ONTARIO POWER GENERATION

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May 8, 2014

VIA RESS AND COURIER

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
P.O. Box 2319
2300 Yonge Street, 27th Floor
Toronto, ON M4P 1 E4

Dear Ms. Walli:

Re: EB-2013-0321 – 2014/15 Payment Amounts Application – Technical Conference Undertaking Responses

Pursuant to the Board's Procedural Order #8 dated May 6, 2014, please find attached public versions of Attachments 1-5 for Ex. L-4.7-SEC 51.

Best Regards,

[Original signed by]

Colin Anderson

Attach

cc:	Charles Keizer (Torys)	via email
	Crawford Smith (Torys)	via email
	Carlton Mathias	via email
	Intervenors of record	(letter only)

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ONTARIO POWER GENERATION

Internal Audit

Nuclear Contractor Time/Cost Reporting and Payment Process

January 2011

Distribution:

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1.0 EXECUTIVE SUMMARY

Internal Audit (IA) has completed its Nuclear Contractor Time/Cost Reporting and Payment Process audit as part of IA's 2009 - 2010 Strategic Audit Plan (SA Plan). The purpose of this audit was to independently assess the effectiveness and efficiency of controls in place for the Nuclear contractor time/cost reporting and payment process including the Oncore system. For the purposes of this report, vendor is defined as an external company and a contractor is defined as an employee of a vendor.

The objectives of the Nuclear contractor time/cost reporting and payment process are to support timely, efficient and accurate processing of contractor expenses and vendor payments. The Oncore system was implemented to improve the timeliness and accuracy of the Nuclear vendor billings and payments and to enhance contractor time and cost reporting. Oncore tracks vendor labour, material, equipment and other costs for capital and Operations, Maintenance and Administrative (OM&A) projects and outages. The system facilitates real-time cost capture, validation, approvals, reporting and analysis. In 2010 approximately $147M (2009 had approximately $163M) of vendor payments for 11 vendors were processed in Oncore. IA reviewed the following controls and found them to be operating effectively:

- Process governance is in place.
- Roles and accountabilities have been properly identified and communicated.
- Availability and timeliness of process information reporting.
- Project set-ups are accurately input into Oncore in a timely manner following approved control practices.
- System incidents (e.g. system errors) are tracked and dispositioned in a timely manner.

IA identified several findings pertaining to achievement of the process objectives in support of Nuclear contractor time/cost reporting and payment. Below are the more significant findings including (responsible process owner in brackets):

- Contractor attendance is not always accurately documented in Contract Monitor logbooks to support valid inputs into Oncore (Operations). Note: This was also identified in 2010 contract audits.
- Contractor time and costs input into Oncore are not always reconciled to independent documentation that supports accurate time/cost inputs (Operations). Note: This was also identified in 2010 contract audits.
- Some system application controls (e.g. input edit checks) are missing to detect/prevent duplicate transactions (Finance).

IA has concluded that internal controls over the Nuclear contractor time/cost reporting and payment process are not adequate (i.e. management control system is not operating effectively). In particular, the control deficiencies listed above create the risk of inaccurate contractor time charges and vendor overpayment. Given the significant volume of vendor transactions being processed through Oncore and the potential for increased use during Refurbishment and New Build activities, we have assessed the enterprise level impact of the control deficiencies as "moderate" (see Appendix D for audit rating methodology). These findings require prompt attention by management.

Nuclear Finance is responsible for administration of the Oncore system (e.g. system updates, system access, system training, system reporting capabilities, vendor set-up, job set-up etc.). Given the importance of timely and effective implementation of controls in this area, we recommend Nuclear Finance be involved in the design and implementation of these controls as well as supporting the ongoing monitoring of controls in this area. Finance should report periodically to OPGN management

on the results of their monitoring activities in this area including effectiveness of controls and any exceptions or issues noted.

Other findings IA identified include:

- System interface exception reports are missing for some of the interfaces and reports that do exist are not routinely monitored (Finance).
- The vendor Master Service Agreement (MSA) rate approval process is not formally documented and is ad hoc (Supply Chain).
- No formal process performance metrics are in place for the Oncore administration process (Finance).
- The project closure process within Oncore is not formalized and not applied consistently (Finance).
- No Oncore business continuity plan exists to allow for recovery from an unexpected system outage (Finance / BS&IT).
- Not all Oncore users have required training prior to being set-up in the system, users have been set-up without required job qualifications (i.e. Contract Owner qualification) and Oncore tracking is not in accordance with the Nuclear training process (Finance / Operations).

Detailed findings are provided in Appendix C below. The control findings have been reviewed with management and their high level action plan has been incorporated in the audit report with a commitment to provide more detailed corrective action plans within 30 days upon issuance of this audit report.

2.0 BACKGROUND

This audit forms part of the overall coverage of OPG's Supply Chain process as defined in IA's strategic planning process. See attached IA Assurance map of the Supply Chain process in Appendix A. This audit is also a follow up to previous audits of the Cost and Schedule Improvement Project (CSIP).

CSIP was initiated by OPG Nuclear in conjunction with the Corporate Information Office in 2006. The objective of CSIP was to improve the project management and investment management capabilities through the implementation of new software/system tools and applicable processes. Seven fully integrated new systems were planned to be implemented under CSIP. Previous internal audits have reviewed the CSIP project planning and execution as well as other aspects of the supply chain process; however, no audit has been performed of the CSIP implementation to ensure objectives were met and efficiencies realized as a result of the project. A key component implemented as part of CSIP was the web-based Nuclear contractor management system (Oncore), which was the focus of this audit. This audit also examined the achievement of objectives and deliverables as they pertain to Oncore.

Oncore was implemented to improve the timeliness and accuracy of the Nuclear vendor billings. Oncore tracks vendor labour, material, equipment and other costs for capital and OM&A projects and outages. The system facilitates real-time cost capture, validation, approvals, reporting and analysis. Approximately $147M (based on 2010 data) and $163M (based on 2009 data) of transactions from 11 vendors are processed by Oncore on an annual basis and $338M (based on 2010 data) and $219M (based on 2009 data) of transactions from 757 vendors are processed outside of Oncore on an annual basis. A significant part of the non Oncore transactions are attributed to milestone driven contracts or other contracts that would not provide benefit to OPG if they were captured within the Oncore system. Previous internal audits of Nuclear contract administration activities and audits of vendors' set-up in Oncore have identified various concerns surrounding Oncore including duplicate time entries, lack of input validation controls and non-current rates set-up within Oncore.

Oncore is administered by a four-person group within Nuclear Finance that supports on average 257 users (including contractors and OPG staff). Nuclear Finance issued the *Contract Administration in Oncore* (N-INS-00150-10001) Nuclear Instruction to govern the administration of Oncore (see Appendix B for Oncore roles and accountabilities). Contract owners complete job setup packages and submit to the Oncore Administration Group (OAG) for input into Oncore. Only Nuclear Supply Chain approved rates are input into Oncore by the OAG. Contractors set-up in Oncore input their time, non-labour expenses and progress payments into Oncore which are reviewed and approved by OPG personnel (Contract Administrators and Contract Owners) in the system. Oncore interfaces with PassPort and on a monthly basis PassPort generates invoices from the approved transactions within Oncore (i.e. reverse invoicing system).

3.0 AUDIT OBJECTIVES AND SCOPE

The objective of this audit was to independently assess the effectiveness and the efficiency of the Nuclear contractor time/cost reporting and payment process including the Oncore system. The assessment included an examination of the post implementation review process and the review of the achievement of objectives with respect to Oncore. The audit assessed key IT controls associated with the Oncore system as well as anti-fraud controls. The scope of this audit did not include a detailed review of process activities covered under the Nuclear contract administration and CSIP project implementation internal audits; however actions resulting from those audits that are within scope of this audit were reviewed for effectiveness.

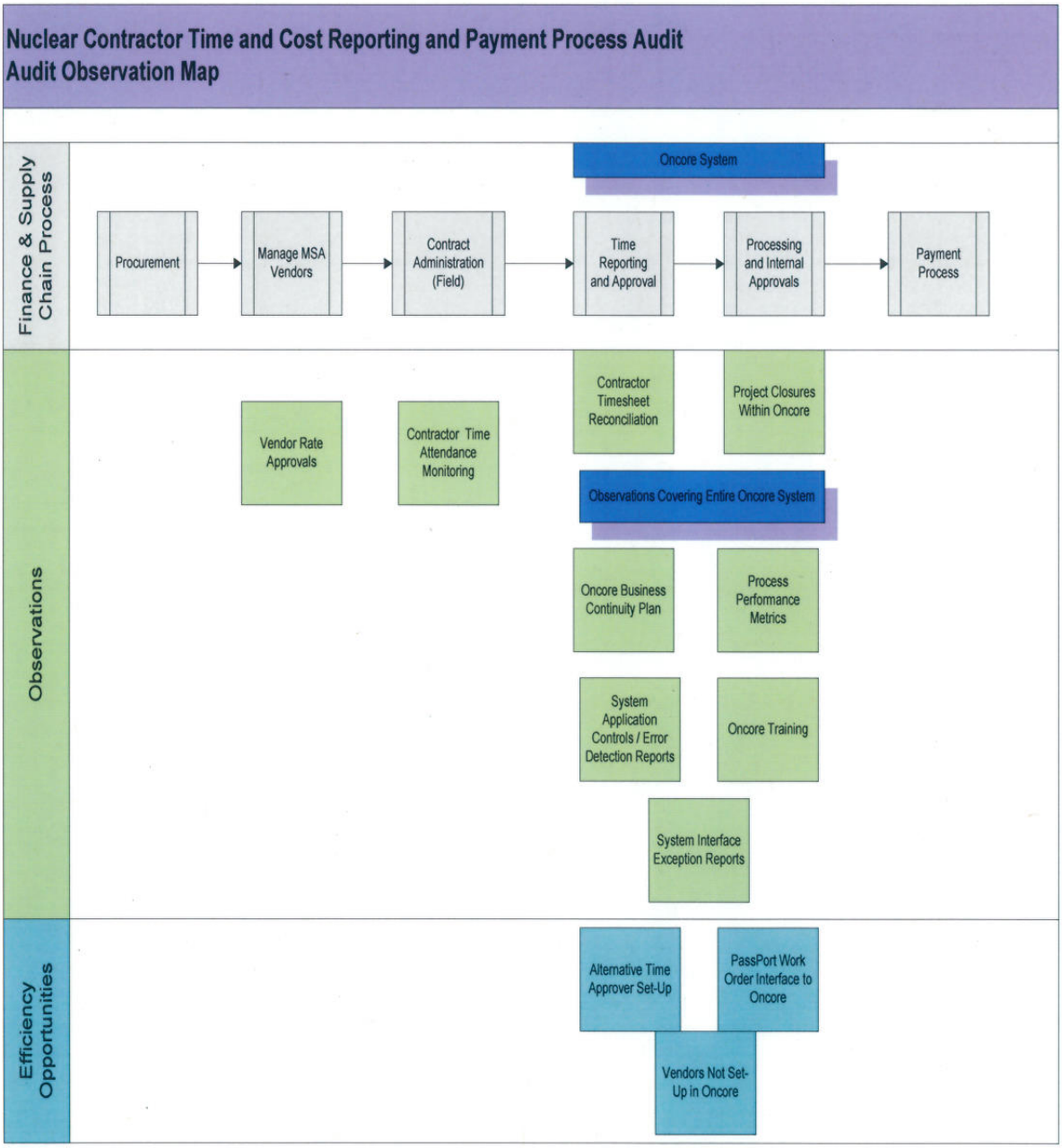
IA conducted the audit in accordance with applicable professional standards of the Institute of Internal Auditors and will use the COSO internal control framework to assess the key elements of control.

IA would like to take this opportunity to thank the Oncore Administration Group, Nuclear Supply Chain and Nuclear Projects & Modifications teams for their assistance and co-operation during this audit.

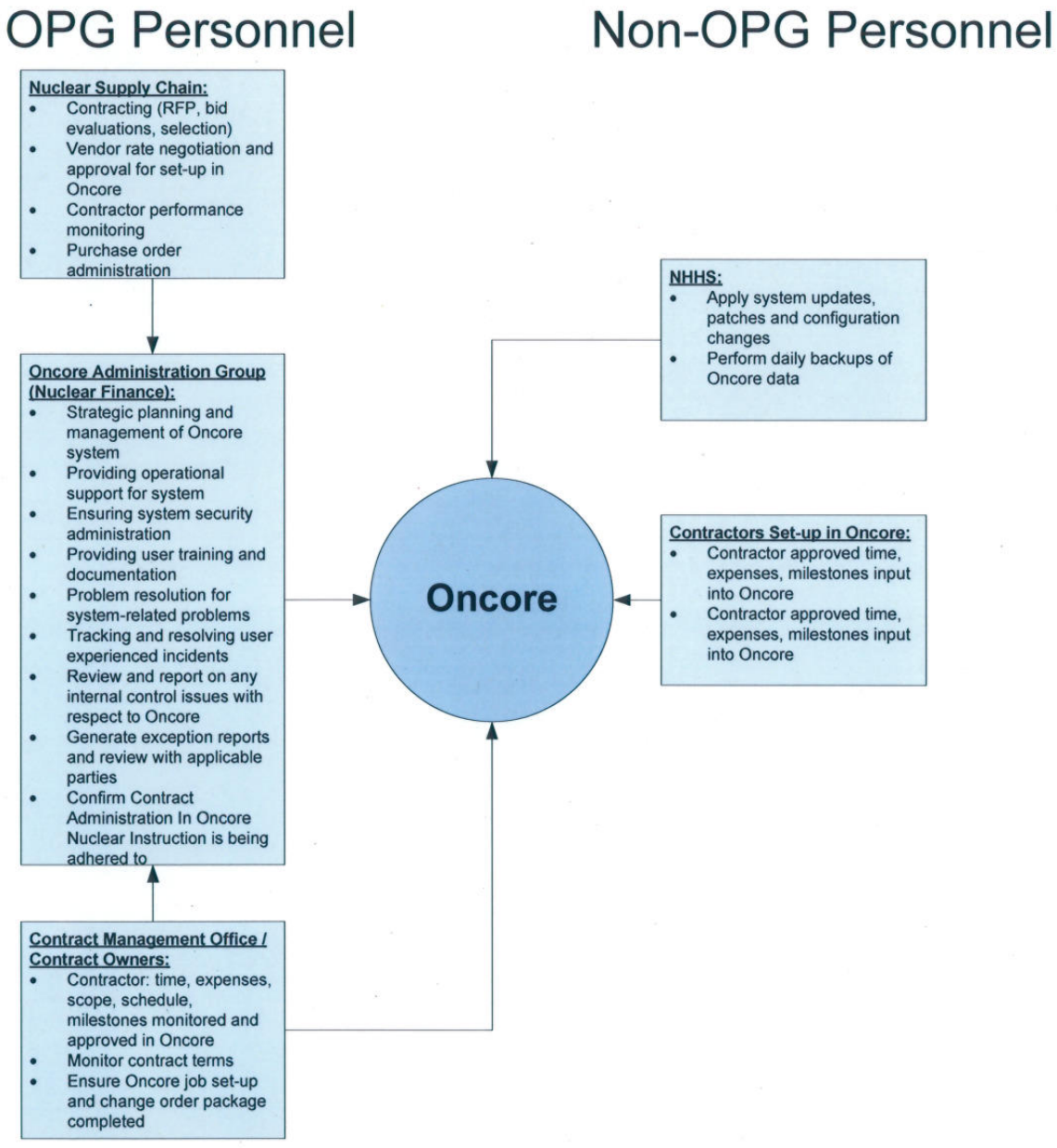
Approved By:

Lou Pollieri
VP & Chief Audit Executive

Appendix A – Observations Mapped to Process Activity



Appendix B - Oncore Roles and Accountabilities



Source: N-INS-00150-10001

Appendix C – Nuclear Contractor Time/Cost Reporting and Payment Process Audit Details/Observations

No.	Issue	Observation Description	Process Risk Rating & Implication	Recommendation	Management Action Plans	Owner & Target Completion Date
Audit Findings / Effectiveness Observations						
1.	Contractor attendance monitoring / timesheet approval	As part of the follow-up review of the 2005 and 2008 Contract Administration audits we reviewed a sample of contracts and reviewed with the Contract Administrators how the time within Oncore was verified. As per the N-GUIDE-00150-10000 Contractor Management Guide, the Contract Monitor log-books are required to include the number of contractor workers which are then to be verified by the Contract Administrator when approving the time. Our sample found instances where independent verification of contractors' attendance was not being monitored and time approvers were not reconciling independent time verified to time submitted in Oncore.	Process risk rating: High If contractor time is not independently verified, incorrect time may be submitted and approved causing OPG to not attain value-for-money.	To provide adequate support for the contractor attendance/contractor timesheet approval process, the information captured in the contract logbooks should include the start and end times of work activities, the number of contract workers on site, the contractor supervisors' names and titles, the applicable work order(s) and the contractor workers' names as outlined in the existing governance (N-GUID-00150-1000 – Contractor Management Guide). This information should be reconciled to time submitted in Oncore by time approvers. The Contract Management Office (CMO) should review other alternatives to address the controls necessary to improve the effectiveness of the current contractor attendance/contractor timesheet approval process for all such	Contract Management Office to direct Contract Monitors and Contract Administrators to provide more detailed information in the contract logbook, including the start and end times of work activities, the contractor supervisors' names and titles, and the applicable work orders. This information is in line with the existing governance provisions outlined in N-GUID-00150-1000– Contractor Management Guide, Section 6 – Tools, subsection 6.11 – Log Book. Accountability for on-going monitoring of contract logbook entries and reconciliations with Oncore time entries will be assigned to the appropriate CMO Section Manager. To enhance the	Owner: Director, Contract Management Office & Facilities Target Completion Date: Q1 – 2011 *Detailed Management action plans will be provided to IA for evaluation and follow-up.

