost effective due the space limitation and the impact of such a large complex on the available parking space near the plant.

In terms of the overall office accommodation needs it is recognized that with the cancellation of the Clarington Energy Center there is a shortage that will need to be addressed through an off site leasing strategy. This shortfall is not within scope of the Maintenance Facility project.

Darlington Refurbishment

This project was also reviewed in the light of the Refurbishment project and facility needs. The facilities planned for the Refurbishment varied from the NMF in terms of functionality and use. In order to consolidate these facilities with the proposed maintenance facility, they would need to be designed and constructed as a hybrid complex which would result in much higher cost and they would not become available to the station until 2024, after Refurbishment, which is too late to meet the station maintenance challenges.

The start date for infrastructure construction within the protected area (outside the powerhouse) for the Refurbishment program is early 2013. This will require the current Darlington maintenance facilities in the area targeted to be replaced by Refurbishment facilities to be vacated and ready for demolition by 2013. As such, the NMF project is on the critical path for the Darlington Refurbishment program.

Operations Support Building (OSB) Retrofit Project

This project was also reviewed against the Operating Support Building (OSB) retrofit project. The driver for OSB retrofit is the deteriorating condition of the building and will not result in additional space. The swing space for office during construction is being planned separately by the Nuclear Facilities organization.

The maintenance facility is being proposed to support the day to day station maintenance needs and its objectives. Its scope is limited to certain specific maintenance functions which include minimum number of offices. The OSB occupants are made of station planning and operations staff and management that need to have ready and immediate access to the plant. During the building retrofit, some of the staff can be relocated temporarily but permanent relocation of the staff and de-commissioning of the OSB requires significant engineering and strategic planning with major impact on scope, cost and schedule of this project and little or no foreseeable cost benefit to OPG.

Business Case Justification:

Employee morale

This project was first initiated in 2001 and later deferred in 2002 due to other priorities. The project was initiated again in 2005 while station maintenance management and staff were being continuously challenged by the shortage or inadequacy of the facilities for carrying out maintenance work. Building the NMF demonstrates OPG's commitment to making adequate provisions for the station maintenance activities and creating an environment where staff can perform their duties more efficiently. This will have a positive effect on employee morale.

Economic benefits

A detailed assessment was made of the economic benefits of this facility based on extensive communications and interviews.

Updated: 2008-03-14
 EB-2007-0905
 Exhibit D2
 Tab 1
 Schedule 2
 Page 8 of 33

1 Ontario Power Generation – Project Summary

Project Name: Improve Maintenance Facilities at Darlington							
Project Number: 31717		Project Category: <input type="checkbox"/> Regulatory <input type="checkbox"/> Sustaining <input checked="" type="checkbox"/> Value Enhancing / Strategic			Project Type: <input checked="" type="checkbox"/> Capital <input type="checkbox"/> OM&A		
Project Start Date (month, year): January 2002				In-Service Date (month, year): December 2010			
Project Description: Construct a new 57,300+ sq. ft. Maintenance Facility, including: <ul style="list-style-type: none"> ▪ Mechanical maintenance monitoring and test equipment lab ▪ Control maintenance monitoring and test equipment lab ▪ Mechanical maintenance valve shop ▪ Mechanical maintenance seal lapping shop ▪ Reactor maintenance shop ▪ Breaker shop ▪ Inspection and maintenance services quality control labs and offices ▪ Control maintenance/mechanical maintenance valve shop ▪ Inspection and maintenance services pressure tube area ▪ Civil first line manager offices ▪ Mechanical maintenance first line manager offices 							
Project Need (i.e., justification for the project): This project is designed to address the current inadequate maintenance facilities at Darlington which are leading to overcrowding, inefficiencies, outage extensions, and non-code compliant work areas.							
Project Costs:							
\$ 000	LTD 2005 Actual	2006 Actual	2007 Actual	2008 Plan	2009 Plan	Future Plan	Total Costs
Capital	141	8	359	3,245	14,563	26,104	44,420
OM&A							
Initial Full Release (A): N/A – Developmental Release		Actual or Forecasted Project Completion Cost (B): N/A			Variance (B-A): N/A		
Variance Explanation (if Variance >10% of Initial Full Release): N/A							

