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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 30% 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

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$000's (incl contingency)	Funding	LTD 2007	2008	2009	2010	2011	2012	Later	Total
Currently Released	Developmental	1,369	234						**1,603**
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	(IEV) Impact on Ec Value	IRR	Discounted Payback
Sustaining	Capital	51.4M$	13.4%	N/A

Submitted By:

Tom Mitchell — May 08, 2008 — Date:
CNO

Finance Approval:

Donn Hanbidge — Date:
SVP & CFO

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

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

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2/ BACKGROUND & ISSUES

DNGS needs to improve its overall maintenance capability to support continuous station operations in a safe and cost effective manner. Darlington initially commissioned a study of a Maintenance Facility under a partial release in 2002, that release was later cancelled due to changing station priorities. Subsequent studies by Wardrop (2005), Acres Sargent & Lundy (ASL) (2006), and most recently ASL to provide a revision to their 2006 study were commissioned; several iterations to the study were required due to changing maintenance strategies, changing management directives, station priorities, and budgetary constraints on the scope of the work.

The Maintenance Facility Conceptual Study rev 00 performed by ASL, which was issued November 13th, 2006, had four developed layouts and conceptual cost estimates, which significantly exceeded the portfolio budget. A new scope of work was provided by the Sponsor on December 13th, 2006 with scope ranked by priority and a cost ceiling for the new Maintenance Facility. ASL was re-engaged and an additional three new conceptual layouts, schedules, and cost estimates produced as a result of the iterations required to be developed to determine the optimal building layout while adhering to the stipulated scope priority and budget limitation.

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 to the new build. These buildings are vacant and life-expired and will require removal regardless of whether the new Maintenance Facility goes forward as a Project. The removal & decommissioning cost is estimated at $1.6M (+60/-30%) and was obtained from rev 00 of the ASL conceptual report. The current construction change room is also in the foot print of the proposed Maintenance Facility. The removal of this building is being completed under project 31718 "New Construction Change Room".

As a result of DNGS progressing through its life cycle, changes in technology, new maintenance strategies, and loss of expired temporary buildings, the current maintenance facilities at Darlington are no longer adequate. The issues that were evaluated to develop the recommended option include the following:

Increased Maintenance Requirements/Original Facilities are Inadequate

1. Increased maintenance staff – Control Maintenance from 140 to 209, Mechanical Maintenance from 135 to 195, and Inspection Maintenance Services (IMS) personnel from 0 to 30. Maintenance staff has increased by > 160 personnel since plant was commissioned.
2. Maintenance strategy is now being focused on day crews as opposed to shift crews. Hence, the total accumulated crew size to be accommodated on days has increased from 40 to 188 maintenance personnel.
3. IMS was never originally provided space for permanent shops and offices. They had been housed in the PHA but this building has been since vacated and condemned.
4. Offices and shops had been built in the path of a potential secondary side pipe failure. These shops were removed and this has resulted in some work groups having inadequate offices and labs. Reference TOE 98-01234-20100-3981-01.
5. Some of the existing shops and offices do not meet the National Building Code and/or ASHRAE 62.1 standards. These areas include MM M&TE lab, CM M&TE lab, MM/CM Valve shop, MM RV shop, MM Seal Lapping shop, and MM Supervisors offices.
6. CM/MM M&TE labs do not have adequate humidity and temperature control. This results in these labs being unavailable for certain critical calibration activities ~ 30% of the time.
7. Greater emphasis on safety resulting in the following requirements:
    a. Pre-job briefing spaces.
    b. Rehearsal and Mockup areas for both IMS and Reactor Maintenance work to maximize efficiency & minimize potential outage delays.
8. Computers now play an important role in delivering work instructions, providing additional information and documenting the work. Hence, offices facilities and computer work stations are required to house them.
9. Changing technologies resulting in the requirement for specialized crews' complete with customized shop space and required FLM/FLMAs such as Fix-It-Now crews and Predictive Maintenance crews.