No.	Issue	Observation Description	Process Risk Rating & Implication	Recommendation	Management Action Plans	Owner & Target Completion Date
				contracts, including continuous monitoring. We recommend that OPG Nuclear Finance provide oversight and monitoring of effectiveness of contractor time and attendance controls on a regular basis, and report the results of their monitoring activities to management, highlighting any exceptions or control issues on a timely basis.	existing contractor attendance and timesheet approval process, the CMO will implement the "Job Clock" system, an electronic time and attendance system. This system is designed to track contractor employee attendance and time spent on site and will apply to all Building Trades Unions. This monitoring system will provide contractors with the capability to generate attendance reports that can be used by Contract Administrators to reconcile the contractor time charges entered into Oncore, prior to approval.	
2.	System application controls/error detection	The Oncore system is missing some key application controls over data integrity. Oncore does not have any input parameter controls which would prevent and detect input errors (e.g. would not detect 80 hours versus 8 hours input). Oncore does not have any duplicate transaction detection controls which would identify a contractor booking time to different projects with different	Process risk rating: High Intentional or unintentional incorrect hours could be input into Oncore without OPG approvers detecting the errors. Transactions that were intended to be rejected could unintentionally be	Long-term: Request software vendor to implement the identified key missing application controls in a future release of the software. Short-term: Design and periodically generate and monitor reports for duplicate transactions and input errors.	Establish a set of key input parameters with acceptable tolerances (e.g., time input greater than 10 hours in one day) to be checked by a customized report each month. Generate a customized report to be run by the Oncore administration group	Owner: Director, Nuclear Reporting Target Completion Date: Q1 – 2011 *Detailed Management action plans will be provided to IA for evaluation and follow-up.

No.	Issue	Observation Description	Process Risk Rating & Implication	Recommendation	Management Action Plans	Owner & Target Completion Date
		time approvers. The "Approve All" function within Oncore has weaknesses that effect the data integrity if not used correctly. If a time approver selects transactions for rejection, then selects "Approve All" for the remaining transactions, Oncore will change the rejected transactions to approved. Not all time approvers we interviewed were aware of this system function. There are no reports that are generated that focus on detecting duplicate transactions or input errors. Notes: *1.* Computer Assisted Audit Techniques (CAATS) were used for audit testing for a sample of invoices over a three month period (e.g. same contractor ID different project ID, same contractor ID – duplicate hours to same project ID) to identify duplicate transactions or apparent input errors (e.g. >16 hours per day). None were identified.	approved for payment.		for the previous month's transactions to identify possible transactions that fall outside of the set parameters. a. Communicate to Contract Administrators the reason for the report and the need for a monthly review of the reported transactions for additional confirmation that charges are appropriate. For invalid charges, the Contract Administrator will contact the vendor to correct billings. The Contract Administrator will notify Oncore Administration upon completion of the review and disposition of the reported transactions. b. The action above and the report generated will highlight time entered for more than one job, thus aiding in the identification of duplicate time	

No.	Issue	Observation Description	Process Risk Rating & Implication	Recommendation	Management Action Plans	Owner & Target Completion Date
					entry. c. Oncore Administration will distribute a broadcast communication to all Oncore users who approve time, reminding them of the proper steps to take in relation to the "Approve All" functionality.	
3.	System interface exceptions reports	On a monthly basis, data (approved transactions) is transferred from Oncore to Passport for accruing and setting up accounts payable. Currently there is no exception report setup for identifying any data transmission errors for the interface between Oncore and Passport. Tempus transfers data (employee numbers, vendor name and number) daily to Oncore through an automated batch job. An exception report is setup for identifying any transmission errors however review of the exception report is ad hoc.	Process risk rating: Moderate Data transmission errors may occur without the Oncore Administration Group knowing. Incorrect processing of vendor time and charges. Increased time and effort involved in reconciliation and rectification of data transfer errors.	An interface exception report should be created for the Oncore to PassPort interface to facilitate the identification of any transmission errors. Exception reports should be reviewed by the Oncore Administration Group staff on a more frequent basis to ensure that errors are identified and corrected. The Section Manager should oversee the review of exception reports.	a. Oncore Admin. has developed a reconciliation process to ensure all payments/invoices sent to Passport balance to the electronic file created in Oncore and uploaded to Passport. This reconciliation will be performed the first business day after the automated 15th file upload. This report compares each invoice created in Passport to the Oncore file, as well as checks the tax applied to the invoice in Passport (GST or HST based on date of timesheet	Owner: Director, Nuclear Reporting Target Completion Date: Q1 – 2011 *Detailed Management action plans will be provided to IA for evaluation and follow-up.

No.	Issue	Observation Description	Process Risk Rating & Implication	Recommendation	Management Action Plans	Owner & Target Completion Date
					not invoice). b. Coreworx has recently revised the daily exception report to include only meaningful information which makes it a more effective report and an efficient task to perform. c. A deliverable has been added to an Oncore Admin. staff's PPR to perform a daily review of the Tempus report.	
4.	Oncore business continuity plan	OPG-STD-0036 Business Continuity Management requires Business Process Owners to ensure a business continuity strategy has been developed. The business continuity plan should outline the actions to be taken before, during and after a significant disruption to a critical business process or processes.	Process risk rating: Moderate A significant disruption to the Oncore system could occur without a defined strategy or plan outlined the continuity of the process.	A business continuity strategy and plan should be developed for the Oncore system in accordance with OPG-STD-0036.	Oncore Administration to work with BS&IT and Internal Audit to develop a business continuity plan to assess the criticality of the Oncore system being not available, recovery options, contingency plans, etc as required by OPG-STD-0036 Business Continuity Management.	Owner: Director, Nuclear Reporting Target Completion Date: Q1 – 2011 *Detailed Management action plans will be provided to IA for evaluation and follow-up.
5.	Vendor Master Service Agreement (MSA) rate approvals	The MSA approval requirements are informal (i.e. the Oncore Administration Group understands who to accept rate changes from within Nuclear Supply Chain). Nuclear Supply Chain governance does not clarify approval accountabilities. Oncore governance (N-INS-00150-1001) does not specify who in Supply	Process risk rating: Moderate New or untrained employees may accept unauthorized/incorrect MSA rates being input into Oncore.	Nuclear Supply should formalize the MSA rate approval process including clearly defining and communicating the approval accountabilities. Nuclear Supply Chain	a. Nuclear Supply Chain and Inspection & Maintenance Services (IMS) to identify what position is accountable to provide authorization to	Owner: Contracts Manager - Nuclear Supply Chain Target Completion Date: Q2 -2011

No.	Issue	Observation Description	Process Risk Rating & Implication	Recommendation	Management Action Plans	Owner & Target Completion Date
		Chain is authorized to forward approved rates to the Oncore Administration Group for input into Oncore. Note: The definition of Nuclear Supply Chain above includes Inspection & Maintenance Services.		should communicate to the Oncore Administration Group who is authorized to provide approved MSA rates for input into Oncore.	Oncore Administration for valid Master Service Agreement rate adjustments. b. Nuclear Supply Chain to provide guidance to their Purchasing Agents to include rate adjustments, if any, in Master Service Agreement revisions. Nuclear Supply Chain to generate a guide to MSA developers on constraints and communication requirements related to rate adjustments.IMS Supply Chain: The process for MSA rate approval within IMS Supply Chain is already documented in all augmented staff agreements (Section 8.5 and 16.20). c. Update Oncore governance to specify the Supply Chain authorities responsible for communicating	*Detailed Management action plans will be provided to IA for evaluation and follow-up.

No.	Issue	Observation Description	Process Risk Rating & Implication	Recommendation	Management Action Plans	Owner & Target Completion Date
					Master Service Agreement rate adjustments.	
6.	Process performance metrics	There are no formal process performance metrics being measured, analyzed, dispositioned or used with respect to Oncore and the associated processes. Without these metrics, Management is unable to determine what the Oncore Administration Group's capacity levels are to add new vendors. With New Build and Refurbishment proceeding, it is important to know what capacity can be handled by the Oncore Administration Group.	Process risk rating: Moderate Without adequate performance metrics, process ineffectiveness and inefficiencies may be occurring without management's knowledge. The lack of metrics also presents difficulties in assessing what the Oncore Administration Group's capacity levels are to add new vendors into Oncore.	Define key process performance metrics that will allow Management to make accurate decisions regarding the volume capacity levels the Oncore Administration Group is able to handle. Monitor these measures and disposition any negative trends effecting the capacity levels.	A specific PPR deliverable has been assigned to both the section head and analyst levels to develop and roll out these metrics in 2011.	Owner: Director, Nuclear Reporting Target Completion Date: Q2 – 2011 *Detailed Management action plans will be provided to IA for evaluation and follow-up.
7.	Project closures within Oncore	The process for closing projects within Oncore has not been defined and is ad hoc. The process governance does not detail how projects within Oncore are to be closed.	Process risk rating: Moderate Inactive projects could remain open for extended periods of timing allowing intentional or non-intentional incorrect charges to be applied.	Define the process for how projects will be closed within Oncore and reflect it in the process governance, communicate it to relevant personnel within the contract administration groups and monitor for compliance. This process should be linked to the project closure process in place for PassPort.	a. NHSS created and generated a report from the Oncore database tables stating for every PO that is Open or On Hold, the date that the PO was initially setup in Oncore and the date of the last timesheet entry. b. Hundreds of PO's have been officially closed in Oncore that have had no activity in the past 6 months.	Owner: Director, Nuclear Reporting Target Completion Date: Q1 -2011 *Detailed Management action plans will be provided to IA for evaluation and follow-up.

No.	Issue	Observation Description	Process Risk Rating & Implication	Recommendation	Management Action Plans	Owner & Target Completion Date
					Oncore Admin. has added this Project Review to its Work plan and will do the review once a month. c. Update the Oncore governance N-INS-00150-1001 to include guidance on closing projects in Oncore.	
8.	Oncore training	The Oncore Administration Group creates and provides training to Oncore users. Attendance sheets are completed and retained. There is no requirement to have the training completed prior to being set-up as a user in Oncore. Project Element IDs (PELs) have been created and approved for the Training Information Management System (TIMS); however completed training is not being entered and monitored in TIMS. A review of sample of ten Contract Owners (Step 3 approvers) found two who did not have the required Contract Owner TIMS Qualification (QUAL).	Process risk rating: Moderate Oncore users may not have the required training and may not use the system effectively or efficiently. This could lead to data integrity issues within the system. Unqualified Contract Owners may not be performing the required due diligence when they are approving their transaction within Oncore.	The PELs within TIMS relating to Oncore should be populated for all personnel who have completed the required training and a verification check should be performed to ensure all current users have the required PEL. Oncore system access approvers should ensure personnel requesting access have completed the required PEL/QUAL prior to approving the access rights.	a. Create a CAL for Contract Administrators and Contract Owners to pass before granting access to Oncore. Communicate new requirement to Oncore users. Update Oncore N-INS-00150-1001 to reflect training requirements. b. Send all completed attendance sheets to TIMS Administration for entry. c. Communicate requirements to those who have had no formal training and give 4	Owner: Director, Investment Management Target Completion Date: Q2 – 2011 *Detailed Management action plans will be provided to IA for evaluation and follow-up.

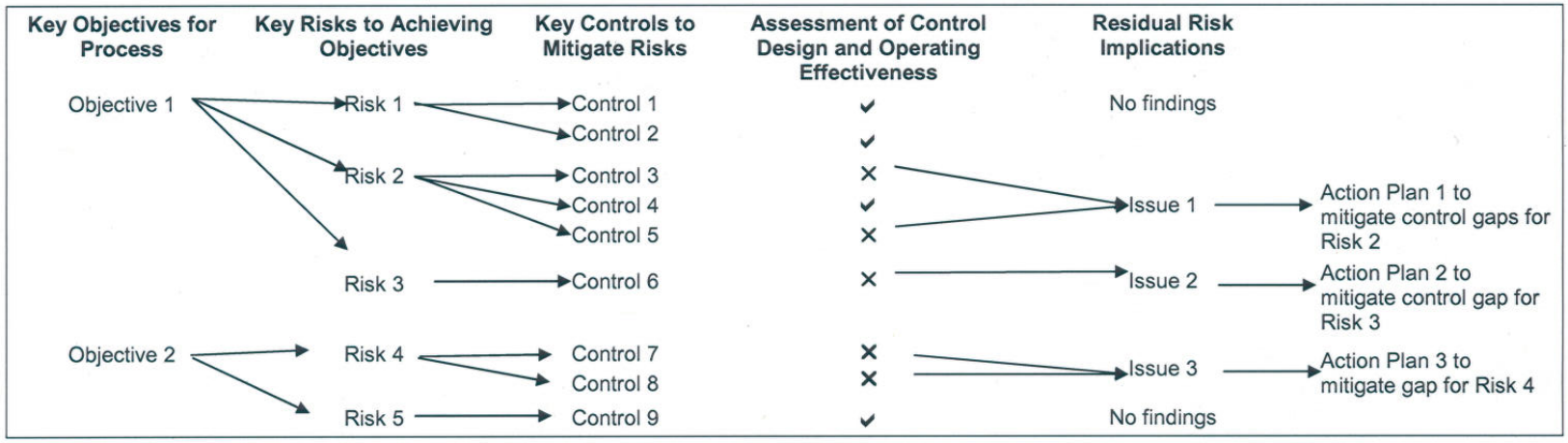
No.	Issue	Observation Description	Process Risk Rating & Implication	Recommendation	Management Action Plans	Owner & Target Completion Date
					week timeline to take new CAL, once available as per 8.1 above.	
Opportunities For Improvement/Efficiency Observations						
1.	Alternate time approver set-up within Oncore	During the review of Oncore system users, we identified a number of Step 2 and 3 approvers who do not have an identified alternate approver set-up in Oncore. In the event these approvers are absent from their duties, transactions will not be approved until someone notifies the Oncore Administration Group to set-up an alternate approver. This causes delays in the processing of transactions.	Process risk rating: Low Process efficiencies may not be fully achieved.	The Oncore Administration Group should consider making a mandatory requirement for all approvers within Oncore to have a designated alternative approver set-up in the system.	a. Oncore Administration to send out a broadcast message to current Approvers reminding them to designate an alternate Approver for their duties should they not be available and in case of unplanned absence. b. Oncore Administration to establish a log of Approvers and alternates, and confirm validity twice per year.	Owner: Director, Nuclear Reporting Target Completion Date: Q1 -2011 *Detailed Management action plans will be provided to IA for evaluation and follow-up.
2.	PassPort work order interface to Oncore	The planned business case for the CSIP project had an interface between PassPort and Oncore facilitating the automatic set-up of work order tasks. This interface was never implemented under the CSIP project. The interface was not implemented due to required fields not being available within the PassPort work order module (i.e. vendor name and PO#). Purchase orders are manually input into PassPort. Contract owners are required to manually create a job set-up form and submit it to the Oncore	Process risk rating: Low Process efficiencies may not be fully achieved. Greater potential for data input errors may cause data integrity issues.	An evaluation of the PassPort/Oncore interface costs and technical requirements should be performed to determine the feasibility of implementing the interface. If the costs and technical aspects are deemed feasible, the interface should be implemented to maximize the process efficiencies.	On hold: An action is underway with BS&IT to investigate the potential replacement of Oncore with the Passport Contract Management Module and Labour Entry Module. One benefit that would be achieved by this move is the integration of the	Owner: VP, Nuclear Finance Target Completion Date: On hold - Response to this identified opportunity has been placed on hold by the VP Nuclear Finance, until completion of the Oncore rationalization

No.	Issue	Observation Description	Process Risk Rating & Implication	Recommendation	Management Action Plans	Owner & Target Completion Date
		Administration Group for set-up in Oncore. The Oncore Administration Group then has to manually enter the submitted work order tasks into Oncore. As the volume of vendors increases within Oncore, the amount of manual entry will increase as well.			Passport work order task level directly to the Contractor time capture system. Downstream integration of the project reporting tools of CSIP will also be investigated. Staff from Nuclear Refurbishment, the PMO Office and Nuclear Finance are working with BS&IT in this review.	project by BS&IT. *Detailed Management action plans will be provided to IA for evaluation and follow-up.
3.	Vendors not being set-up in Oncore	Currently there are 11 vendors actively using Oncore. There is no formal analysis being performed to identify potential new vendors who meet the established criteria for set-up in Oncore. Note: Due to the current BS&IT review of system rationalization, the Oncore Administrator has not actively pursued adding vendors to Oncore.	Process risk rating: Moderate The benefits of the Oncore system may not be fully realized if vendors are not set-up who meet the criteria. Process efficiencies may not be maximized if vendors are not set-up in the system.	The Oncore Administration Group in conjunction with Nuclear Supply chain should periodically perform an analysis to identify vendors who meet the requirements to be input into Oncore and approach the identified vendors to be set-up in the system.	On hold: Until mid-2010, the Oncore system was not able to handle more than 11 vendors. Now, the Oncore system is in a much more reliable and stable state, and Oncore Administration staff is able to handle more volume and has training materials now available to support many users. Refurbishment and IMS are vendors now awaiting set up. However, BS&IT have a corporate wide initiative of reducing the number of smaller systems, including	Owner: VP, Nuclear Finance Target Completion Date: On hold - Response to this identified opportunity has been placed on hold by the VP Nuclear Finance, until completion of the Oncore rationalization project by BS&IT. *Detailed Management action plans will be provided to IA for evaluation and follow-up.