Numbers may not add due to rounding

Updated: 2008-03-14
EB-2007-0905
Exhibit 02
Tab 1
Schedule 2
Table 1

Table 1
Capital Project Listing - Nuclear
Facility Projects - Released Amount and Balance to Be Released
Projects > \$10M Total Project Cost¹

Line No.	Project Name	Project Summary Ref. No.	Category	Start Date	Final In-Service Date	Released Amount (\$M)	Balance To Be Released (\$M)
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
Project summaries for the following projects are included in this section of the application.							
	Darlington NGS						
1	Second Darlington Full Scope Simulator	28452	Sustaining	Sep-06	Jul-09	14.2	0.0
2	O2O Storage Facility	31555	Sustaining	Nov-06	Dec-10	2.8	25.4
3	Improve Maintenance Facilities at Darlington	31717	Sustaining	Jan-02	Dec-11	1.4	43.0
4	Man Control Room HVAC	33283	Sustaining	May-01	Sep-08	10.9	0.0
5	Chiller Replacement to Reduce CFC Emissions	33631	Regulatory	Jan-04	Dec-11	6.6	6.7
6	PH Computer Replacement	33815	Sustaining	Aug-05	Feb-12	10.4	0.0
7	Used Fuel Dry Storage In Station Modifications	33925	Sustaining	Jan-01	Dec-08	44.4	0.0
8	Shutdown System Computer Aging Management	33955	Sustaining	Nov-06	Dec-11	1.6	63.0
9	Standby Generator Controls Replacement	33973	Sustaining	Dec-06	Dec-11	1.2	13.1
10	DN DCC Replacement / Refurbishment / Upgrades	33977	Sustaining	Sep-03	Dec-12	19.2	0.0
11	Auxiliary Heating System - Phases 1 & 2 Alternative Heating	34000	Regulatory	Mar-06	Dec-09	2.0	18.5
12	Feeder Replacement As Low As Reasonably Achievable Optimization	34008	Sustaining	Jan-06	Dec-08	10.8	0.0
13	Fire Protection Upgrade Program Phase 2	79016	Regulatory	Oct-97	Dec-07	19.0	0.0
14	Fire Protection Upgrade Program Phase 3	79148	Regulatory	Aug-01	Dec-08	28.9	0.0
	Pickering A NGS						
15	Catadina Vault Inspection Tooling	46537	Sustaining	Aug-06	Dec-09	22.0	0.0
16	Pickering Site - O2O Storage Facility	49251	Regulatory	Nov-06	Jul-10	1.9	11.4
17	Switchyard Relay Building Cable Replacement	49266	Sustaining	Dec-06	Jun-10	14.5	0.0
	Pickering B NGS						
18	CFC Replacement (Freon Removal)	40543	Regulatory	Oct-03	Dec-09	19.0	0.0
19	Auxiliary Power System for PB	49104	Regulatory	Mar-05	Feb-08	104.7	0.0
20	Standby Generator Governor Upgrade	49109	Sustaining	Oct-05	Jul-08	22.0	0.0
21	Chemistry Standards (CH-002) at PB	79147	Regulatory	Feb-98	Jun-08	17.8	0.0
	Engineering & Modifications						
22	Additional Feeder Cut and Weld Tooling	62567	Sustaining	Jun-07	Dec-08	12.1	0.0
	Nuclear Programs & Training						
23	Security Fence Project	25609	Regulatory	Nov-05	Sep-10	39.3	7.6
24	Security Hardening Project	25901	Regulatory	Nov-05	Dec-10	4.5	9.0
25	Controlled Area Improvements	25902	Regulatory	Nov-05	Sep-09	1.9	12.2
26	Security Monitoring Room	25905	Regulatory	Nov-05	Dec-09	11.6	7.7
27	Security Doors Upgrade	25908	Regulatory	Aug-06	Dec-09	3.1	10.1
28	Security Optimization (Capital)	62558	Regulatory	Apr-02	Dec-08	172.0	0.0
29	Subtotal Facility Projects					620.1	227.8

¹ Projects with expenditures during Test Period

Board Staff Interrogatory #047

Ref: Ex. F2-T3-S3

Issue Number: 6.3

Issue: Is the test period Operations, Maintenance and Administration budget for the nuclear facilities appropriate?