10. As a result of DNGS progressing through its life cycle, the original plant facilities did not adequately accommodate or foresee current aging plant considerations or license requirements. These considerations include:
    a. Maintenance strategy implementing transition from corrective to preventative/predictive maintenance requires as per industry benchmarking experience a 30% increase in required shop space. Overhaul/refurbishment programs for major breakers, pumps, and valves have or are being developed as part of this strategy.
    b. Space for IMS Quality Control labs and personnel.
    c. IMS Periodic Inspections Programs.
    d. Reactor Maintenance - specialized component repair programs for Pressure Tubes and End Fittings, Feeders, Horizontal and Vertical Flux Detectors, and Adjustor Rods.
11. No provision for adequate Breaker and Relay maintenance. This is currently being performed in the Sequence Event Monitoring computer rooms which were never designed for this purpose.
12. Reactor Maintenance (RM) shop was never provided. Currently RM is housed in a temporary building with inadequate space, no permanent services, and an underrated floor loading capacity.
13. As a result of IMS not having permanent facilities, it takes an extra 2 weeks with 6 people to set up their equipment every outage. IMS also incurred a 2 day outage delay while trying to remove the CIGAR (Channel Inspection and Gauging Apparatus) inspection head from the channel. SCR D-2005-03661 (B3 category). This can be attributed to the lack of proper facilities to do maintenance and rehearsal on CIGAR.

Refurbishment/Upgrade

As part of the 2006 ASL study, a review of the feasibility and cost of upgrading existing ships and offices was performed as a potential option for building a new facility. The following areas were not considered for upgrade as they do not currently exist or exist in an area that was not originally intended for its current use:

- Reactor Maintenance Shop
- CM Breaker and Relay Maintenance Shop
- IMS QA Group
- IMS Pressure Group Inspection Program
- Civil Maintenance FLM offices

The following areas were considered for upgrade at an estimated cost of $33.5M:

- CM M&TE Lab - $4M
- MM M&TE Lab - $5.45M
- CM Valve Shop - $6.3M
- MM RV Shop - $6.46M
- MM Seal Lapping Shop - $6.65M
- MM FLM offices - $4M
- MM Welding Shop - $750K

Refurbishment of these areas was not recommended by ASL due to high costs as a result of a high level of contingency needed due to the risk of performing modifications in an operating plant. In addition existing plant configuration may place limitations on the level of improvements that can be achieved by upgrades. (i.e. existing Common Service Area (CSA) HVAC system may not support required ASHRAE 62.1 and M&TE clean requirements, precise humidity and temperature control specifications without major improvements)

Contracting Out Considerations

Contracting out of maintenance services has been briefly investigated by DNGS Maintenance management. However this strategy was never fully developed, documented, or costed out. The following issues are some of the contributing factors:

1. Damage may occur to sensitive equipment if shipping offsite is required.
2. Emergency type situations where 24/7 response is needed may not be available if a contractor is utilized.
3. Costs and delays associated with Unconditional Transfer Permits and security requirements when shipping offsite and outside the protected area.

The contracting out of major breaker maintenance as part of the OPEX and EPRI recommended developed overhaul program was quoted as $10K per breaker in 2005 which equates to 980 breakers x $10K = $9.8M. This would be required for all 980 breakers on a 12 year cycle. This has not been implemented to date as pilot contracts (both onsite and offsite) were not successful due to quality and timeliness of contract work.

Combined Facilities

Wardrop as part of the 2005 conceptual study was commissioned to assess the viability of an OPG shared site facility. Due to the major decisions pertaining to Pickering A U2/U3 Safe Storage and the pending decision in 2009 for Pickering B refurbishment, this assessment could not be completed and ultimately it was decided by the CNO in 2006 that a combined site maintenance strategy was not viable at this time and the project mandate was changed to a Darlington only project.

DNGS Maintenance has recently investigated preliminarily a combined PNGS/DNGS offsite MM/CM M&TE lab option with OPG Real Estate Services Division and received a quote for $1M for a "leased permanent" fully customized build to suit industrial unit plus $400k per year on a lease agreement. Alternatively a quote of $400k was received for a "leased portable" prefabricated relocatable M&TE lab structure that could be placed in an industrial unit which would then also require a ~ $180k yearly lease cost. These estimates are only for the space and do not include any other costs such as equipment, utilities, IT, etc. or the costs in transporting the tools offsite from both sites on a daily basis under Radiological Transfer Permits. This simplistically works out to a cumulative cost of $9M for the customized build or $4M for the prefabricated relocatable lab assuming a 20 year lease. The proportional cost of the M&TE labs based on the estimated 2410 ft^2 net of new ~ 60,000 ft^2 Maintenance Facility is ~ $1.8M. These costs have not been vetted through by the consultants and have been reflected here to facilitate option comparison.