No.	Issue	Observation Description	Process Risk Rating & Implication	Recommendation	Management Action Plans	Owner & Target Completion Date
					Oncore, which could be replaced with a labour entry module (which is dependent on using new Contract Modules) in Asset Suite, the newest version of Passport. New Refurbishment and IMS vendors to be added to Oncore by end of 2011, assuming continued use of Oncore. Ongoing review by Oncore Administration to identify highest potential benefit vendors, based on needs of the business.	

APPENDIX D - OVERVIEW OF AUDIT RATING METHODOLOGY

IA's ratings for operational audits of OPG business processes are derived from an assessment of the management controls that are in place to mitigate key risks to the achievement of process objectives. The diagram below illustrates IA's basic approach to conducting an audit. If control deficiencies are identified that prevent IA from providing reasonable assurance that the process objective will be met (i.e. key risks are adequately mitigated), an audit issue will be noted and a corrective action plan from management will be required.



The ratings for the audit will be assigned based on a two-tiered assessment of residual risk exposure. The first tier rating assesses the residual risk at the local, process level and is guided by an evaluation of the 5 interrelated components of control, as defined by the COSO Internal Control Framework (i.e. control environment, risk assessment, control activities, information and communication, monitoring). This results in one of the following audit opinions:

- *Not Adequate*: a management control system is not in place or not operating effectively.
- *Generally Adequate*: sufficient controls are in place and generally operating effectively with some improvements required.
- *Adequate*: an appropriate management control system is in place and operating effectively.

The second tier to IA's audit rating is an indication of the implications of the residual risk at the broader, enterprise level. This rating of "High", "Moderate" or "Low" is intended to answer the "so what?" question for senior management and the Audit and Risk Committee by giving context to audit results in terms of their impact on OPG as a whole.

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ONTARIO POWER GENERATION

Internal Audit

Darlington Refurbishment Program, Preliminary Planning Phase

May 2012

Distribution:

Albert Sweetnam, EVP Nuclear Projects

cc: Tom Mitchell
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APPENDIX A

1.0 EXECUTIVE SUMMARY

Audit Rating[1]:	[Generally Adequate]
Enterprise Level Impact:	[Moderate]

Internal Audit (IA) has completed the Darlington Refurbishment Program (hereafter, the Program or Refurbishment), Preliminary Planning Phase audit. This was a project audit identified in IA's 2011-2012 Strategic Audit Plan (SA Plan). The objective of this audit was to independently assess OPG's Project Management processes and controls over the current phase of the program. The audit scope included a review of processes and controls in the areas of: Risk Management, Procurement Management, Scope Management (including Change Management), Cost Management, Schedule Management and Human Resource Management/ Organizational Development.

The audit noted that the Refurbishment Program Management Team has established a number of key processes to support the current phase, including monthly project and program review meetings, quarterly executive advisory committee meetings, a scope review board and a sound gating process framework to manage progression of projects within the Program. A Gate Review Board has been established to provide oversight and a level of challenge within the program. Management has implemented a database to record and manage program risks and support Refurbishment's risk management plan. In recognition of the long duration of the program, management also established a process to record, and provide supporting rationale and documentation for significant decisions and assumptions made across the Program.

The scope of the audit included: Risk Management, Procurement Management, Scope/Change Management, Cost Management, Schedule Management and Human Resources Management/Organization Development.

The processes and controls in place at the time of the audit were found to be generally adequate relative to the current early planning phase of the project. While the high priority findings noted herein do not present a concern at this time, successful implementation of the management action plans over the course of 2012 will be critical to the project's continued ability to effectively manage its work throughout the remainder of the planning phase.

The following key findings were identified during the audit:

- Planning and Control – Planning and Control has identified the tools and systems required to support the Refurbishment Program. The required systems are available within OPG; however, they are currently not fully-functional to support cost management. Full implementation of these tools and systems is a critical enabler to effective project cost management and cost/schedule integration over the duration of the program.
- Procurement Management – Contracting Strategy documents for Fuel Handling[2] and Turbine Generators (projects with estimated budgets up-to $500M) document the Contracting Strategy and the rationale for proceeding on a single source basis. In their current form the Contracting Strategy documents do not adequately support the rationale for the proposed single source and therefore

[1] *Please see Appendix A for ratings definition*
[2] *The Fuel Handling Contracting Strategy is currently under review*

they require enhancement and updating to more effectively support the single source approach with the OEM vendors.

- Risk Management – The current Risk management Program is recognized as well thought out for this phase of the program; however, some additions are required in the Risk Management Plan. Specifically, program level risk management oversight and integration of the contractors' risk management into the overall program risk management processes, need to be included in the Risk Management Plan to ensure consistent application throughout the program.
- Contingency Management – Internal Controls currently established over use of Program contingency are manual and prone to error. The audit identified a number of errors in the allocation of contingency indicating that without robust review, authorization governing use of contingency funds, there is increased risk of error and/or use of contingency without appropriate authorization. Increased automation of this process would also contribute to its effectiveness.

The current Contracting Strategies for Turbine Generators and Fuel Handling envision obtaining OPG's Board of Directors approval after the negotiations with the OEM vendors are completed. To assist the Board in fulfilling its oversight responsibilities for this project, the Refurbishment Program management team should inform the Board of the planned sourcing decisions for Turbine Generators (TG) and other significant contracts before significantly engaging the OEM vendor in contract negotiations. In addition, OPG's procurement governance requires "prior approval" for non-competitive sourcing methods, but the precise meaning of this term is not clear i.e. whether approval should be requested before or after negotiations with the vendor. It is important that management determine the most appropriate timing for approval of sourcing method given the lack of clarity on this point and the significance of the Refurbishment Program and the TG contract.

Management has developed detailed action plans to address the audit findings. Specific management action plans along with the individuals responsible and the implementation timelines are discussed in the "Audit Findings" section of this report.

The findings in this report have been reviewed with management and management has committed to specific action plans to address these findings. Please see Section 4.0 for specific details of the above findings along with the associated risk impact, audit recommendations and management action plans.

IA would like to take this opportunity to thank the Darlington Refurbishment Program Management Team and other staff for their co-operation during this audit.

Approved By:

Lou Pollieri
VP & Chief Audit Executive

2.0 BACKGROUND

Nuclear facilities are ageing and there is a need to assess and make recommendations with respect to the feasibility of continuing to operate these stations beyond the current predicted end-of-service life dates. Current medium confidence estimates, based on Darlington pressure tubes fitness for service, predict that the Darlington Nuclear Generating Stations (DNGS) reactors will reach the end of their current operating lives between 2018 and 2020.

In June 2006, the Ontario Government directed OPG to begin technical feasibility studies on refurbishing its existing nuclear plants. In November 2009, the OPG Board of Directors approved the decision to proceed with the Darlington Refurbishment Project. The Board of Directors also approved the release of funds for the definition phase of the project to complete preliminary planning and the overall timing and release strategy.

The principal objective of the project is to assess the feasibility of refurbishing Darlington Nuclear Generating Station (NGS) reactors, plan and execute the refurbishment and to enable operations for an additional 25 to 30 years. The refurbishment will involve an outage for replacement of life-limiting components, as well as maintenance or replacement of other components which are most effectively done during the refurbishment outage period.

The project is currently in the Definition Preliminary Planning Phase and is transitioning to the Detailed Planning Phase at the end of 2011. The planned timelines for the different phases of the project are as follows:

- Initiation Phase 2008 – 2009
- Definition Phase – Preliminary Planning 2009 – 2011
- Definition Phase – Detailed Planning 2012 – 2015
- Field Execution and Closeout Phase (four units) 2016 – 2024
- Operation Phase (Return to service of units) starting in 2019.

Based on the November 2009 OPG Board of Director's submission, the project is expected to cost in the range of $6 to $10 billion (2009 dollars), excluding interest and escalation.

3.0 AUDIT OBJECTIVES AND SCOPE

The objective of this audit is to independently assess OPG's Project Management processes and controls over the current phase of the project and to provide reasonable assurance over the effectiveness of processes and key controls in the areas named below.

To determine the scope of this audit, IA performed a preliminary risk assessment and sought input from key management personnel in regards to risks to the achievement of the project objectives. IA also took into consideration the project risk register maintained by the project team as inputs into the audit scope. The risks were considered on an "Inherent" risk basis (i.e. before the consideration of controls). The audit focused on testing the effectiveness of controls around inherent risks.

Specifically, the audit focused on the inherent risks in the following areas:

- Risk Management
- Procurement Management
- Scope Management/Change Management
- Cost Management
- Schedule Management
- Human Resources Management/Organization Development

This audit excluded the following:

- Business case, capital allocations, funding releases and supporting processes
- Health and Safety requirements
- Regulatory and Licensing requirements and processes
- Applicability and suitability of technical standards
- Campus Plan Project
- Providing assurance on the likelihood that the project and/or its current phase will achieve its objectives on time or on budget.

4.0 AUDIT FINDINGS

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
4.1	**Planning and Control – Tools and Systems**			
	Planning and Control (P&C) function currently does not have the fully-functional tools and systems required to support the program beyond the initial planning phase. One of the main responsibilities of P&C is to define and maintain project management infrastructure systems, methods, tools and processes. Defining and implementing adequate information technology infrastructure along with key management processes and controls in the early phases of the program is critical to the Project Management team's ability to manage schedule, cost and integration of project work. The program is currently managed using the P6 integrated master schedule and Excel for cost management and reporting. The P6 integrated master schedule is sufficient for the current planning phase of the program. However, excel is manual, prone to error and cannot enable cost/schedule integration. Version, edit/change and access controls are also difficult to maintain in an excel-based environment. As the Program progresses, management's ability to effectively manage cost, schedule and integration may become substantially impaired. Management identified Proliance, the cost/performance management and reporting tool, as a replacement for	HIGH	1. This matter requires prompt management attention and should be escalated to the Program's executive management to secure adequate support and resources to ensure the required configurations and modifications to the suite of tools and systems designed for project management are accomplished in a timely and effective manner. 2. Upon implementation of the suite of systems, management should perform real data tests that stress the system and ensure that the integration of the systems provides timely and accurate reporting. Management should also perform simulations to ensure	Action Plan(s): A joint Nuclear Refurbishment and Projects & Modifications process simplification team has been established to review and recommend directions to the EVP Nuclear Projects on the Planning & Controls tools and systems required by Nuclear Projects. The recommendations as to the requirements were made and concurred by the EVP Nuclear Projects. Nuclear Refurbishment will be sponsoring and funding the needed IT implementation efforts. A project will be launched to establish and enable the IT tools required to meet the needs of the Refurbishment Project. The project plan will provide specific deliverables and dates on the implementation of the Proliance cost and performance management tool and its integration points with SharePoint and Primavera Planner P6. The plan will incorporate a requirement to test the systems by performing a simulation to determine if the systems are effective to meet the needs of the Refurbishment program. Owner: SVP, Nuclear Refurbishment Target Completion Date: June 15, 2012

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	excel. Proliance, currently exists in other business units in OPG however, the functionality was modified to the extent where it is unable to meet the needs of the Refurbishment Program. In addition to cost and performance management and reporting, this tool will also enable cost/schedule integration. Discussions with management indicated that management recognized this issue prior to the audit and initiated efforts to secure the required system configurations. It appears that this effort took a substantial amount of time to come to fruition due to organizational initiatives aimed at standardization across Nuclear Project processes and OPG's IT footprint. Furthermore, management is in the process of defining the systems and required functionality for the refurbishment project. <u>Risk Impact Analysis</u> As the Refurbishment Program evolves, project management's ability to effectively manage Project Control activities from cost and schedule perspective will become impaired if fully-functional suite of project management systems is not implemented in a timely manner. This matter is time sensitive and requires prompt management attention as the program is expecting to engage its first contractor in early 2012.		that the systems can be operated effectively.	BS& IT will complete the release quality project plan to implement Proliance. <u>Owner:</u> VP and Chief Information Officer <u>Target Completion Date:</u> June 15, 2012 BS & IT and Darlington Refurbishment will provide a target completion date to implement Proliance in 30 days. <u>Owners:</u> SVP, Nuclear Refurbishment VP and Chief Information Officer

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
4.2	**Procurement Management – Single Source Contracting Strategies**			
	At the time of the audit, Fuel Handling and Turbine Generators Contracting Strategy Documents in their then current forms did not support the proposed Single Source approach. Fuel Handling and Turbine Generators are two of the project bundles in the Refurbishment Program. The budget for the Fuel Handling project is expected to be in the range of $175M-$195M, and the budget for the Turbine Generator project is expected to be approximately $500M. The Project Management Team has developed Contracting Strategies for both Fuel Handling and Turbine Generators projects. We examined: the Contracting Strategy documents, the minutes of meetings for both Fuel Handling and Turbine Generators projects and interviewed key personnel involved in the development of the strategy documents including the Project Managers and members of the Refurbishment Program Executive Team. Discussions indicated that ample amount of technical and operational experience exists throughout the organization supporting the approaches proposed in the Strategy Documents. However, the strategy documents in their current form were not reflective and did not demonstrate such knowledge, and how it was applied to arrive at the preferred single source approach. Specifically, our review of Contracting Strategies identified the following: • The level of support and the amount of analysis	HIGH	1. Project Management should revise the strategy documents to demonstrate and further support: the identification and evaluation of the viable alternatives, the analysis and evaluations performed to arrive at the proposed approach/option, how risks, assumptions, costs/benefits and trade-offs etc. were quantified, assessed and evaluated, as well as their impacts on the various alternatives. 2. Project management should ensure: OPG's newly-created centre-led Supply Chain function is involved in the revision of the Contracting Strategies, the revised Contracting Strategies are submitted to the EVP, Nuclear Project for review and approval.	Action Plan(s): To provide additional supporting analyses and risk quantification for the Contracting Strategies, a Kepner-Tregoe Decision Analysis of the contracting options has been completed for Turbine Generators. The analysis assessed the various contracting options against the project objectives. This analysis supports the recommendation in the Contracting Strategy Summary. Issues related to executing a competitive process for the Turbine Generator work have been re-evaluated. The costs of reverse engineering, or, acquiring the needed Intellectual Property have been included in the assessment and documented in a report by Faithful and Gould. The Construction Industry Institute's Project Delivery and Contracting Strategy (PDCS) Tool has also been utilized for evaluation of Fuel Handling contracting options. Project Management will update the Contracting Strategy for Turbine Generators (NK38-REP-09701-10021) with all supporting information to better reflect the robust and rigorous analysis completed (including risks, assumptions, costs, benefits, strengths and weaknesses) for the sourcing options (i.e. competitive versus single source). Additional quantitative analysis will

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	behind the evaluation of alternatives was not apparent. The strategy documents did not demonstrate what analysis was performed to arrive at the proposed approach/option. • The process did not demonstrate how risks and assumptions outlined in the Contracting Strategies were quantified and assessed to determine how they impacted various alternatives. • The process did not demonstrate how costs, risks, benefits and trade-offs of the possible alternatives were evaluated. • Discussion with management indicated that timing was an important factor in completing the strategy documents. Potentially, this may have restricted the expected level of analysis and evaluations required to support Contracting Strategies of this nature. We recognize that creation of such strategy documents goes beyond the realm of the normal course of the OPG procurement process and we believe it was prudent of management to recognize the need for additional rigor and planning for procurement initiatives of this size. However: in conclusion, the current strategy documents require enhancement to more effectively support the single sourcing options proposed for both projects. <u>Risk Impact Analysis</u> OPG's ability to successfully support the proposed		Management should also ensure that OPG's Board of Directors are informed on a timely basis of contracting strategies and decisions. 3. Project Management should ensure that the Single Source Justification is approved in accordance with OPG's governance requirements (see OPG-STD-00017[3], Element 7.2 (d)), which requires prior approval of non-competitive procurement method by appropriate supply chain official and OPG's CEO.	also be undertaken and reflected in the contracting strategy, where appropriate. <u>Owner:</u> Director, Commercial Strategy <u>Target Completion Date:</u> August 31, 2012 Project Management will update the Contracting Strategy for Fuel Handling (NK38-REP-09701-10020) with all supporting information to better reflect the robust and rigorous analysis completed (including risks, assumptions, costs, benefits, strengths and weaknesses) for the sourcing options. This includes completing a Kepner-Tregoe Decision Analysis for evaluating contracting options. <u>Owner:</u> Director, Commercial Strategy <u>Target Completion Date:</u> October 31, 2012 Management will provide a briefing on the Turbine Generator and Fuel Handling contract strategies to the Nuclear Oversight Committee. <u>Owner:</u> SVP, Nuclear Refurbishment

[3] Currently being transferred from former OAR to Procurement Governance.