Interrogatory

Please aggregate the contingency amounts (General and Specific) for all of the OM&A Business Case Summaries, for the 2008-2009 period, and identify how much of those contingency amounts were utilized by OPG.

Response

The following table provides the aggregate General and Specific contingency amounts planned for 2008 and 2009 in the OM&A Business Case Summaries ("BCS"), as well as the aggregate contingency amounts approved via the nuclear project management process outlined in Ex. D2-T1-S1 page 10, lines 4 - 12.

Line No.	OM&A Contingency (\$M)	2008	2009
	Contingency Planned (BCS)		
1	General	15.9	20.5
2	Specific	1.2	2.2
3	Total	17.1	22.7
4	Contingency Approved (AISC)	6.0	12.7

The approval of contingency requests by the Asset Investment Screening Committee ("AISC") does not identify whether the approval is General or Specific contingency.

As explained in Ex. D2-T1-S1, page 10, lines 4-12, project contingencies are included in the total project costs in the approved BCSs ("Contingency Planned" in the table above), but there are no project contingencies in the project portfolio budget. When project managers receive approval for contingency funding from the AISC ("Contingency Approved" in the table above), the AISC allocates budget from other projects that have been delayed or are being completed under budget.

Witness Panel: Nuclear Projects

1 **INCLUDING MAJOR COMPONENTS."**

2 MR. PASQUET: The last answer associated with this
3 question is: No, by applying our mitigation measures
4 identified in our life cycle plans -- and they have been
5 incorporated into our business planning -- none of the
6 identified degradation mechanisms are considered to be
7 life-limiting to the average station service life.

8 MR. KEIZER: Thank you. Moving on to question 17,
9 dealing with **contingency amounts**.

10 MR. LEAVITT: So this question was in response to
11 **Board Staff Interrogatory Response No. 47**, which dealt with
12 the aggregate of project contingency amounts, both the
13 contingency approved at the time of the business case
14 summary approval, and the actual amount of contingency
15 used.

16 So a number of clarifying questions were asked.

17 The first question was: Of the \$39.8 million in total
18 contingency approved, how much was used?

19 With respect to Exhibit L, tab 1, schedule 47, the
20 39.8 total contingency is the sum of the 2008 and 2009
21 amounts, 17.1 and 22.7 million.

22 And of that contingency that was approved in the BCSs,
23 the amount of that contingency used in each year is, in
24 fact, line 4 in the table. **So 6 million was used in 2008,**
25 **12.7 million was used in 2009, for a total of 18.7 million**
26 **out of 39.8 million approved.**

27 The part B of the question asks to clarify if the 18.7
28 is incremental to the 39.8 million approved in the BCS, and

1 no, it is not. It is, in fact, a portion of the total
2 contingency that was approved. So it looks like, you know,
3 perhaps just a little less than 50 percent of the
4 contingency that was originally approved was, in fact, used
5 by the portfolio in those years.

6 Part C of the question asks to clarify the distinction
7 between general and specific contingency.

8 This is terminology used when developing the business
9 case summary. Sometimes there are specific elements of the
10 project that have not yet been firmed up. For example,
11 projects may be approved before a fixed price contract is
12 set. If that is the case, we may specify a specific
13 contingency amount associated with that known-unknown, if
14 you will, in the project.

15 For those things that are not known, project managers
16 sometimes refer to these as "unknown-unknowns" but for
17 those other items, a general contingency amount is
18 specified for the project, as well.

19 MR. KEIZER: Then moving on to Board Staff question
20 No. 18, relating to issue 6.5 and the staffing analysis.

21 MR. LEAVITT: So this question refers to some staffing
22 analysis that was done near the end of the benchmarking
23 work in 2009. And it had -- it had made recommendations
24 that would be typical of what could be applied across
25 nuclear.