Hybrid Solution

As part of the 2006 ASL study, a hybrid solution was considered. A hybrid solution consisting of refurbishment of existing lab/shops combined with a new facility was never developed as an option due to the estimated cost for refurbishment for existing areas of $33.6M. This $33.6M combined with the cost associated for a new ~ 25,000 sq. ft building for the remaining areas would have seen cost estimates easily exceeding $55M - $60M before contingency. As a result of these costs this option was deemed prohibitive from a cost perspective and not evaluated any further.

Additional Background and Issues

The ASL cost estimates are only for the construction of the new Maintenance Facility and required building services. The cost of computers, modular office furniture, and telephones are included but as these costs cannot be capitalized along with the building they will be accounted as minor fixed assets in subsequent BCS's. The cost estimates do not include any costs such as: moving existing maintenance equipment, purchase of new maintenance equipment, radiation monitoring equipment, signage, etc.

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3/ ALTERNATIVES AND ECONOMIC ANALYSIS

$ 000's	Status Quo	Alt 1 (Recommended) Full Cost	Alt 1 (Recommended) Incremental Cost	Alt 2 Delay	Alt 3 MF Option H	Alt 4 MF Option I	Alt 5
Revenue							
OM&A	-	(1,600)			(1,244)	(1,244)	
Capital	-	(54,543)			(47,416)	(45,527)	
NPV (after tax)	(150,699)	(99,238)			(100,491)	(108,252)	
Impact on Economic Value (IEV)	N/A	51,461			50,208	42,447	
IRR%	N/A	13.4%					
Discounted Payback (Yrs)	N/A						

Status Quo - Not Recommended

This option is not recommended since the need for upgraded maintenance facilities at Darlington was first identified in 2002, and has escalated since. The risks to employee health and safety, potential outage extension, and loss of productivity would continue to rise incrementally.

Alternative 1 - Maintenance Facility Layout G from Revised Conceptual Study - Recommended

Option Comparison	Option G	Option H	Option I
CM M&TE Lab	✓	Excluded	Excluded
MM M&TE Lab	✓	Excluded	Excluded
MM Relief Valve Shop	✓	Excluded	Excluded
MM Seal Lapping Shop	✓	✓	Excluded
Reactor Maintenance Shop	✓	✓	✓
CM Breaker Maintenance Shop	✓	✓	✓
CM/MM Valve Shop	✓	✓	✓
IMS Pressure Tube Area	✓	✓	✓
IMS QC Labs & Offices	✓	✓	✓
Civil FLM Offices	✓	✓	✓
MM FLM Offices	✓	✓	✓
MM Welding Shop	Excluded	Excluded	Excluded

Proceed with the scope defined in the revised Conceptual Study Option G by ASL with a space estimate of 57,300+ sq. ft at a cost estimate of $44.55M excluding contingency. This alternative will address all the areas identified in the revised Charter except the welding shop. The new facility will increase maintenance productivity and effectiveness, mitigate the potential increase of industrial accidents, mitigate potential outage extensions, and potential future cost savings realized by not moving labs/shops permanently offsite into a leased industrial space. The scope of this recommended option based on the priority specified by the sponsor will consist of the identified shops, labs and offices above under Option G. This alternative has a positive NPV of 54.4M$. See Attachment E for a breakdown of this NPV.

Alternative 2 - Delay Project - Not Recommended
N/A

Alternative 3 – Maintenance Facility Layout H with "leased portable" M&TE lab - Not Recommended
This option provides a new facility similar to Layout G with the exclusion of the CM and MM M&TE labs, and MM Relief Valve shop. The space estimate for this option is 48,900+ sq. ft. and the cost estimate associated with this alternative is ~ $39M excluding contingency. This option does not effectively meet all the current and identified future DNGS Maintenance needs and will result in further management intervention to mitigate the needs of these excluded areas in the future.
NPV was calculated including the purchase of a $400K relocatable CM/MM M&TE lab plus an estimated industrial lease cost of $180K per year. These estimates are preliminary and only for the space and do not include any costs such as equipment, utilities, IT, etc. or the accurate costs in transporting the tools offsite from both sites on a daily basis under Radiological Transfer Permits.