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	sourcing and contracting approaches may be adversely impacted if the documents created to record the process undertaken to arrive at the preferred strategy do not adequately reflect the work performed to arrive at the preferred option. This is particularly important for the Refurbishment Program, considering its duration and any anticipated level of staff turnover.			Target Completion Date: May 31, 2012 – Turbine Generators November 30, 2012 – Fuel Handling Project Management will obtain approval of the Single Source Justification from OPG's CEO and the appropriate supply chain official prior to signing the contract with the proponent. Owner: Director, Commercial Strategy Target Completion Date: November 30, 2012
4.3	**Decision Making Repository**			
	The major Decision Making Repository was incomplete at the time of the audit and the required process was not being followed. From the on-set of the project, management has recognized the need to establish a process to record and support the basis on which significant decisions and assumptions are made. The main objective of such process is to support defendability of decisions and assumptions for the purpose of cost recovery. To that effect, the program has established a repository database to record significant decisions and assumptions across the program. We reviewed the process including the governance	MEDIUM	1. Project Management should update and roll-out the framework to provide the appropriate guidance regards to the levels, types and materiality of decisions and assumptions to be documented. This will help ensure that the decision making and recording process is uniformly achieved throughout the	Action Plans(s): The Decision Making process and associated Repository are used to capture key project decisions and assumptions that are not documented elsewhere within the Refurbishment Program. The Nuclear Refurbishment Assumptions, Issues, and Decisions Management Procedure (N-PROC-LE-0008), as well as the Decision Record and Analysis Summary Form (N-FORM-11390) and Key Assumption/Issue Identification Form (N-FORM-11394), have been developed to provide guidance for documenting and recording these assumptions, issues, and

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	framework established and a sample of records stored in the decision database. We noted that the current repository database was not being used consistently and has not been updated for approximately one year as of the time of the audit. In the meantime, decisions and assumptions were tracked and documented in other relevant project records (e.g. Gate Submission Packages). The current governance framework does not define the types of decisions and assumptions to be recorded and the materiality requirements to ensure consistency in the decision making and recording process. The following are example of exceptions noted: • The current repository does not reflect some significant decisions and assumptions driving key procurement activities on the program, e.g., the current proposed single source approach for Fuel Handling and Turbine Generators. • Significant decisions and assumptions related to the Fuel Handling project bundle appear to be included in the stage gate documentation submissions; however, they are currently not recorded or referenced in the central repository. Discussions with management indicated that the process is at an early stage of development and management has recognized that further strengthening of the process was required prior to the audit.		program. 2. Project Management should update the central repository to reflect key decisions and assumptions made to date throughout the program that currently may be documented in project gate submissions and other deliverables. 3. Going forward, Project Management should keep the repository up to date and all significant decisions and assumptions should be recorded in a timely manner as required by the governance framework currently in place.	decisions. Since the time of the audit, management has reviewed and updated the Nuclear Refurbishment Assumptions, Issues, and Decisions Management Procedure (N-PROC-LE-0008), and the Decision Record and Analysis Summary Form (N-FORM-11390) and Key Assumption/Issue Identification Form (N-FORM-11394) to ensure the gaps identified in the decision-making governance process are closed. In addition to the above, management will: 1. Provide further communication on the requirements of the decision and assumptions making process across the projects on an on-going basis, e.g. in a weekly huddle meeting. 2. Per the procedure, review and update the repository to reflect significant decisions and assumptions to-date. 3. Planning and Controls will Monitor Compliance at least, quarterly. <u>Owner:</u> Director, Planning and Control <u>Target Completion Date:</u> June 15, 2012

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	Risk Impact Analysis OPG's ability to successfully defend key decisions in future could be adversely impacted if an adequate level of documentary support is not retained.			
4.4	**Risk Management – Risk Management Process**			
	Risk Management Plan We reviewed: the program's risk management framework, the Risk Management Plan and the Contingency Management Processes management planned to use throughout the program. While the risk management program is recognized as being well thought out for this phase of the program, we have identified a number of areas where further improvement is required to the Risk Management Plan. Specifically, we noted that the following key areas were not adequately reflected in the Program's current Risk Management Plan: • Risk management oversight (e.g. a body to provide a level of challenge on program-wide risk management activities). • Integration of the contractor's risk management. • Ownership of the program's risk register (see point 2 below). • Specific timing and frequency of risk management activities/meetings. • Monitoring to evaluate the effectiveness of risk response strategies on an on-going basis. Without adequate coverage of these areas, the effectiveness of the Risk Management Plan will be reduced.	MEDIUM	1. Project Management should update the Risk Management Plan to include the following elements: establish an "Oversight Committee" (with clearly defined and formally documented mandate) to provide a level of challenge on program-wide risk management activities, provide the expected level of guidance as to how the contractor's risk management activities will be integrated and managed, provide the expected level of guidance as to how the ownership, integration and management of the projects and program risk registers, provide the expected guidance as to the timing and	Action Plan(s): Nuclear Refurbishment has established a very comprehensive risk management program that includes: • A review of risks by the Refurbishment Executive Team in regular monthly Program and Project meetings. • Participation of the CRO in monthly Program meetings and a quarterly CRO review of key risks with the Executive team. • Dedicated risk workshops with senior management to review both program and project level risks. • Guidance to Risk Owners on the requirements, and frequency, of risk management activities, including use of the risk register. • Direction on risk management expectations to project managers on the preparation of a risk management plan, at Gate 2, per the Nuclear Refurbishment Gating process. This plan includes Contractor's risks. Although management recognizes that there are opportunities for continuous improvement, the

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	Risk Impact Analysis Project Team's ability to identify, manage and respond to key risks in an appropriate and timely manner may be adversely impacted if the expected level of guidance is not provided by the Risk Management Plan. 2. Risk Register Project Management has recognized that managing risk on a project of this size will require a structured approach to capturing, evaluating and dispositioning risks. For this purpose a Risk Register Database (RADAR) was established. We reviewed three months of the program's risk registers and the processes established by management to maintain them and noted the following: • Risk description statements are not always clear and in some instances do not identify the adverse events, and their expected impact on objectives. This leaves the risks open to interpretation. • Risks are not consistently categorized as required by the current Risk Management Plan. • Based on the Risk Registers reviewed, risk close-out justifications were not always clearly stated and our request for copies of supporting "close-out forms" was not successful. • There is currently no audit trail function in RADAR to support changes/updates to risks. The risk management activities outlined above that are not considered in the current Risk Management Plan		frequency of risk management activities, and to establish a monitoring mechanism that will enable management to evaluate the effectiveness of risk response strategies on an on-going basis. 2. Project Management should also: adhere to the existing Risk Management Plan when establishing risk statements and risk categories in the risk register, provide guidance on how risks are to be closed out in the database, and establish a system to enable management to track risk changes/updates in the database.	Risk Management Program is continuing to evolve with the overall progression of the Refurbishment Program planning phase work. Management will review its Risk Management Plan to incorporate the additional feedback provided in this report. Owner: Director, Planning and Control Target Completion Date: June 15, 2012 With respect to managing the Risk Register, management will: 1. Develop, communicate, and issue instructions on the level of rigour required to close risks in the RADAR tool. Owner: Director, Planning and Control Target Completion Date: June 15, 2012 2. Design and implement the required capabilities to track changes in risk scores and evaluate additional opportunities to add additional risk controls to the RADAR tool or the overall process, i.e. a process/security

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	need to be addressed in a reasonable timeframe. This matter will become more critical, as the project bundles passes Gate 2 of the Nuclear Refurbishment Gating process. Risk Impact Analysis The above may adversely impact Project Team's ability to understand, consistently capture and effectively manage risks on the program. In addition, the intended move to a risk-based contingency further underpins the need for a structured and consistent management of the project's risk without which management's ability to accurately estimate contingency may be adversely affected.			enhancement to ensure that risks cannot be deleted. Owner: Director, Planning and Control Target Completion Date: August 15, 2012
4.5	**Contingency Management - Management and Use of Contingency**			
	In reviewing management of contingency we noted that the manual internal controls in place at the time of the audit were not effective in providing assurance over the allocation of contingency funds. We reviewed: the existing approach used to manage contingency within the Refurbishment Program, the existing contingency governance process management planned to use throughout the program and 16 draw-down transactions totaling $12.5M from the contingency transaction ledger dated between January 2010 and October 2011. We noted that, while the governance related to contingency appears to be adequately designed, management chose not to establish a risk-based contingency for the current phase of the program. It	MEDIUM	1. Project Management should implement a robust contingency management framework to effectively meet the needs of the Program. 2. Project Management should establish a robust set of internal controls to provide reasonable assurance that the management and use of contingency are effective to meet the needs of the program.	Action Plan(s): The contingency management process, as documented in the Nuclear Refurbishment Contingency Management Procedure (N-PROC-LE-0013), is currently based on industry best practice and incorporates the current governance. At this phase of the project, Contingency is being managed at the program level only; as projects progress through Gate 2, risk informed contingency will be determined and allocated to specific projects or held at program level, depending on the type of risks. Additionally, management will ensure:

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	may be acceptable to establish contingency as a management reserve in the early stages of the program. The need to establish risk-based contingency will become more important as the project bundles passes Gate 2 and transitioned to a deliverable-based WBS. Contingency is currently managed manually in excel as I.T. tools and systems are currently not in place (see finding 4.1). We reviewed the processes around management, and allocation, of contingency and noted the following exceptions: • A transfer-in for $1.5M was erroneously posted as a draw-down, the amount remained undetected at the time of audit. • An unauthorized and unsupported adjustment for $1.24M was used to decrease the contingency. • A draw-down amount for $900K was inadequately supported and did not contain the required approval. • An unapproved transaction processed for $250K. Although we did not identify any intentional inappropriate disbursement of contingency fund, the exceptions identified above resulted from a system of manual internal controls, which require timely improvements. <u>Risk Impact Analysis</u> Without robust automated controls in place governing authorization and use of contingency funds, the risks of		3. Internal controls over management and use of contingency should be automated during the implementation of recommendation 4.1 above. In the mean time, a process to ensure the appropriate levels of reconciliations, review and sign off should be implemented. 4. Project Management should ensure that the information required to properly support each transaction is clearly stated.	1. Upon progression of projects through Gate 2, management of contingency will be formalized in accordance with the contingency framework. <u>Owner:</u> Director, Planning and Control <u>Target Completion Date:</u> June 15, 2012 – coinciding with the first project progressing through Gate 2. 2. The process to manage and report on the allocation/use of contingency will be enhanced, through workflow automation, with the implementation of the Planning and Controls tools (see finding 4.1). <u>Owner:</u> Director, Planning and Control <u>Target Completion Date:</u> (Approx. Q1, 2013) 3. Until the tools and systems (see finding 4.1) are in place, Project Management will immediately implement a monthly reconciliation for contingency. This reconciliation will require management's approval, and any variance resulting, will be identified and explained. <u>Owner:</u> Director, Planning and Control

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	errors and inappropriate use of contingency is increased.			Target Completion Date: April 30, 2012 4. Documentation support requirements for contingency transactions will be clarified and documented within the Nuclear Refurbishment Contingency Management Procedure (N-PROC-LE-0013) and associated instructions or guides. Requirements will be communicated as part of the change management plan as the governance is updated. Owner: Director, Planning and Control Target Completion Date: June 15, 2012
4.6	**Planning and Control – PMO Standard Setting Mandate**			
	Planning and Control authority to mandate PMO standards is currently not clearly defined and is not formally documented. We reviewed the Project Execution Plan (PEP) and noted that while mandates assigned to other key functions within Refurbishment organization have been clearly defined and formally assigned (example, Engineering and Quality Management), the authority to mandate PMO standards is currently not clearly defined and formally assigned to the Planning and Control function.	MEDIUM	The authority to mandate PMO standards should be formally assigned to the Planning and Control function and documented in the PEP and role documents for Planning and Control.	Action Plan(s): The role of the Planning and Control function in establishing and mandating PMO standards within the Refurbishment Program is well understood and accepted. Project Management is currently transitioning from a Project Execution Plan (PEP) to the Nuclear Refurbishment Program Management Plan (PMP). The PMP will formally document the authority for Planning and Control to mandate PMO standards within the

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	Discussions with senior program management indicated that Planning and Control is generally recognized as a standard setting authority for project management processes; however, such recognition may not be uniform and consistent between projects. It is apparent that Planning and Control authority to mandate project management standards is intuitively recognized but informally accepted within the Refurbishment Program. <u>Risk Impact Analysis</u> The Project Management team's ability to establish consistency to enable integration of program activities can be adversely impacted if there is potential ambiguity with regards to the mandate to set PMO standards and require adherence to such standards.			Refurbishment Program. <u>Owner:</u> SVP, Nuclear Refurbishment <u>Target Completion Date:</u> April 30, 2012
4.7	**Planning and Control – Governance Framework**			
	Process governance documentation is excessive and the applicability of it is not always clear. We reviewed the Program Management Governance framework in development at the time of the audit and noted that while the processes documented in Governance appear sound. The governance documentation at the time of the audit was over abundant, multi-layered, repetitive in nature and its structure was complex, relative to requirements. Specifically, for each Project Management process the following suite of governance is created: Policy, Charter, Program, Procedure, Standard, Guides,	MEDIUM	Management should proceed with its current plan to rationalize the governance as soon as possible. The objectives of rationalization should include reduction of the amount of governance documentation, while making process governance easy to "navigate", understand its applicability and facilitate practical use and	<u>Action Plan(s):</u> The Darlington Refurbishment Management System governance structure is established and maintained by the Director, Management Systems Oversight, with ownership of specific Project/Program Management Governance falling to the appropriate senior Project Management. The Darlington Refurbishment Management System also integrates with the overall Nuclear Management System (N-CHAR-AS-0002). It continues to evolve as the organization, project, and associated models for executing Refurbishment work evolve. It is also evolving with changes