26 So we were -- we had, I guess, noted that one position
27 has been eliminated and 35 staff have been reassigned, as
28 was recommended, to other functional organizations, and

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Undertaking

Board Staff to clarify additional question put by Board Staff, and indicate sources for the data; OPG to provide an answer after they have reviewed question.

Response

The table prepared by Board Staff as part of this question does not present an appropriate analysis as a result of the following factors:

- For development or partial release business case summaries (BCSs), the table includes estimated contingencies for the entire project. These estimates are included in these BCSs for information only and do not represent the final project contingency. The contingency information that can be used for analysis is the contingency for the development phase (for developmental BCSs) or the approved phase (for the partial release BCSs) only.
- For full release BCSs, the table includes project contingencies for projects where there have been previous releases through developmental or partial release BCSs. In these cases, the appropriate contingency for analysis is the "going forward" contingency related to the "going forward" project costs. The contingency in full release BCS will have been estimated on the basis of these going forward costs.

OPG has corrected the table prepared by Board Staff and presents the corrected table in confidential Attachment 1. As indicated in Attachment 1, the corrected range of "Contingency Factor" (as defined by Board Staff) is [REDACTED].

- a) "Contingency Factors" (as defined by Board Staff) for the listed projects fall within the range of approximately [REDACTED]. This range is consistent with OPG's approach to determining contingencies. OPG determines contingencies on a project by project basis and does not apply a general percentage contingency. The approach of the Project Management Institute.

Projects at the lower end of the range tend to be those where cost estimates are available from previous execution of similar projects [REDACTED], and for which the scope is particularly well defined. Projects at the higher end of the range tend to be first-time projects, with more significant risks due to the nature of the work involved (e.g. [REDACTED]). Risks driving contingency allocation are discussed in Section 6 of each BCS (Risk Table).

- b) The Environmental Qualification Discovery Work and Scope Reduction Project has a partial release BCS. As indicated in (a) above, the correct contingency amount to be

1 used in any analysis is the approved contingency for this release only, ie. [REDACTED] (see
2 Ex. F2-T3-S3 Attachment 1, Tab 13, Pg 16, columns entitled "This BCS 2009/2010").
3 The amount of [REDACTED] cited in the question represents a preliminary estimate of the
4 contingency for the full project, and is included in the BCS for information purposes
5 only.
6

7 The primary factor in determining the contingency for this project (and all projects)
8 was project manager judgment. To assist in this task, the project manager assessed
9 18 contingency criteria, including, for example, resource availability, constructability,
10 familiarity, and scope definition. Based on the relative risk ranking of each criterion, a
11 percentage contingency was assigned to each criterion and then summed to arrive at
12 an estimated contingency for the entire project; in this case, [REDACTED]. This estimate and
13 project manager judgment were used to determine the contingency of [REDACTED] in the
14 partial release. The [REDACTED] contingency represented [REDACTED] of the partial release of
15 \$32.5M, as shown in Table 1.
16

Numbers may not add due to rounding.

Filed: 2010-05-26
 EB-2010-0008
 Exhibit F2
 Tab 3
 Schedule 3
 Table 3

Table 3
 OM&A Project Listing - Nuclear
Projects <\$5M Total Project Cost¹

Line No.	Sponsoring Division	Number of Projects	Total Project Cost (\$M)	Average Cost Of All Projects (\$M)
		(a)	(b)	(c)
	Facility Projects			
1	Darlington NGS	13	26.5	2.0
2	Pickering A NGS	12	21.3	1.8
3	Pickering B NGS	15	22.4	1.5
4	Nuclear Support Divisions²	12	15.6	1.3
5	Total	52	85.7	1.6

Notes:

- 1 Projects with expenditures during Test Period.
- 2 Nuclear Support Divisions includes Engineering, Projects & Mods, Supply Chain, Programs & Training, Inspection Mtce and Commercial Services, Facilities and PINO.