Alternative 4 – Maintenance Facility Layout I with "leased portable" M&TE lab - Not Recommended
This option provides a new facility similar to Layout H with the further exclusion of the MM Seal Lapping shop. The space estimate for this option is 45,500+ sq. ft. and the cost estimate associated with this alternative is ~ $37.4M excluding contingency. This option does not effectively meet all the current and identified future DNGS Maintenance needs and will result in further management intervention to mitigate the needs of these excluded areas in the future.
NPV was calculated including the purchase of a $400K relocatable CM/MM M&TE lab plus an estimated industrial lease cost of $180K per year. These estimates are preliminary and only for the space and do not include any costs such as equipment, utilities, IT, etc. or the accurate costs in transporting the tools offsite from both sites on a daily basis under Radiological Transfer Permits.

Alternative 5 – N/A - Not Recommended

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4/ THE PROPOSAL

The Following are the objectives and deliverables for this Partial BCS:

Building Removal & Decommissioning

- Completion of Detailed Design.
- Preparation of decommissioning workplans.
- Issue PO for the decommissioning and removal of buildings.
- Completion of contract for the decommissioning and removal of buildings
- AFS for the building removal and decommissioning

Relocate Buried Services and Establish Tie-In Points

- Issue PO for Detailed Design.
- Complete Detailed Engineering of the Tie-Ins and Buried Services relocations
- Issue Request for Proposal (RFP) and evaluate bids for an installation contract.
- Preparation of workplans.

Maintenance Facility

- Preparation of an EPC contract for the construction of the new Maintenance Facility.
- Issue a RFP for a Commercial EPC contract for the new Maintenance Facility
- Receive bids from proponents and complete bid evaluations
- Issue a PO for the Preliminary Design of the Maintenance Facility
- Issuance of a Full Release BCS.

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

1. 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 (eg, tabulate: function/space currently used for this function/why the function must be moved to a new location).

2. Detailed benchmarking data for similar building construction on a cost-per-square foot basis.

5/ QUALITATIVE FACTORS

The successful completion of this project will improve the following:

Staff relations

- New maintenance facility shops and offices will relieve overcrowding and congestion and result in improved staff morale.

Health and Safety

- New maintenance facility shall be compliant with ASHRAE 62.1 air quality requirements, relieve overcrowding and congestion, and result in improved health and safety inefficiencies.

6/ RISKS

Description of Risk	Description of Consequence	Risk Before Mitigation	Mitigating Activity	Risk After Mitigation
Cost				
Overall project cost exceeds current estimate. Current cost estimates are conceptual. Cost estimate accuracy is +60%/-25%	Potential adjustment required on scope and cost of the project.	**High**	The conceptual study layouts have been independantly cost estimated by an external 3rd party estimator Altus Helyar. Construction quote can be obtained after detailed design for the Full Release BCS. A second independent cost estimate will be commissioned when the scope is more defined before the Full Release BCS.	**Medium**
Changes to the funding release strategy and/or fine tuning of contracting stategy may impact overall cost and schedule (owner only vs owner constructor) This is a 1st time strategy for implementing an owner only contract inside the protected area. Lessons Learned can be utilized for future projects that may result in schedule and cost savings.	Could cause a delay to the schedule & increase costs.	**Medium**	Review and finalize contracting stategy and impact to design and installation requirements with Supply Chain, Procurement, Design & Legal before Full Release BCS is issued. The estimates used for this BCS were conservatively assumed to be Owner/Constructor contracts. Early involvement of serior station management in investigating contracting strategy.	**Medium**