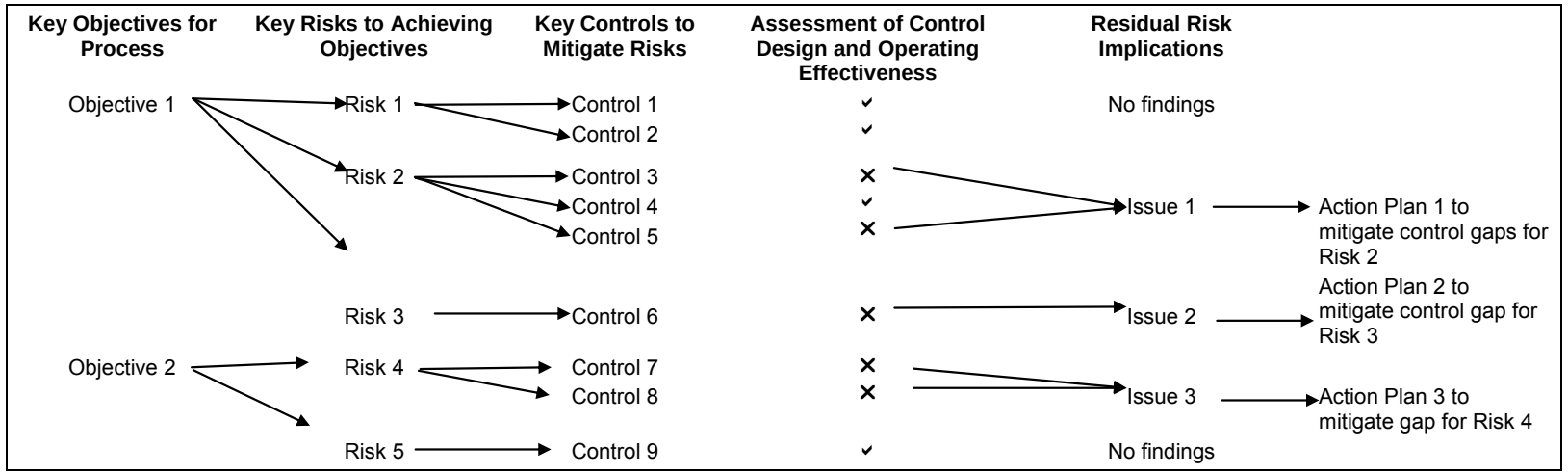
#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	Manuals and Instructions are added where deemed necessary. While such governance structure complies with OPG's Nuclear governance requirements, when applied to the Refurbishment program, it presents a risk of introducing ambiguity and potential inconsistency when it comes to process applicability and application. As new project team members including new Project Managers join the Refurbishment Program, the complexity of the process governance may lead to inconsistent application of the project management processes across various projects. Discussions with management indicated that the need for governance rationalization was recognized by management prior to the audit. <u>Risk Impact Analysis</u> The Project Management governance objective is to establish a "common language" of the Program and to ensure processes are applied consistently across the various projects. The program's ability to ensure consistent application of processes across the various projects and to effectively on-board new Project Personnel from outside OPG may be potentially impacted adversely by the overly complex governance structure currently in place.		application.	introduced through the new Corporate Business Transformation initiatives. The objective in developing and maintaining the governance is to streamline and simplify to the extent possible and practical. Since the time of the audit, management has established a project management and controls toolkit. This toolkit has been communicated and published within the Refurbishment Program and is located the Program's website. This toolkit points users to the suite of governance processes applicable to each of the knowledge areas within the program (e.g. risk management, schedule management, estimate development etc.) and it will continue to be updated as the governance requirements evolves. In addition to the above, management will: The Management Systems Oversight function is developing a governance structure separate from the Nuclear Management System, where possible, to enable streamlining of the Darlington Refurbishment Management System. <u>Owners:</u> Director, Planning and Control / Director (acting) Management System Oversight <u>Target Completion Date:</u> August 30, 2012

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
4.8	**Human Resources Management – Succession Management Process**			
	The Refurbishment Program did not have an independent stand-alone Succession Plan at the time of the audit. We reviewed the human resource planning activities for the Refurbishment Program, including: Human Resource Management Plan, Resource Planning Forecast, Jobs and Role Description Documentation, Change Management initiatives and the Nuclear Organization Succession Management Process. We also tested a sample of 12 development plans currently in place for 12 potential successor candidates being considered for five key positions in the Refurbishment Program. We noted that: • While the five "priority one" positions identified for succession within the Refurbishment Program were included in the Nuclear Business Unit Succession Plan, the Succession Plan for critical and/or key positions below the "priority one" positions within the Refurbishment Program was not formalized. This does not provide the level of granularity required to meet specific needs of the Refurbishment Program. • It was also required that each of the potential successor candidates has a development plan in place not older than two years from the date signed by the sponsors. Fifty percent (6/12) of the development plans reviewed were out of date.	MEDIUM	1. Project Management should ensure a Succession Plan specific for the Refurbishment Program is established as soon as reasonably possible to ensure continuity within the program. 2. Upon implementation of the Refurbishment-specific Succession Plan, management should ensure the development plans for potential successor candidates are established in a timely manner and updated on an on-going basis with adequate monitoring in place to ensure they stay current.	Action Plan(s): Since the time of the audit, the Refurbishment Program has progressed from Preliminary Planning to Detailed Planning. The Refurbishment Program has also experienced growth in staff. This progression has enabled management to formalize and establish a Succession Plan within the Darlington Refurbishment Program. The Succession Plan has identified and documented key and/or critical roles within the Darlington Refurbishment Program and the potential successor candidates. Contractor succession planning is also a consideration for the life of the project. In the recently signed Re-tube and Feeder Replacement contract, the contractors are required to develop succession plans for key and/or critical roles on their project teams. Incentives are also included in the contract to ensure continuity of key/critical personnel on the program. Management is currently in the process of completing the associated steps identified in N-PROC-HR-026, including updates of development plans for identified succession candidates.

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	Discussions with management indicated that management recognized the importance of establishing a formal and consolidated Succession Plan specific for the Refurbishment Program. Following the natural progression of the program, management had continued the development and formalization of the Succession Plan since the time of the audit. The progress achieved by management is outlined in the management action plans. Management further indicated that work is underway to update the development plans for the six potential successor candidates. Risk Impact Analysis In case of loss of critical project personnel, the Project Management ability to backfill could be adversely impacted, potentially resulting in disruption to the Program (e.g. reduced productivity and loss of continuity).			Owners: SVP, Nuclear Refurbishment/Manager, Human Resources This action was completed effective March 31, 2012.

APPENDIX A
OVERVIEW OF AUDIT RATING METHODOLOGY

IA's ratings for operational audits of OPG business processes are derived from an assessment of the management controls that are in place to mitigate key risks to the achievement of process objectives. The diagram below illustrates IA's basic approach to conducting an audit. If control deficiencies are identified that prevent IA from providing reasonable assurance that the process objective will be met (i.e. key risks are adequately mitigated), an audit issue will be noted and a corrective action plan from management will be required.



The ratings for the audit will be assigned based on a two-tiered assessment of residual risk exposure. The first tier rating assesses the residual risk at the local, process level and is guided by an evaluation of the five interrelated components of control, as defined by the COSO Internal Control Framework (i.e. control environment, risk assessment, control activities, information and communication, monitoring). This results in one of the following audit opinions:

Not Adequate: a management control system is not in place or not operating effectively.
Generally Adequate: sufficient controls are in place and generally operating effectively with some improvements required.
Adequate: an appropriate management control system is in place and operating effectively.

The second tier to IA's audit rating is an indication of the implications of the residual risk at the broader, enterprise level. This rating of "High", "Moderate" or "Low" is intended to answer the "so what?" question for senior management and the Audit and Finance Committee by giving context to audit results in terms of their impact on OPG as a whole.

ONTARIO POWER GENERATION

Nuclear Oversight - 889 Brock Road, Pickering, ON L1W 3J2

MEMORANDUM

Internal Use Only

May 24, 2012

File No: N-REP-01070-0409234 T06

DISTRIBUTION:

Audit OPGN NO-2012-009
Project Management

Nuclear Oversight conducted an audit of Project Management from March 26 to April 17, 2012. The objective of the Audit was to determine whether project management activities are being performed in compliance with governance requirements and managed effectively to deliver quality products per established milestones.

The audit determined that managed system controls are effective for project management activities being performed by Nuclear Support, Darlington and Pickering project management staff. Improvements since the last audit include the introduction of program health reporting using Fleetview reports and full implementation of reporting tools which track milestone compliance, budget and cost (COGNOS).

The audit recognized that project management is meeting their key business case summary (BCS) milestone targets; however, the audit identified deficiencies in some key elements of the program. These include three areas of project management execution (applying value engineering, dispositioning lessons learned and managing risk) and staff qualifications. These deficiencies, if not corrected, may impact overall project effectiveness and may result in similar issues on some projects.

A copy of the audit report is attached. Please contact either me at 702-5430 or Russ Gomme at 702-5452 if you have any questions.

Regards,

B. Morrill

Brent Morrill
Director
Nuclear Oversight
P82-6

BM/

Enc

Internal Use Only

Nuclear Oversight Audit Report – Project Management

OPGN NO-2012-009 T6

Objective and Scope

Determine whether project management activities are being performed in compliance with governance requirements and managed effectively to deliver quality products per established milestones. The audit focused on assessing ongoing and recently completed projects at Darlington and Pickering for effectiveness over the key project life cycle phases which were managed by the Projects and Modifications organization.

The audit was conducted at Darlington, Pickering and Nuclear Support over the period of March 26 to April 17, 2012 in accordance with the audit plan shown in Appendix 1.

Overall Assessment

The audit determined that managed system controls are effective for project management activities being performed by Nuclear Support, Darlington and Pickering project management staff. Improvements since the last audit include the introduction of program health reporting using Fleetview reports and full implementation of reporting tools which track milestone compliance, budget and cost (COGNOS).

The audit recognized that project management is meeting their key business case summary (BCS) milestone targets; however, the audit identified deficiencies in some key elements of the program. These include three areas of project management execution (applying value engineering, dispositioning lessons learned and managing risk) and staff qualifications. These deficiencies if not corrected may impact overall project effectiveness and may result in similar issues on some projects.

The audit identified two findings:

Finding 1: Deficiencies in Project Management Execution

Finding 2: Staff Qualifications

Four audit insights are provided in Section 2.

Eight SCRs were initiated during this audit, as listed in Appendix 2.

1.0 Findings

1.1 Finding No. 1 Deficiencies in Project Management Execution

Some deficiencies in the execution of project management activities were identified in the areas of Value Engineering, Lessons Learned and Project Risk Management.

These deficiencies may have led to missed opportunities to ensure value for money, may have caused similar issues to occur from not applying lessons learned and ineffective maintenance of Project Risk Registers could impact on project milestones.

Supporting facts: (Additional supporting facts are shown in Appendix 3.1)

1) The use of Value Engineering (VE) as required by N-INS-00120-10019, Value Engineering has decreased since 2010 and the rationale for not performing VE is not consistently documented for projects with an investment over $5M. See Appendix 3.1 Table 1.

a) For 7 of 7 projects started in 2010 or 2011 with investment of more than $5M, Value Engineering was not performed.

b) 5 of 7 projects did not have documented rationale with the director's approval in the form of a signed exemption memo for projects with investment more than $5M.

c) In 2010, 7 projects completed the VE process, while in 2011, only 1 project used VE. Currently in 2012 there is only 1 project as a candidate for VE.

d) There is a requirement to have internal value engineering facilitators (VEF); however, currently there is only one internal qualified VEF who only recently (1st Qtr, 2012) obtained this qualification. The lack of internal qualified VEFs may be contributing to the reduction in performing VE on projects.

i) Section 1.2 of N-INS-00120-10019 identifies that internal VEFs should be developed to reduce reliance on external resources.

2) Some Lessons Learned (LL) from LL Reports are not effectively circulated or explicitly dispositioned.

a) LL documented in 2 of 5 LL reports reviewed had similar issues in subsequent phases of the same project and/or in other subsequent projects.

i) NK30-LLD-54600-00002 - Phase I SG Protective Relays (2010) and NK30-LLD-54600-00004 - Phase II SG Protective Relays (2012):

(1) The 2010 Phase I LL Report documented problems with engineering rigour in preparing the installation/commissioning work plan, scheduling issues and on-line wiring issues which were repeated and documented in the 2012 Phase II LL report.

ii) NA44-LLD-34320-00001 "PNGS A Mod/Replacement of FRP Components & Vacuum Bldg Basement Improvement Project during 2010 VBO" (2010).

(1) This LL report identified that design quality issues caused EC revision. This adverse condition was again identified as a LL in D-LLD-63103-10001, "Gaseous Fission Product Monitor Replacements" (2012), where design quality issues resulted in EC revisions.

b) In 5 of 5 LL reports reviewed, recommendations were listed but not dispositioned using SCRs or ARs to address the specific LL identified in the report. For example:
   i) D-LLD-59000-10001, DND Full Scope Simulator: 39 LL were identified in the LL report and each has a corresponding recommendation to enhance future projects. The report did not identify any specific action to disposition these recommendations.

c) OPEX from other organizations provides examples of processes to document LL:
   i) The SME from James A. Fitzpatrick Nuclear Plant, who participated in this audit, described the process followed at her plant where definitive actions are developed for LL and tracked to completion. The LL Report remains open until all LL are dispositioned.
   ii) OPG's Nuclear Refurbishment Organization has procedure N-PROC-LE-0006, Nuclear Refurbishment Lessons Learned and OPEX Manangement. The expectation is that all LL items are given ID numbers and uploaded in a database (called DOLLAR) for use in subsequent projects.

3) Project Risk Management & Control activities are not being consistently carried out during project execution phase as required by N-PROC-AS-0039 R010, Project and Portfolio Management sections 1.6.1/1.6.2 and N-INS-00120-10014 R003, Project Risk Management Section 1.4.

a) Not all projects are maintaining Project Risk Registers during project execution as per N-INS-00120-10014, Section 1.4.
   i) 2 out of 2 projects reviewed at Pickering did not have current risk monitoring logs. A Project Risk Register was completed in the Project execution Plan (PEP) for both projects; however, the Project Risk Register was not updated with significant/unforeseen risks that occurred during the project. Projects reviewed were Pickering B EPG2 Starting Air Compressor (13-49136) Pickering B Trash Screen Replacement (13-49140).
   ii) While 5 out of 5 projects reviewed at Darlington do have a current Risk Register, 4 out of 5 have some gaps in information. The information tracked in the risk registers is not consistent. See details in Appendix 3.1.

b) The expectations for frequency and method of reporting project risk during project executions are not well defined and Project Managers are not reporting risk in a consistent manner. N-PROC-AS-0039 Rev 010 Sections 1.6.1 and 1.6.2 provides expectations for Project Managers on using project monitoring and control tools (ONCORE, ProSight, Proliance) and provides a list of metrics (which includes Project Risk Register) for monitoring and controlling their project; however, a review of the on-line reporting tool shows that the monitoring and control tools are not being used by all Project Managers.

SCR N-2012-02709 was initiated to identify the finding. Director Project Control Office agreed to be the EO for this SCR at a significance level 3.

1.2 Finding No. 2 Staff Qualifications

Some Project Managers identified for active projects are not fully qualified as required by N-QG-403-0023 R002, Nuclear Project Staff Qualification Guide. Also, some staff in the Projects and Modifications organization do not have a job description document and consequently are not linked to any qualification requirement.

The qualification requirements for Project Managers were recognized to be onerous and a revision to the Qualification Guide is in progress. This issue is a continuing item from the previous Project Management Audit NO-2009-019.

Although some project management documents were signed by unqualified Project Managers these documents were not considered critical and some have since been revised to remove the requirement for the Project Manager to sign.

Supporting Facts:

1) Some Project Management staff assigned to active projects are not fully qualified. A list of the active projects with Project Managers (PM) was provided by Project Control Centre staff.

a) Five of 11 PMs have not completed the Project Manager's Qualification (shown as In-progress in TIMSII).
   i) These 5 PMs are managing 37 of the 73 projects currently in progress at the Pickering and Darlington sites.
   ii) One of these PMs has not completed the Project Leader's Training (a prerequisite to the PM's training).

b) Unqualified PMs are signing some project management documentation as PM; however, there were no co-signatures from qualified PMs. The following are some examples:
   i) D-PIR-33110-10004, "Post Implementation Review for Steam Generators Primary Side Clean".
   ii) D-BCS-33110-10008-R001 "Developmental Release Business Case Summary".
   iii) Project Change Request Authorization for Project 16-31302 "Darlington Buried Services Upgrade Project".
   iv) D-LLD-63103-10001 "Lessons Learned Report – Gaseous Fission Product Monitor Replacements Project".
   v) FIN-FORM-PA-004 – Report of Equipment in Service for "Darlington Chiller Replacement to Reduce CFC Emissions".

c) One Contract staff is listed as a PM for two projects (Pickering and Darlington Fukushima Phase I Projects), but is not linked to OPG's Project Manager's qualifications (Qual ID 11832). Documents signed by this contract staff are:
   i) Fukushima Phase 1 Project - Partial Release Business Case Summary (signed as reviewer).
   ii) AISC Part B for Projects 13-49299, 13-49300, 13-49158,13-49159, 16-31508 and 16-31510 (signed as the preparer).
   iii) N-TQD-403-00001 (Nuclear Engineering Support Personnel Training and Qualification Description), Section 1.4.2.1 stipulates that "*Augmented staff*

performing tasks under the Nuclear QA program shall be qualified for the assigned work under this TQD".

d) Project Management Principle A.1.2, per N-PROG-AS-0007, Appendix A, states that "Project Managers are qualified to do the job".

2) There is no job description document for some staff in the Projects and Modification Organization. These staff are in the following departments:

a) Department of Project Management Office (in the sections of Business Controls, Systems Process and Reporting and Governance and Improvement).

b) Department of Project Control Office Scheduling in the section of Project Controls.

3) A draft version of N-QG-403-0023 Rev 003, which was reviewed by the audit team, has defined new qualification requirements for the PM and has removed the qualification requirements for the Project Leader. Based on these new requirements, some gaps will continue to exist if the requirements were to be implemented immediately. Also, the job description/qualification requirements of the Project Leader will have to be addressed.