Cost for demolition of Power House Annex exceeds conceptual estimate of $2.0M due to: - Impact on adjacent building - Waste removal and recycling requirements - Cost for the design and installation for the relocation of underground services and building service tie-ins exceeds conceptual estimate	Potential increase in scope and cost of project.	**Medium**	Cost to remove the PHA was estimated by ASL in the 2006 conceptual study. Impact to other affected structures due to removal of the PHA has been identified and mitigation discussed with Sponsor. Sponsor has concurred that removal of adjacent trailers at this time is a cost effective solution. Waste removal and recycling plan being developed. $300K contingency added in 2008 cash flow to cover potential added cost of waste removal. Cost to complete the relocation of underground services and building tie-ins was estimated by ASL in the 2006 conceptual study. A drawing reivew was completed to identify underground services in the area during the conceptual study	**Medium**
Scope				
Final scope of the new Maintenance Facility may require further cuts due to OPG budget constraints.	Further changes in scope will delay the schedule and increase OPG project management costs.	**High**	A Detailed design will be performed to identify the detailed scope of buried services, and tie-ins before the scope is finalized for the Full Release BCS. A more accurate cost estimate will be available in the next release for management decision making.	**Low**
Preliminary/Detailed Design may result in an increase in scope.	Changes in scope will delay the schedule and add cost to the project.	**High**	Further scope identified during the design will be challenged by projects & have to be agreed by all stakeholders & sponsor.	**Medium**
Increase scope of work due to discovery work (ie re-route buried services in building footprint).	Increase in cost and schedule or further reduction in shop space to ensure approved budget is maintained.	**High**	Preliminary drawing review has been conducted to identify any possible services that may require relocation. Field survey to be completed during Technical Evaluation.	**Medium**

Schedule				
Insufficient information to determine the scope and timeline of design deliverables accurately.	Increase in cost and schedule.	**Medium**	Fine tuning of Detailed Design deliverables will be completed after Technical Evaluation and included in subsequent RFPs for Buried Service relocation, Maintenance Facility construction, Building service and plant system tie-ins etc. These will be detailed in subsequent BCS's.	**Medium**
Fine tuning of contracting stategy may impact overall cost and schedule.	Require changes to funding release strategy which could cause a delay to the schedule & costs.	**High**	Review and finalize contracting stategy and design and installation requirements with Supply Chain, Procurement, Design & Legal before the Full Release BCS is issued.	**Medium**
Design deliverables not on time.	Delay to schedule.	**Medium**	Select approved vendor, provide clear scope & deliverables. Review progress regularly & establish and monitor effective design performance metrics.	**Low**
Resources				
Insufficient OPG design resources available.	Delay project schedule & milestones.	**High**	Design will be contracted out to external agency. OPG Projects Design have committed to provide DTL and any additional design support for this project.	**Low**
Availablility of qualified vendors to perform design and subsequent implementation (procure, construct).	Delay in issuing contract due to need to assess various interfacing risks, vendor qualification issues, and contracting language.	**Medium**	Obtain OPEX from other OPG projects of similar nature. Early involvement with Supply Chain and various other departments or potential vendors and early review of the associated contracting strategies. Supply chain is currently in the process of qualifying more vendors for N286.1 "procurement".	**Medium**
Technical				
Legacy issues on Design.	Re-engineering may be required if there are legacy and interface issues with systems that the project is modifying. This would add scope to the project which may cause delays and increase	**Medium**	Preliminary site walkdowns have been completed. Complete drawing review on systems being impacted to be performed during Technical Evaluation and subsequent Engineering efforts.	**Low**

	project costs.			
Discoveries from geotechnical analysis of soil.	Delay and added cost to the project due to the prefered site not being suitable for building addition which could then subsequently lead to Increased costs to the design and installation to meet the requirements identified.	**Medium**	Test drill site to determine the soil composition prior to completing Technical Evaluation to ensure the design takes this into account. Method & cost to implement corrective actions will be challenged & documented.	**Low**
Regulatory				
There are no regulatory risks.		**N/A**		**N/A**
Environmental				
Excavation and Construction waste may not be suitable for shipment to a clean landfill site due to radiological contamination.	Added cost to the project due to disposal costs associated with contaminated waste.	**Low**	A Geotechnical Analysis and Radiological testing by Kinetrics will be performed during the Technical Evaluation. A Waste Disposal plan will also be developed and submitted to OPG for acceptance.	**Low**
Waste from demolition of buildings may not be suitable for recycling or for shipment to a clean landfill site due to radiological and/or conventional contamination.	Added cost to the project due to disposal costs associated with contaminated waste.	**Low**	All building material to be scanned and tested for radiological, asbestos, mold and other contaimination prior to demolition of buildings	**Low**
Health & Safety				
Personnel injured during demolition of buildings.	Personnel injury or death Delay to project	**Low**	Adherence to OPG Policies and Procedures will be maniditory during the removal of buildings. Contractor's safety record wil be part of the criteria during bid evaluation.	**Low**
Asbestos, mold or other conventional hazardos material present in the buildings to be removed.	Personnel injury or long term health concerns. Added costs and/or delay to project.	**Low**	All building material to be scanned and tested for asbestos, mold and other contaimination prior to demolition of buildings. Ensure personnel protect themselves with the apporpriate PPE per OPG Policies and Procedures	**Low**