SCR N-2012-02710 was initiated to identify the finding. Director Project Control Office, agreed to be the EO for this SCR at a significance level 3 with CARB.

2.0 Insights

(Additional supporting facts for each of the insights are shown in Appendix 3.2)

2.1 Learning Behaviors

The Project Management audit reviewed learning behaviours in the areas of Corrective Action Program, OPEX and Self Assessments.

1) Corrective Action Program:
   a) The audit reviewed project management SCRs and identified similar trends which are reported in the project management trend report. Some deficiencies were identified with the corrective action plans from the previous audit findings and were documented in SCR N-2012-02458.
2) OPEX: Evidence of use of OPEX was observed by the audit during project management daily project control Center meetings and weekly Oversight & Review meetings. Benchmarking has been used by project management as observed in the self assessment database. Some weaknesses were identified with the disposition of lessons learned which is captured in Finding 1 of this report.
3) Self Assessments:

   A review of self assessments identified while self assessments are being performed and recommendations are being recorded in the assessments there is poor performance in documenting the disposition of these recommendations. These have been identified in SCR N-2012-02456.

2.2 Additional Insights

Management AR #28143754-01, 02, 03 was initiated for the Director Project Control Office to review the insights # 2, 3 and 4 for possible further action.

1) Positives

a) **Insights provided by Nuclear Industry Evaluation Program (NIEP) Subject Matter Expert** (Manager of Projects at Entergy's Fitzpatrick Nuclear):

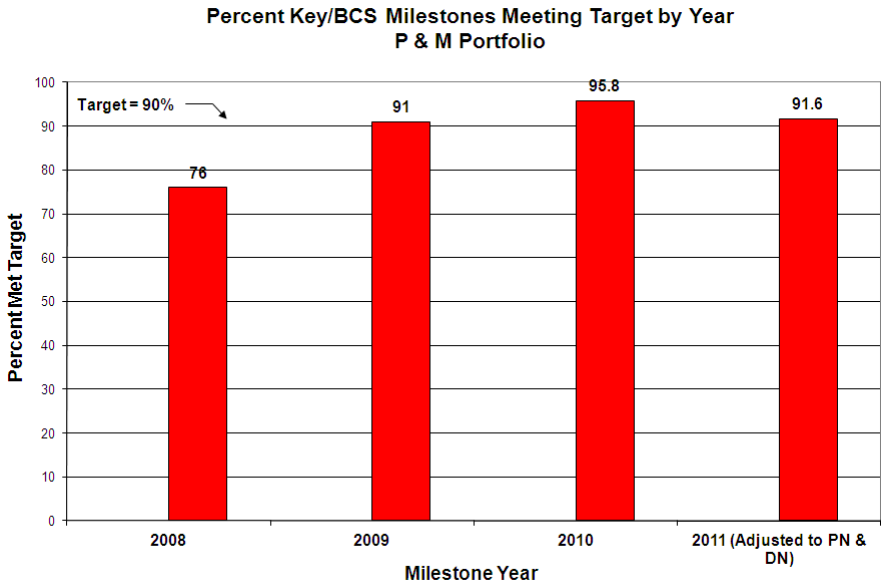
i) Projects controls process was implemented as the result of the cost and schedule improvement program. The process described is consistent with industry best practices. Using P6 for project schedule allows automated (an unbiased) CPI/SPI calculation – a standard Project Performance Indicator.

ii) OPG has integrated the estimating, scheduling, and budget programs which allows for accurate project status and automated standard reporting. At Entergy, they are progressing toward this model.

iii) Good level of detail of scheduling as this is commensurate with resources required to maintain process. Standard scheduling template has been revised (less detail than original) and has attained an acceptable balance.

b) Projects and Modifications (P&M) have an effective application (COGNOS) that tracks, calculates, and produces the metrics and Performance Indicators to reflect BCS milestone compliance, budget, and project related indicators.

c) The data extracted show that P&M has met the 90% target for Project Milestones in 2010 and for Project BCS Milestones in 2011.



d) PCC meetings (daily) and Oversight & Review meetings (weekly) represent good opportunities for:
   i) P&M staff to be engaged and aware of the issues across the organization.
   ii) OPEX sharing.
   iii) Resource sharing.
   iv) Observation and coaching.

2) Change Management

Consideration should be given to change management when using the pilot process to ensure an effective change management plan is in place.

a) A number of Project Management procedures have been recently revised or are in the revision process. Interviews with some Project Management staff indicated that, in some instances, roll-outs have been ineffective or nonexistent. For example

   i) N-PROC-AS-0039 Rev 010A issued March 2012 required the preparation of Business Case Summaries (BCS) utilizing a new template but no roll-out was completed.

   ii) Staff identified there was no roll-out for the new Extended Services/Master Service Agreement.

3) The Expedited Project Process (The Fast Track Strategy)

Consideration should be given to include additional details in the procedure to ensure project managers and interface organizations understand how to perform this process in a consistent manner.

a) The Fast Track Strategy for Project # 13-49140, Pickering B Trash Screen Replacement, currently at the field execution phase, has experienced a number of difficulties. There were problems with the vendor as well as unsatisfactory support from other departments which resulted in missed milestones:
   i) Work plans were issued 78 days late,
   ii) Work Assessing was completed 76 days late,
   iii) Project Execution Plan issued 113 days late.

b) At the time the "fast track strategy" was used there was no guidance in N-PROC-AS-0039 R010 (Project and Portfolio Management). N-PROC-AS-0039 Rev 010A was revised in March 2012 after this project initiation and includes a new section, 1.7.2.5, on "Expedited Project Process"; however, additional details may be needed to perform this new process on a consistent basis.

4) Insight on Project Indicators

The process for establishing the overall Project status indicator as it relates to the schedule performance indicator (SPI), cost performance indicator (CPI) and Projects Risk Register elements should be reviewed and consideration for defining the selection process added to the procedure. Currently the indicator appears inconsistent with the data from these elements. See tables in Appendix 3.2.

3.0 Signatures

Prepared by: Russ Gomme Date: MAY 24, 2012

Russ Gomme
Audit Team Leader Engineering
OPG Nuclear Oversight

Approved by: G. Colaiacovo Date: 24 May 2012

Grant Colaiacovo
Manager
Independent Assessment Engineering
OPG Nuclear Oversight

APPENDICES

Appendix 1

Audit Plan

1.0 RATIONALE

Completion of this audit on Project Management will meet the requirement to audit this element of engineering programs per N-PROC-RA-0048 Appendix A.

2.0 OBJECTIVE

Determine whether project management activities are being performed in compliance with governance requirements and managed effectively to deliver quality products per established milestones.

3.0 SCOPE

The focus of the audit is on the Project Management process, interfaces with other organizations, and effectiveness in meeting key project milestones and deliverables. The audit will focus only on projects managed by the Projects and Modifications organization.

The following scope elements will be considered:

- To assess compliance and effectiveness over the key project life cycle phases, projects will be selected that have been recently completed and/or ongoing projects.
- Management oversight of project activities.
- Performance against project milestones (e.g. Available for Service, Outage, etc.) and budgets.
- Stakeholder input and feedback.
- Interfaces with Engineering Change Control, Outage, and Operations.
- Qualification of Projects staff.
- Review of SCRs.
- Actions from relevant audits and SCRs.
- Governance.
- Use of OPEX.

4.0 REFERENCE STANDARDS

The standards for the audit will include, but not be limited to:

N-CHAR-AS-0002 R15	Nuclear Management System
N-PROC-RA-0048 R15	Conducting Audits
N-PROC-RA-0022 R29A	Processing Station Condition Records

N-PROG-MP-0007 R011	Conduct of Engineering
N-PROG-AS-0007 R007	Project Management
N-PROG-AS-0001 R013	Managed Systems
N-PROG-MP-0001 R010	Engineering Change Control
N-PROC-AS-0039 R010	Project and Portfolio Management
N-PROC-MA-0022 R17	Integrated On-Line Work Schedule
N-PROC-RA-0023 R016	Fleetview Program Health and Performance Reporting
N-INS-00100-10000 R004	Project Cost Estimating Instruction
N-INS-00120-10014 R003	Project Risk Management
N-INS-00120-10019 R001	Value Engineering
N-TQD-403-00001 R007	Nuclear Engineering Support Personnel Training and Qualification Description
N-QG-403-00023 R002	Nuclear Qualification Guide for Nuclear Project Manager / Project Leader
OPG-PROC-0050 R001	Developing and Documenting Business cases
OPG-PROC-0056 R001	Post Implementation Review
CSA N286-05	Management System Requirements for Nuclear Power Plants
N-LIST-08130-10023 R002	CSA N286-05 To OPGN Governance Cross Matrix

5.0 AUDIT PERSONNEL

The team consists of:

Audit Team Leader:	Russ Gomme, Nuclear Oversight
Auditor:	Maher Ghannam, Nuclear Oversight
Auditor in Training:	Ghaman Kaulessar, Nuclear Oversight
Auditor in Training:	Terri Walsh, Nuclear Oversight
Auditor in Training:	Adam Habayeb
SME:	Joanne Dudar, Projects & Mods, Project Controls
SME NIEP:	Sheila Brey, James A. Fitzpatrick Nuclear Power Plant
Manager:	Grant Colaiacovo – Nuclear Oversight

6.0 INDIVIDUALS/ORGANIZATIONS NOTIFIED

- Nahil Rahman, Director, Pickering Projects
- Dianne Gaine, Director, Darlington Projects
- Scott Guthrie, Director, Project Control Office
- Mike Peckham, Vice President, Projects and Modifications

7.0 SCHEDULE

Preparation – March 5 to March 23, 2012
Entrance Meeting – March 23, 2012
Audit Fieldwork – March 26 to April 17, 2012
Prepare report and review – April 18 to May 10, 2012

Exit Meeting – May 11, 2012
Issue Report – May 25, 2012

8.0 REQUIRED FACILITIES AND EQUIPMENT

The audit will be conducted from 889 Brock Road building. Site visits for interviews, etc. will be arranged as needed.

Appendix 2

SCRs Initiated During the Audit

The Following Station Condition Records were initiated during the audit on conditions that required immediate corrective action. Refer to the SCR Database for details. Finding SCRs are listed in their appropriate Findings of the report.

SCR No.	Title
N-2012-02061	16-38419 Process Issue - Formal Request for Waiver of Value Engineering not Obtained
P-2012-06925	Project 13-49146: VE Exemption memo not filed as per N-INS-00120-10019
N-2012-02190	O&C Area's for Improvement - No CAP initiated (Audit NO-2012-009)
N-2012-02191	P&M - Fleetview report identifed there is no formal PM Peer Team (Audit NO-2012-009)
N-2012-01991	Project Management Governance discovery during audit NO-2012-009
N-2012-02121	Project Execution Plans referenced obsolete QA documents
N-2012-02458	Some deficiencies were identified with the corrective action plans from the previous 2009 Project Management audit findings.
N-2012-02456	GAPs identified in disposition of Project Management Self Assessment recommendations (Nuclear Oversight Audit (NO-2012-009)

Appendix 3

Other Audit Details

Appendix 3.1 Additional supporting facts for the Findings

Finding No. 1 Deficiencies in Project Management Execution

1) The use of Value Engineering (VE) as required by N-INS-00120-10019, Value Engineering has decreased since 2010 and the rationale for not performing VE is not consistently documented for projects with an investment over $5M. See table 1 below.

a) For 7 of 7 projects started in 2010 or 2011 with investment of more than $5M VE was not performed.

b) 5 of 7 projects did not have documented rational with the directors approval in the form of a signed exemption memo for projects with investment more than $5M.

i) N-INS-00120-10019 (Value Engineering) Section 1, item c states "*Exemption from the VE process, for projects with investment more than $5M, requires a documented rational and Projects and Modifications Director approval.*" Project details are shown in Table 1 below.

Table 1: Projects started in 2010 or 2011 with investment of more than $5M

Project #	**Project Title**	**Investment ($M)**	Comment
13-46634/35/36	PA Fuel Handling Life Extension	14.6 to 26	Exemption memo.
16-31426	Fuel handling Inverter Replacement	9.192	Exemption memo.
16-38419	Upgrade containment isolation valves	7.569	PM stated VE not needed but not documented. In response to audit input SCR N-2012-02061.
13-40691	PB EPG & Main output Power Protective relay Replacement	5.443	PM stated VE not needed but not documented. Plan to document exemption in PEP.
13-49296	Class II Emergency Lighting Transformer	6.220	PM Stated VE not required but not documented.
13-49146	CSA N293 RE Locatable Structures Compliance	11.073	In response to audit input SCR P-2012-06925.
13-40692	Turbine supervisory Equipment Obsolescence	5.414	PM stated two smaller projects one capital other OM&A.

c) In 2010, 7 projects completed the VE process while in 2011, only 1 project used VE and currently in 2012 there is only 1 project as a candidate for VE.

d) N-INS-00120-10019 states a qualified Value Engineering Facilitator (VEF) must be utilized. All projects which have completed the value engineering process have utilized external company qualified VEF's. Currently there is only one internal qualified VEF who only recently (1st Qtr, 2012) obtained the qualification.

i) Section 1.2 of N-INS-00120-10019 identifies that internal VEFs should be developed to reduce reliance on external resources.

e) VE process has been implemented; however, there is either no direct or indirect metric which can be assessed to determine its cost/benefit.

2) Some Lessons Learned (LL) from LL Reports are either not effectively circulated or explicitly dispositioned.

a) LL documented in 2 of 5 LL reports reviewed had similar issues in subsequent phases of the same project and/or in other subsequent projects.

i) NK30-LLD-54600-00002 - Phase I SG Protective Relays (2010) and NK30-LLD-54600-00004 - Phase II SG Protective Relays (2012):

(1) The 2010 Phase I LL Report documented problems with engineering rigor in preparing the installation/commissioning work plan. The 2012 Phase II LL also identified engineering rigor issues with installation/commissioning work plan.

(2) Phase I Conclusion included Lesson 4.0 (f): *"Use written communication and ensure a reply when scheduling events to ensure that understanding is achieved by the work control organization"*. During the Phase II execution, SCR P-2010-28192 document delay in PC14 application which resulted in a requirement for 80 hours of overtime (~10K$) to meet AFS milestone.

(3) Phase I LL documented on-line wiring issues. Similar on-line wiring issues were encountered during Phase II.

ii) NA44-LLD-34320-00001 "PNGS A Mod/Replacement of FRP Components & Vacuum Bldg Basement Improvement Project during 2010 VBO" (2010).

(1) This LL report identified that design quality issues caused EC revision. This adverse condition was again identified as a LL in D-LLD-63103-10001, "Gaseous Fission Product Monitor Replacements" (2012), where design quality issues resulted in EC revisions.

b) In 5 of 5 LL reports reviewed, recommendations were listed but not dispositioned using SCRs or ARs to address the specific LL identified in the report. For example:

(1) D-LLD-59000-10001, DND Full Scope Simulator: 39 LL were identified in the LL report and each has a corresponding recommendation to enhance future projects. The report did not identify any specific action to disposition these recommendations.

(2) NK30-LLD-33115-00007, P1081 Divider Plate Locking Tabs Replacement: 26 LL were identified with recommendations; however, there are no specific actions to disposition these recommendations.

(a) There were 266 category D4 SCR's during the 2010 project's life. While these SCRs were summarised on the LL Report, there is no further documented action to track the disposition of the lessons learned.

(b) There was also one category B2 SCR (P·2010·11703) which has an action to "incorporate Lessons Learned recommendations from this investigation into project execution"; however, once in the LL Report there is no further documented action to track the disposition of the lessons learned.

(3) NK30-LLD-54600-00002, Phase I SG Protective Relays (2010) and NK30-LLD-54600-00004, Phase II SG Protective Relays (2012). The Conclusion sections of both Phase I and Phase II reports summarise the LL recommendations (6 for phase 1 and 2 for phase 2); however, there were no listed actions for their disposition or to track completion.

(4) NA44-LLD-34320-00001 PNGS A Mod/Replacement of FRP Components & Vacuum Bldg Basement Improvement Project during 2010 VBO" (2010). This LL report identified 34 LL; however, there was no specific actions listed for disposition of the recommendations.

(5) D-LLD-63103-10001, Gaseous Fission Product Monitor Replacements: There were 7 LL documented in the report. The report contained seven LL which should be applied to similar size/complex projects in the future; however, there was no specific actions listed for disposition of the recommendations.

c) There is no guidance/expectation in N-PROC-AS-0039 on dispositioning recommendations in LL reports.

d) Feedback from Project Management stated LL are discussed in the weekly oversight meetings.

e) OPEX from other organizations provide examples of processes to document LL:

i) The SME from James A. Fitzpatrick Nuclear Plant, who participated in this audit, described the process followed at their plant where definitive actions are developed for LL and tracked to completion. The LL Report remains open until all LL are dispositioned.

ii) OPG's Nuclear Refurbishment Organization has proceduralized Lessons Learned and OPEX management in N-PROC-LE-0006. The expectation is that all LL items are given ID numbers and uploaded in a database (called DOLLAR) for use in subsequent projects.