Investment				
Cost benefit information cannot justify proceding with the project. The final scope of the what that is to be included in the maintenance facility is not yet known.	Return on investment cannot be realized.	**Medium**	End users have been interviewed to gather critical data for calculation of the NPV. Investment Finance and Station Long Range Strategic group will further scrutinize validity of assumptions for the next release based on the final scope decision after the Technical Evaluation is complete	**Low**

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7/ POST IMPLEMENTATION REVIEW PLAN

Type of PIR:	Targeted Final AFS Date:	Targeted PIR Approval Date:	PIR Responsibility (Sponsor Title)
TBD in Next Release	TBD in Next Release	TBD in Next Release	

Comments:

	Measurable Parameter	Current Baseline	Targeted Result	How will it be measured?	Who will measure it? (person / group)
1.					
2.					
3.					
4.					
5.					

Appendix "A" Glossary (acronyms, codes, technical terms)

BCS	Business Case Summary
PHA	Power House Annex
RFP	Request For Proposal
EPC	Engineer, Procure, Construct
IMS	Inspection Maintenance Services
TOE	Technical Operability Evaluation
QC	Quality Control
CIGAR	Channel Inspection and Gauging Apparatus
SCR	Station Condition Report
ASL	Acres Sargent & Lundy
NPV	Net Present Value
CM	Control Maintenance
PO	Purchase Order
DTL	Design Team Leader
OPEX	Operating Experience
TBD	To Be Determined
PIR	Project Implementation Report
PWU	Power Workers Union
BTU	Building Trades Union
PEP	Project Execution Plan
AFS	Available For Service
IEV	Impact On Ec Value
IRR	Internal Rate of Return
RM	Reactor Maintenance

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Appendix "B"

Project Funding History

$ 000's		All Existing and Planned Releases (incl contingency)									
			Cumulative Values								
Release Type	Month	Year	2007	2008	2009	2010	2011	2012	2013	Later	Total
Developmental	Jul	2007	1,369	234							1,603
Partial			(861)	3,960	3,836						6,935
Full			508	4,194	18,932	19,985	13,599	521			57,739
											0
											0
											0
											0
											0
LTD Spent	Dec	2007		508							508

Comments:
Previous release of $450k was obtained in 2002 to provide seed money for the first Acres Sargent & Lundy conceptual study of which $116k was spent. $34k in capital interest charges has accumulated against this amount to date.

Appendix "C" Financial Model – Assumptions

Project Cost Assumptions:

- OPG staff will provide project management & support role during design and implementation
- Design and Installation work will be performed by contractors with oversight and support for OPG Project Design
- Current P3 resource costs were used thru 2009. Escalation rate of 4% was used for 2010 & 2011
- DNGS Strategic Planning has prepared a Monte Carlo Crystal Ball risk model analysis of all alternatives to develop the NPV figures. All assumptions used for this model were based on ASL submissions, OPG reliable sources, or from individual area stakeholders. Attachment D has the relevant information from this analysis for the recommended Option G with an overview of the NPV figures for Base and Options H and I. The appendix also includes the assumptions, Long Term Disability statistics. This model has been reviewed and accepted by OPGN Investment Management for the purpose of the Economic Analysis values used for this Developmental BCS.