3) Project Risk Management & Control activities are not being consistently carried out during project execution phase as required by N-PROC-AS-0039 R010, Project and Portfolio Management sections1.6.1/1.6.2 and N-INS-00120-10014 R003, Project Risk Management section 1.4.

a) Not all Projects are maintaining Project Risk Registers during project execution per N-INS-00120-10014, Section 1.4.

   i) N-INS-00120-10014 section 1.4 provides expectations on ongoing risk management and control during project execution. It states:

      (1) "..*in order to proactively manage the risks identified for the current release they should be monitored on an ongoing basis..*"

      (2) " ..*formal risk reviews should be conducted at the completion of a project phase, every 6 months or every time a top risk is triggered..*"

      (3) " *if outside of a formal risk review, new risks are discovered, or existing risks have change the risk register should be updated with that information*,"

   ii) 2 out of 2 projects reviewed at Pickering did not have current risk monitoring logs. A Project Risk Register was completed in the PEP for both projects; however, the Project Risk Register was not updated with significant/unforeseen risks that occurred during the project.

      (1) Pickering B EPG2 Starting Air Compressor (13-49136).

      (2) Pickering B Trash Screen Replacement (13-49140).

   iii) While 5 out of 5 projects reviewed at Darlington do have a current Risk Register, 4 out of 5 have some have gaps in information. The information tracked in the risk registers is not consistent:

      (1) EPS UPS Upgrade (16-33258) – Does not have current status, timeframe for risk, action owners.

      (2) DN Passive Auto-Catalytic Recombiners (PAR's) (16-31306) - the numerical assessment of risk was not updated.

      (3) Powerhouse Heating Steam (16-38462) – Status of closed or past risks is not documented.

      (4) Active Liquid Waste (16-31403) – Status of closed or past risks is not documented.

      (5) Chiller Replacement (16-33631).

b) The expectations for frequency and method of reporting project risk during project executions are not well defined and Project Managers are not reporting risk in a consistent manner.

   i) N-PROC-AS-0039 R010 section 1.6.1/1.6.2 provides expectations for Project Managers on using project monitoring and control tools (ONCORE, ProSight, Proliance) and provides a list of metrics (which includes Project Risk Register) for monitoring and controlling their project; however, a review of the on-line reporting tool shows that the monitoring and control tools are not being used by all Project Managers.

      (a) A review of the Project Dashboard in Cognos (the project reporting tool that uses data from ProSight and Proliance) shows that the status of the Project Risk Register elements (cost, schedule, scope, regulatory, nuclear safety,

technical, resources, environmental health & safety and materials) is not being updated for all projects.

ii) Interviews with project leaders indicate that they provide written descriptions of current risks for reporting, but do not provide any quantitative assessment of risk.

iii) Feedback from the PMO SPOC is that updating the Prosight risk register in not a requirement. Its use is at the discretion of the project team, as each project has a risk management plan. The dashboard is for the exclusive use of the project team.

c) A review of the Risk Registers for the 5 projects listed in 3 a) iii above the on-line Project Risk register did not reflect the Risk Register (log) maintained by project leaders for two projects.

i) Active Liquid Waste – Spare parts issues, technical issues and schedule threats are described, but the colours for these risk categories remains green.

ii) Powerhouse Heating Steam the following problems noted: *"09-Feb-12: revision to charter still in progress. U4 installation work has been removed from D1341 scope. Discussion in progress with station to determine whether U4 and U2 work should and can be scheduled IPG. Risk to pulling forward to IPG since not planned wrt work plans, materials and not scoped into IPG"* While schedule is yellow in the on-line tool, risk of cost increase noted in Risk Register is not reflected in the on-line reporting tool.

Appendix 3.2 Additional supporting facts for the Insights

1) No additional details
2) No additional details
3) No additional details

4) Insight on Project Indicators

The expectations for frequency and method of reporting project metrics and the colour rating for some project metrics displayed in the on-line reporting tool is not well defined.

a) N-PROC-AS-0039 R010 sections 1.6.1/1.6.2 provides expectations for Project Managers on using project monitoring and control tools (ONCORE, ProSight, Proliance) and provides a list of metrics for monitoring and controlling their project; however, a review of COGNOS, the on-line reporting tool, shows that the metrics in the on-line tool are not aligned and the monitoring and control tools are not being used consistently by all Project Managers.

i) The Project Status Indicator (Trend colour) shown in on-line reports (Project Dashboard, Project Performance Drill Down Reports, Monthly Projects and Modifications Executive Report) is not aligned with the CPI and SPI data which are calculated values. A sample of 14 projects reviewed is provided in Table 1 below.

(1) The Project Status Indicator is shown as a project “Trend Colour” in the monthly Executive Report.

(2) In interviews, project managers stated that the Project Status Indicator is their assessment of the project at that time based on their experience and knowledge of the project status.

(3) Feedback from the PMO SPOC confirms that the overall project colour is a qualitative measure not quantitative. It incorporates the teams’ experience and knowledge.

(4) PMO Director commented on reasons for the misalignment in reporting metrics:

(a) The CPI and SPI indicator have historical data that may not always provide an accurate picture of current project status.

(b) The assessment of the overall health of projects is subjective. The metric most considered by Management is delivery of AFS milestone.

ii) The status colour of the on-line Project Risk Register elements (cost, schedule, scope, regulatory, nuclear safety, technical, resources, environmental health & safety and materials) do not align with the Project Status Indicator, the CPI or SPI data.

(1) Table 2 shows that in 8 of 13 projects reviewed the Project Risk Register elements do not reflect the CPI, SPI or Project Status Indicator.

(2) Feedback from the PMO SPOC is that updating the Prosight risk register in not a requirement. Its use is at the discretion of the project team, as each project has

a risk management plan. The dashboard is for the exclusive use of the project team.

Table 1 – Comparison of Project Status Indicator to SPI/CPI

Project # - Title	SPI	CPI	Project Status Indicator
16-31403 - Active Liquid Waste	red	red	green
13-46634 - PA Fuel Handling SPV Equipment Reliability	red	red	green
13-49136 - Replace Starting Air Compressors EPGs	red	red	green
16-31306 - DN Passive Auto-Catalytic Recombiners (PAR's)	green	red	green
16-33631 - Chiller Replacement	Yellow	red	green
16-33258 - EPS UPS Upgrade	red	red	Yellow
13-40690 PB HPSW NV Relocation Replacement	red	red	Yellow
16-31540 - Trash Screen Removal System	green	Yellow	green
16-40641 - PB Steam Generator Locking Tab Replacement	Yellow	green	green
16-33973 - DN SG Controls	green	red	Yellow
16-38462 – Powerhouse Heating Steam	green	green	green
16-33621 - ACU Replacement for SCA	red	red	red
13-40680 PB Main Generator	Yellow	red	red
13-49129m - PB Seismic Monitoring Obsolescence	red	Yellow	red

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Table 2 – Comparison of Project Risk Register Elements to Project Status Indicator and SPI/CPI

Project # - Title	Cost	Scope	Schedule	Resources	Technical	Nuclear Safety	Regulatory	Environment	Health & Safety	Materials	SPI	CPI	Project Status Indicator (trend colour)
16-31403 - Active Liquid Waste	green	green	green	green	green	green	green	green	green	green	red	red	green
13-46634 - PA Fuel Handling SPV Equip Relia	green	green	green	green	green	green	green	green	green	green	red	red	green
16-31306 – DN PAR's	green	green	green	green	green	green	green	green	green	green	green	red	green
16-33258 - EPS UPS Upgrade	green	green	green	green	green	green	green	green	green	green	red	red	Yellow
13-40690 PB HPSW NV Relocation Replacement	green	green	green	green	green	green	green	green	green	green	red	red	Yellow
16-31540 - Trash Screen Removal System	green	green	green	green	green	green	green	green	green	green	green	Yellow	green
16-40641 - PB Steam Generator Locking Tab Replacement	green	green	green	green	green	green	green	green	green	green	Yellow	green	green
13-49129m - PB Seismic Monitoring Obsolescence	green	green	green	green	green	green	green	green	green	green	red	Yellow	red
13-49136 Replace EPG Starting Air Compressors	green	green	Yellow	Yellow	green	green	green	green	green	green	red	red	green
16-33631 - Chiller Replacement	green	green	green	green	Yellow	green	green	green	green	green	Yellow	red	green
16-33973 - DN SG Controls	Yellow	green	Yellow	green	Yellow	green	green	green	green	green	green	red	Yellow
16-38462 – Powerhouse Heating Steam	green	green	Yellow	green	green	green	green	green	green	green	green	green	green
16-33621 - ACU Replacement for SCA	green	green	Yellow	green	green	green	green	green	green	green	red	red	red

Appendix 4

Audit Meetings

ENTRANCE MEETING:

Location: 889 Brock Road, Conference Room 618

Date & Time: March 23, 2012 at 11:00am

Attendees:

Jamie Lawrie, Dianne Gaine, Nahil Rahman, Oscar Wynia, Bill Landon, Vincent Tzambazis, Joanne Dudar, Maher Ghannam, Ghaman Kaulessar, Adam Habayeb, Terri Walsh, Grant Colaiacovo, Russ Gomme

Items Addressed:

The details of the audit were discussed. Handling of issues related to operability, report ability and escalation were covered. The responsibilities of the Audit SPOCs were reviewed.

BRIEFING MEETINGs (SPOCs & Managers):

Location: Various

Date & Time: March 27, March 29, April 3, April 5, April 12, April 17, 2012 at various times

Attendees:

Jamie Lawrie, Nahil Rahman, Oscar Wynia, Bill Landon, Vincent Tzambazis, Joanne Dudar, Maher Ghannam, Ghaman Kaulessar, Adam Habayeb, Terri Walsh, Grant Colaiacovo, Russ Gomme

Items Addressed:

Audit problem development sheets (PDS) were presented and reviewed. ATL emphasized that it was important to get facts confirmed and communicated.

PRELIMINARY DEBRIEF MEETING:

Location: 889 Brock Road, Conference Room 618

Date & Time: April 27, 2012 at 10:00am

Attendees:

Jamie Lawrie, Dianne Gaine, Nahil Rahman, Oscar Wynia, Joanne Dudar, Ghaman Kaulessar, Adam Habayeb, Terri Walsh, Grant Colaiacovo, Russ Gomme

Items Addressed:

Presented audit findings, insights and overall assessment.

CHALLENGE MEETING:

Location: 889 Brock Road, Conference Room 618
Date & Time: May 4, 2012 at 9:30am
Attendees:
Jamie Lawrie, Nahil Rahman, Dianne Gaine, Riyaz Habib, Sabine Parks, Brent Morrill, Romeo Urjan, Grant Colaiacovo, Maher Ghannam, Ghaman Kaulessar, Adam Habayeb, Terri Walsh, Russ Gomme

Items Addressed:
The findings were reviewed for accuracy and significance level. The quorum agreed with finding 1, finding 2 and their significance level. It was determined that finding 3 on "Gaps in corrective actions from previous audit findings and self assessments" would be replaced with two SCRs to address the adverse conditions of ineffective CAPs for previous audit findings and inadequate disposition of self assessment recommendations.
The quorum agreed with the overall assessment with minor changes to the ratings sheet.

EXIT MEETING:

The exit meeting was arranged for May 11, 2012; however, it was cancelled since the VP of Projects & Modifications was unable to attend due to an emergent schedule conflict, and an empowered delegate was not provided (SCR N-2012-02549). The VP of Projects & Modifications followed up with an E-mail on May 17, 2012 stating that an exit meeting would not be required

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Appendix 5

Completed Audit Rating Criteria

AUDIT RATING CRITERIA Project Management NO-2012-009

	Definition: Performance of managed system controls demonstrate industry best practices with a clear focus on continual improvement. Corrective action program, self assessments, benchmarking and OPEX are actively used in a self-critical manner.	Definition: Performance has demonstrated that managed system controls are effective. Effective managed system controls provide assurance of meeting OPG,N requirements in a consistent and ongoing basis with few areas of concern.	Definition: Performance has demonstrated that managed system controls are not fully effective. OPG,N requirements are not consistently being met.	Definition: Performance has demonstrated that managed system controls are not effective. OPG,N requirements are not being met. Significant or chronic performance problems exist that pose a risk to the station or organization.		Audit Rating is white. Performance has demonstrated that managed system controls are effective. Effective managed system controls provide assurance of meeting OPG,N requirements with few areas of concern.
	Attributes: (Highlight appropriate items)	**Attributes: (Highlight appropriate items)**	**Attributes: (Highlight appropriate items)**	**Attributes: (Highlight appropriate items)**		**Supporting Fact, Example or Finding Reference**
Program	Requirements are clearly established in governance, governance is being well maintained, and compliance is consistent.	Requirements are established in governance, governance is generally maintained, and minor non-compliances exist.	Requirements are established in governance, governance is not well maintained, and compliance or performance gaps exist.	Controls are either not clearly established in governance or have not been effectively implemented, governance is not being maintained, and gaps to regulatory or code requirements are evident.	Program	SCR N-2012-01991 Project Mgmt Governance issues
	Ownership and interfaces are well established and effective. Peer interfaces are recognized and implemented effectively.	Ownership is clear and interfaces are understood. Peer interfaces are recognized and managed.	Ownership and interfaces are inconsistent or not well understood. Most Peer interfaces are recognized.	Ownership and interfaces are inconsistent or not understood. Peer interfaces are not recognized or not effectively managed.		
	Organization is clearly established to support requirements on a sustainable basis.	Limited organizational issues or sustainability challenges exist to the support of OPGN requirements.	Organizational accountabilities have not been adequately established and challenges exist to effectively support OPGN requirements on a sustainable basis.	Organizational roles and accountabilities are not established and/or are not sustainable.		
	No examples of persons performing activities for which they are not shown as qualified within TIMS. Training Qualification Guide is up to date.	No examples of persons performing activities for which they are not shown as qualified within TIMS. Training Qualification Guide requires minor updating.	Isolated examples of persons performing activities for which they are not shown as qualified within TIMS. Training Qualification Guide requires updating.	Widespread examples of persons performing activities for which they are not shown as qualified within TIMS. Training Qualification Guide is well out of date.		Finding # 2 Qualification Gaps
CAP/OPEX	CAPs are timely, proactive, and comprehensive with trends being self-identified.	CAPs are typically timely and effective in identifying causes and appropriate corrective actions. Adverse trends are self identified and addressed via the CAP process.	CAPs or plans to correct performance issues are not consistently effective or well executed.	CAPs or plans to correct performance issues are not effective or well executed, contributing to repeat of significant managed system implementation issues or breakthrough events.	CAP/OPEX	SCR NO-2012-02458 Gaps in corrective actions from previous audit findings.
	Operating Experience (OPEX) is consistently reviewed and used effectively to improve performance.	Use of OPEX to improve performance is evident in most areas.	Weak or ineffective use of OPEX may have contributed to repeat events or issues not being identified and corrected in a timely manner.	Ineffective use of OPEX may have contributed to repeat events or issues not being identified or corrected in a timely manner.		Finding #1 related to lessons learned Insight # 1 Positive PCC meetings (daily) and Oversight and review meetings (weekly)
	No significant issues have been identified by independent organizations (NSRB, Nuclear Oversight, WANO, CNSC, TSSA, MOE).	Responsive to independent organizations (NSRB, Nuclear Oversight, WANO, CNSC, TSSA, MOE).	Not responsive to independent organizations (NSRB, Nuclear Oversight, WANO, CNSC, TSSA, MOE) on a consistent basis.	Repeat issues identified by independent organizations (NSRB, Nuclear Oversight, WANO, CNSC, TSSA, MOE), requiring additional oversight.		
Performance	Performance is exemplary, indicating the area could be a benchmarking opportunity for lower performing site(s).	Areas of concern do not significantly affect performance. Plans exist and appropriate actions are taken to address concerns.	Concerns still exist in some areas which are adversely affecting performance.	Performance has contributed to a reduction in Regulatory or Operating margin, or operating beyond design limits.	Performance	
	Performance is consistently meeting expectations in the areas of Nuclear and Conventional Safety, Radiation Worker Practices, or Training. Demonstrates ownership and effective use of training to improve performance.	Limited examples are evident where performance did not meet expectations in the areas of Nuclear and Conventional Safety, Radiation Worker Practices, or Training.	Performance is not meeting expectations in some areas of Nuclear and Conventional Safety, Radiation Workers Practices, or Training.	Performance is not meeting expectations in the areas of Nuclear and Conventional Safety, Radiation Worker Practices, or Training, and recovery plans are not in place or are unlikely to succeed.		
	No significant issues exist with the implementation of OPGN requirements.	Limited issues exist with the implementation of OPGN requirements.	Significant issues exist with the implementation of OPGN requirements.	Significant or chronic problems exist with the implementation of OPGN requirements. Failure to act on indications of performance issues have contributed to significant consequential events.		Finding #1 Deficiencies in project management execution
	Ownership displayed for overall station performance and/or fleet area improvements, and benchmarking performed to close gaps to industry best practices.	No significant consequential events but challenges to barriers exist.	Risk of a significant consequential event is relatively high or has occurred but was identified internally, ie, not by an external organization such as TSSA, CNSC, MOE.	Multiple or repeat significant consequential events have occurred; identified either internally or by external organization such as TSSA, CNSC, MOE.		
	No events, low level or otherwise, are evident that challenge barriers.	Self revealing events are few and are being dealt with appropriately.	Self revealing events continue to occur and are not consistently being dealt with effectively.	Safe operating margins are periodically challenged.		
Oversight	Performance indicators are clearly established and consistently achieved or exceeded.	Performance indictors typically show performance is meeting expectations.	Performance indicators typically show performance is not fully meeting expectations or are not reflective of actual performance.	Performance indicators have either not been established or are not meeting expectations. A downward trend in performance exists.	Oversight	Insight # 1 Positive insights from external SME
	Self-Assessments are timely, critical, provide value and support continuous improvement including benchmarking to industry best practices.	Self-assessments are typically critical and provide value by identifying and closing gaps to top fleet performance.	Self-Assessments are not targeted at areas of sub-standard performance or are not sufficiently critical.	Self-Assessments have either been ineffective in addressing performance issues, or have not been performed.		SCR NO-2012-02456 gaps in dispositioning self assessment adverse condition/recommendations.
	No significant adverse trends are evident.	Limited performance adverse trends are evident and action plans are in place to improve performance.	The failure to identify precursors, monitor metrics, or measure performance is resulting in significant self revealing events.	Management is unaware of managed system state or performance, lack performance monitoring in critical areas, or performance gaps are not always addressed.		
				Longstanding deficiencies with ineffective resolution were identified with potential for escalation by Nuclear Oversight.		
				Work activities are being stopped by Nuclear Oversight or through the initiation of formal Stop Work proceedings.		