Financial Assumptions:

- 7% discount rate
- PHA cost of removal will be expensed to accumulated depreciation monthly as incurred.
- Maintenance Facility Design and Construction costs were estimated by ASL with the assistance of an external constructor Ball Construction. A 15% - 25% additional premium was added over equivalent commercial costs due to the fact that this work is inside the DNGS protected area and subject to OPG ECC processes and Safety Regulations. OPG Project Management and Support costs were developed between ASL & OPG Design Projects and substantiated via an independent 3rd Party estimator Altus Helyar.
- See Attachment "D" for BCS NPV Assumptions and Analysis.
- Note that this project estimate does not include costs for moving existing maintenance equipment, purchase of new maintenance equipment, purchase of radiation monitoring equipment

Project / Station End of Life Assumptions:

- Darlington end of life ~ 2050
- Maintenance Facility nominal end of life 2050

Energy Price / Production Assumptions:

- See Attachment "D" for BCS NPV Assumptions and Analysis

Operating Cost Assumptions:

- See Attachment "D" for BCS NPV Assumptions and Analysis

Other Assumptions:

- OPG to provide unrestricted access to work area
- All work is within the secured area with incumbent restrictions

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Attachment 1 Tab 1

Project Name 16 - 31717

Partial Release Business Case Summary D-BCS-28200-10003-R000

Attachment "A" **Project Cost Summary**

$000's OM&A	LTD Prior Yr	This Release 2008	This Release 2009	Future Release 2009	Future Release 2010	Future Release 2011	Future Release 2012	Later	Total
Project Management (OPG)	164	570	356	357	875	484	184		**2,990**
Engineering & Drafting (OPG)	54	325	190	190	175	190	117		**1,241**
Material		100		500	500	500			**1,600**
Installation – PWU, BTU	11	226	200	430	782	354			**2,003**
Contract - Design	137	825	2,000	8460	550	150	100		**12,222**
Contract - Installation	-	1,100		1150	11,000	7,850			**21,100**
Contract - Other	100		100						**200**
									-
									-
Interest (Capital Project Only)	42	99	105	525	1,491	933			**3,195**
Project Costs (excl contingency)	**508**	**3,245**	**2,951**	**11,612**	**15,373**	**10,461**	**401**	**-**	**44,551**
General Contingency		649	885	3,484	4,612	3,138	120		**12,888**
Specific Contingency		300							**300**
Project Costs (incl contingency)	**508**	**4,194**	**3,836**	**15,096**	**19,985**	**13,599**	**521**	**-**	**57,739**
2008-2012 Business Plan	1,170	2,140	2,951	11,418	15,154	11,556	-		**44,389**
Variance to Business Plan	**(662)**	**1,105**	**-**	**194**	**219**	**(1,095)**	**401**	**-**	**162**
Committed Cost									**-**
Inventory Write Off Required									**-**
Spare Parts / Inventory									**-**
Total Release (excl contingency)	**508**	**3,245**	**2,951**	**11,612**	**15,373**	**10,461**	**401**	**-**	**44,551**
Total Release (incl contingency)	**508**	**4,194**	**3,836**	**15,096**	**19,985**	**13,599**	**521**	**-**	**57,739**
Ongoing OM&A (non-project)									**-**
Removal Costs (incl in above)	**137**	**1,463**							**1,600**

Basis of Estimate					
Design Complete	Zero to Minimal		Quality of Estimate	Conceptual + 60% to - 25%	
3rd Party Estimate	Yes	OPEX used	Yes	Lessons Learned	N/A
Reviewed by Sponsor	Yes	Budgetary Quote(s)	No	Phase 1 Actual Used	No
Similar Projects	No	Contracts in place	No	Competitive Bid	No

Variance to Business Plan

The estimated variance(s) to the 2007-2011 Business Plan will be addressed through the portfolio management process. A PCRAF is not required .

Reviewed By:

for Stephanie Tham
Project Manager

4 Feb 2008
Date:

Approved By:

Dianne Gaine
Eng & Mods Manager (Strat IV)

Feb. 4/08
Date:

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Attachment 1 Tab 1

Project Name 16 - 31717

Partial Release Business Case Summary D-BCS-28200-10003-R000

Attachment "B" **Project Variance Analysis**

Capital	LTD Dec 2007	Choose One: Last BCS Jul 2007	Choose One: This BCS Jan 2008	Variance	Comments
Project Management (OPG)	164	2602	2990	388	Add resources for 2012 project closeout
Engineering & Drafting (OPG)	54	888	1141	253	Add resources for 2012 project closeout
Material		1595	1600	5	
Installation – PWU, BTU	11	2043	2003	-40	
Contract - Design	137	1876	12222	10346	Separate out the design and install cost
Contract - Installation		31866	21200	-10666	Separate out the design and install cost
Contract - Other	100	150	200	50	
				0	
				0	
Interest (Capital Project Only)	42	3400	3195	-205	
Project Costs (excl contingency)	**508**	**44420**	**44551**	**131**	
General Contingency		**13281**	**12888**	-393	
Specific Contingency			300	300	
Project Costs (incl contingency)	**508**	**57701**	**57739**	**38**	
Committed Cost				0	
Inventory Write Off Required				0	
Spare Parts / Inventory				0	
Total Release (incl contingency)	**508**	**57701**	**57739**	**38**	
Total Release (excl contingency)	**508**	**44420**	**44551**	**131**	

Ongoing OM&A (non-project)				**0**	
Removal Costs (incl in above)				**0**	

Comments:

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Attachment "C" **Key Milestones**

Completion Date			Description
Day	Mth	Yr	
18	Apr	2008	PHA DCP Approved
21	Jul	2008	Work package Assessment complete - PHA Demo.
07	Oct	2008	Start of PHA Demolition
07	Feb	2009	AFS PHA Demolition
16	Apr	2008	RSTI Design Contract PO Issued
05	Aug	2008	RSTI Preliminary Design Complete
10	Dec	2008	RSTI DCP Approved
15	Apr	2009	RSTI Work Package Assessment Complete
19	June	2009	Full Release BCS Approved

A Project Execution Plan (PEP) will be approved by Jun 2009

Comments:

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Attachment 1 Tab 1

Attachment "D"

DNGS Long Range Planning - Recommended Option NPV Calculation

- Result Summary
- Assumptions
- LTA source assumption
- Individual area results

NPV Option Result Summary

Up to Retube - 2021	NPV (k$)
Base Case	(67,274)
Option G	(67,430)
Option H (with leased Portable M&TE lab)	(64,482)
Option I (with leased Portable M&TE lab)	(67,250)

After Retube - 2050	NPV (k$)
Base Case	(150,699)
Option G	(99,283)
Option H (with leased Portable M&TE lab)	(100,490)
Option I (with leased Portable M&TE lab)	(108,251)

Attachment E

Briefing Note: 31717 DNGS Maintenance Facility
Breakdown of the 54M$ Preferred Alternative NPV

		%		NPV (M$)
Backlog Improvement (1)		3.5		1.8
LTA Reduction (2)		0.1		0.1
Productivity Gain (3)		13.1		6.7
Planned Outage extension reduction (4)				28.8
- Reactor maintenance shops	27%			
- IMS Pressure Tube Insp prog	10%			
- MC Valve shop	10%			
- Other shops	9%			
subtotal	56%	56.0		
Forced Outage extension reduction (5)				11.6
- IMS Quality group	8%			
- MC Breaker & Relay shop	7%			
- Other shops	8%			
subtotal	23%	22.6		
Rebuilding, not buying, Seal parts (6)		2.0		1.0
Breaker overhaul inhouse (7) & various other		2.6		1.3
		100.0		51.4

(1) Online Elective Maintenance Backlog improvement will reduce Forced Loss Rate which will impact on generation and incremental Forced Outage Cost.

(2) Existing facilities are overcrowded and noisy with poor air quality which may cause potential Health and Safety incidents.

(3) Overcrowded locations, lack of Pre-Job Briefing areas, lack of crane equipment, extra equipment shuffling, lack of Mockup/Rehearsal area, and insufficient temperature/humidity control resulting in overtime to recover productivity losses.

(4) Improve response time on tool calibration, breaker preparation, valve work, Channel Inspection and Guaging Apparatus for Reactor work, Single Channel Fuel Replacement work, and minimize delays as the Mockup/Rehearsal facility and crane are always in place.

(5) Improve response time on tool calibration, Release Valve decontamination, Seal preparation, breaker preparation, Channel Inspection and Guaging Apparatus for Reactor work, and minimize delays as the Mockup/Rehearsal facility and crane are always in place.

(6) Facility to rebuild old Seal parts instead of buying new ones will result in significant savings.

(7) Performing major breaker maintenance in house instead of outsourcing.