Tips on Colour Selection

1. Pick attributes that are relevant to the findings, not all attributes to a colour rating need to be highlighted.
2. Significance level 2 findings will typically support YELLOW or RED dependant on the severity of the issue.
3. Significance level 1 findings are generally RED.
4. Significance level 3 findings can be WHITE or YELLOW. If the issue(s) fall between the WHITE and YELLOW, highlight both
5. Some brief supporting facts along with the associated finding number must be provided in the right column for each attribute highlighted.
6. Overall rating must be judged on severity of the attributes and their associated finding(s).

Appendix 6

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Manager, Site Corrective Action, Pickering	C. KEEL	P42-1

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Manager, Operations Programs	Z. KHANSAHEB	P82-4
Manager, Maintenance Programs	A. LAPP	P82-4
Manager, Reg. Affairs Darlington	J. COLES	D08-E3
Manager, Supply Chain Business Support	S. TUCKER	P82-3
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OPG CONFIDENTIAL

ONTARIO POWER GENERATION

Internal Audit

Darlington Campus Plan Infrastructural Projects

October 2012

Distribution:

Albert Sweetnam, EVP Nuclear Projects

cc: Tom Mitchell
Donn Hanbidge
Carlo Crozzoli
Mike Peckham
Jody Hamade

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APPENDIX A

1.0 EXECUTIVE SUMMARY

Audit Rating[1]:	Generally Adequate
Enterprise Level Impact:	Moderate

Internal Audit (IA) has completed the audit of the Campus Plan Infrastructural Projects. This was a project audit identified in IA's 2012-2013 Strategic Audit Plan (SA Plan). The objective of this audit was to independently assess OPG's Project Management processes and controls over Campus Plan Facilities and Infrastructure project bundles (hereafter called Campus Plan) "critical" to the start of the Darlington Refurbishment Program.

The audit scope included a review of processes and controls around Campus Plan in the areas of Risk Management, Procurement Management, Scope Management (including Change Management), Cost Management, Schedule Management and Regulatory Management (limited to permits and license management).

Campus Plan is one of the major "project bundles" within the Darlington Refurbishment Program. It is managed by Projects and Modifications and consists of over 25 sub-projects. The Darlington Energy Complex component is currently managed by Corporate Real Estate. The planned timelines for completing the key Campus Plan projects to enable the start of the Darlington Refurbishment Program are Building and Facilities – April 2016 and Infrastructure Projects to enable Refurbishment Outage by October 2016.

Campus Plan includes sub-projects that are considered "critical" to the commencement of the outage and execution phases of the Darlington Refurbishment Program. During the audit, we reviewed four sub-projects, two in the definition phase and two in the execution phase. Three of the four sub-projects reviewed are considered critical to the commencement of Darlington Refurbishment Program. Projects and Modifications recognized the potential adverse implications if the critical sub-projects are not completed on time to enable the start of the Refurbishment execution phase and they have established key processes to provide assurance that projects are planned, executed and turned over in time to support Darlington Refurbishment. Some of such processes are, early front end planning, Project Control Center, daily "plan of the day" review meetings, weekly critical milestone review meetings, monthly projects review meetings, training workshops for project managers and the implementation of the Extended Service Master Service Agreement (ESMSA) with previously agreed contractual terms and conditions, aimed at reducing the contract negotiation timeframe with contractors. .

In general, the processes and controls in place at the time of the audit were found to be **generally adequate** with **moderate** enterprise level risk impact.

Projects and Modifications have the required tools and systems in place to manage the sub-projects and is committed to streamlining the project performance tracking and reporting process. During the audit, we observed the leadership team within Projects and Modifications providing impactful project management training to Project Managers and project support staff.

Some of the key findings resulting from this audit are as follows:

[1] *Please see Appendix A for ratings definition*

- While Projects and Modifications have the infrastructure and system capabilities within the organization, management has not established a standardized project performance reporting framework to be used by the Project Managers on a consistent basis, to monitor, control and report on the progress and performance of projects.
- The audit identified a data integrity issue with cost reports from Proliance that affected the earned value metrics generated, for the two projects reviewed. It should be noted that this issue had no impact on NFRA data. The issue was brought to management's attention and management used this input to further validate that the issue was not pervasive.
- Project Managers are currently not using the work breakdown structure-based budgets for the projects reviewed, to provide the level of visibility required to track, monitor and report on projects' progress.

There are several other findings in this report which, when taken together with those listed above, indicate the need for Projects and Modifications to further strengthen the core project management capabilities and competencies within the organization required to manage an increasing number of projects efficiently and effectively. This is important, given the number of projects entering execution is expected to increase substantially in the next 18 to 24 months.

Our detailed findings can be found in section 4.0 of this report. These findings together with audit recommendations and management action plans have been reviewed and discussed with management, and management has committed to specific action plans to address each of these findings.

IA would like to take this opportunity to thank the Projects and Modifications Management Team and other staff for their co-operation during this audit.

Approved By:

Lou Pollieri
VP & Chief Audit Executive

2.0 BACKGROUND

OPG Board of Directors approved the decision to proceed with the refurbishment of the Darlington Nuclear Generating Station. The Darlington Refurbishment Program is currently in detailed planning within the definition phase. The outage and execution phases of the Refurbishment Program are scheduled to start in 2016. In order for the outage and execution phases to commence as planned, the facility and infrastructural upgrade requirements within the Darlington Campus Plan (a project bundle in the Darlington Refurbishment Program) are required to be successfully completed.

The Darlington Campus Plan was created to manage infrastructural activities at Darlington site, including the Refurbishment Program and Darlington New Nuclear project activities.

The principal objective of the Darlington Campus Plan Infrastructural Project is to implement the facility and infrastructural upgrade requirements to enable the outage and execution phases of the Darlington Refurbishment and to upgrade the infrastructure required to support the post-refurbishment operations. The program is currently described as, Campus Plan Inside, Campus Plan Outside and Campus Plan Infrastructure.

The planned timelines for the Campus Plan Refurbishment Related Infrastructural Project are as follows:

- Campus Plan Buildings and Facilities complete by 15 April 2016
- Campus Plan Projects for Refurbishment Outage Complete by 15 October 2016

The overall Campus Plan Infrastructural Project is currently expected to cost in the region of approximately $455 million.

3.0 AUDIT OBJECTIVES AND SCOPE

The objective of this audit is to independently assess OPG's Project Management processes and controls over the program and to provide reasonable assurance over the effectiveness of processes and key controls in the areas named in the table below.

To determine the scope of this audit, IA performed a preliminary risk assessment and sought input from key management personnel in regards to risks associated with the achievement of the program objectives. IA also took into consideration the risk register maintained by the management team as input into the audit scope. The risks are considered on an "Inherent" risk basis (i.e. before the consideration of controls). Specifically, the audit focused on the inherent risks in the following areas:

- Risk Management
- Procurement Management
- Scope Management/Change Management
- Cost Management
- Schedule Management
- Regulatory Management (limited to permit and license management)

This audit excluded the following:

- Darlington Refurbishment Program
- Health and Safety requirements
- Regulatory and Licensing requirements, except permit and license management
- Applicability and suitability of technical standards
- Darlington Energy Complex
- Providing assurance on the likelihood that the project will achieve its objectives on time or on budget.

4.0 AUDIT FINDINGS

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
4.1	**Use of Standardized Project Performance Monitoring and Reporting**			
	Project Managers are not consistently using a set of standardized project performance reports at a level of detail required to detect cost and schedule variances in project performance at work breakdown structure level. During the audit we reviewed various project progress and performance reports produced from the different reporting systems (P6, Proliance, Cognos, NFRA etc.). While the tools and systems are in place to produce project performance reports and Project Managers have the ability to access a wide variety of project cost and schedule reports, management has not formally mandated or established a suite of required project performance reports for use by the Project Managers for project execution. We noted that individual Project Managers are currently using "ad-hoc" and non-standard cost and schedule reports. It is necessary for management to implement a consistent and standardized set of project performance reports for use by the Project Managers. This standardized project reporting process will enable the Project Managers to be consistent as they provide updates on the progress of their projects, as well as to assist management with fulfilling its oversight responsibility. <u>Risk Impact Analysis</u> Project Managers' ability to effectively monitor the progress and performance of individual projects, as	MEDIUM	Project Controls should establish a project performance reporting framework (standardized reports) to be consistently used by Project Managers, to provide assurance that performance reporting is accurate and consistent across the projects.	<u>Action Plan(s):</u> Management agreed with the finding. 1. Project Controls will establish a project performance reporting framework. This will include a suite of already available standardized project cost and schedule variance reports for use by the Project Managers and the management team. The framework will outline the specific format and content of the performance reporting requirements from the specific systems. 2. Management will communicate expectations for conducting project variance reviews at the work breakdown structure level at a Project Management Workshop before year end 2012. Management will review use of work breakdown variance analysis on select projects at the bi-monthly Year End forecast review meetings with the project managers. <u>Owner:</u> Director, Project Controls – Projects and Modifications. <u>Target Completion Date:</u> December 31, 2012 – Establishing and rolling out standardized project performance reports.

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	well as identifying and responding to the root causes of cost and schedule variances will be adversely impacted if a standard set of project performance reports (including cost and schedule variance analysis) is not used by Project Managers and Directors to monitor project performance on a consistent basis.			January 31, 2013 – Monitoring use of standardized project performance reports.

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
4.2	**Cost Management – Data Integrity of Project Cost Reports**			
	Review of a sample of project cost reports indicated that data integrity issue existed at the time of the audit with cost reports generated from Proliance, affecting the quality of earned value metrics generated (e.g. CPI of 82.0 and SPI of -0.94)[2]. Project actual costs from NFRA were not affected. We reviewed project cost reports generated from three different systems (Cognos, Proliance and NFRA), for the Water and Sewer and the Darlington Maintenance Facility Projects, which are currently in the execution phase. NFRA is the reliable source of actual project cost information that is configured to "feed" cost data into Proliance and Cognos for use by the Project Managers and project staff. A comparison of actual life-to-date project cost amounts from the NFRA and Proliance systems identified significant cost discrepancies of $6.58M and $2.8M for the Darlington Maintenance Facility and the Water and Sewer project respectively. The data integrity issue was brought to the attention of management. Management acknowledged the existence of the issue and subsequently advised that the actual cost discrepancy issue is limited to a few projects. Management also indicated that the discrepancies were the timing difference of the P6 schedules going "live" into production in Proliance and the commencement of actual cost flow from NFRA, as	MEDIUM	1. Management should reconcile project cost information between NFRA, Proliance and Cognos for all affected projects. 2. Management should, as part of the effort to increase oversight over the use of performance and variance reports monitor to provide assurance that project cost data is accurately and consistency captured and reported in the NFRA, Cognos and Proliance systems.	Action Plan(s): Management agreed with the finding. Management has taken actions to address the life-to-date project cost discrepancies as follows: 1. Management has revised the Terms of Reference for the Projects and Modifications Oversight Committee. Going forward, Projects and Modifications Oversight Committee will review together with the Business Case (BCS) for each project, a functional resource loaded P6 schedule (to be activated) prior to submitting the Business Case for approval at either the Gate Review Board, Asset Investment Screening Committee, or the Project Investment Screening Committee. This will enable the flow of actual cost data from NFRA to Proliance. 2. Performed a one-time forced reconciliation to capture the legacy cost differences for the affected projects not previously reported in Proliance to agree with costs in NFRA. 3. Management will monitor during the Projects and Modifications Oversight Committee meetings to ensure, activation of

[2] A CPI of 82 would mean that the project is "earning" $82 dollars of work completed for each $1 spent which is practically impossible and therefore is indicative of a data integrity issue. Negative SPI is an anomaly and also indicates a data integrity issue.

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	well as the legacy costs incurred before the projects were transferred to Projects and Modifications. Management indicated that this issue was limited to SPI and CPI performance indicators, with no impact on upward reporting due to "actual" project cost performance reporting being derived from the NFRA system. Risk Impact Analysis Without having reliable project cost data for all projects and seamless system integration to enable accurate and consistent project cost reporting, there is a risk that management's ability to identify negative cost variances and to effectively forecast estimate-at-complete and estimate-to-complete will be adversely impacted.			P6 schedules (place in production) in Proliance coincides with the approval timeline for business cases. Owner: Director, Project Controls – Projects and Modifications. Target Completion Date: July 25, 2012 – Action #1 is complete. Management has revised the Terms of Reference for the Projects and Modifications Oversight Committee. Going forward, Projects and Modifications Oversight Committee will review together with the Business Case (BCS) for each project, a functional resource loaded P6 schedule (to be activated) prior to submitting the Business Case for approval at either the Gate Review Board, Asset Investment Screening Committee, or the Project Investment Screening Committee. This will enable the flow of actual cost data from NFRA to Proliance. July 25, 2012 – Action #2 is complete. Forced reconciliation to balance Proliance with NFRA. October 30, 2012 – Projects and Modifications Oversight Committee to commence monitoring to ensure activation of P6 schedules in Proliance coincides with approval of business cases.

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
4.3	**Cost Management – Work Breakdown Structure-based Budgets**			
	Management has not ensured that Project Managers use work breakdown structure-based budgets on a consistent basis, to provide the level of visibility required to track, monitor and report on progress of projects. During the audit we reviewed, monthly status reports and varying versions of business case releases. While high-level project progress is reported against a rolled-up budget release and business cases briefly outline the lists of deliverables, we noted that, while work breakdown structure-based monitoring and reporting capabilities are available, project managers are not consistently using the function and consequently do not have adequate visibility into how the projects are performing. <u>Risk Impact Analysis</u> The above may adversely impact project manager's ability to understand and respond to potential project challenges in a timely manner. In addition, management's ability to correct lagging performance in a timely manner will be limited.	MEDIUM	1. In order to provide reasonable assurance that funding releases and project budgets are effectively managed, Project Controls should establish a process whereby, a work breakdown structure-based budget and actual cost variance reports are used throughout the project lifecycle to plan, track, monitor and report on the progress and performance of project deliverables and work packages. 2. Project Controls should ensure Project Managers monitor project cost performance against the work breakdown structure-based budgets to prevent the likelihood of unforeseen cost growth.	<u>Action Plan(s):</u> Management agreed with the finding. 1. Project Controls will use the existing work breakdown structure-based budgets and actual cost variance reporting in Proliance as part of the standardized reporting framework (see finding 4.1, page 5, action plan #2) for use by the Project Managers. 2. Project Controls will provide coaching to the Project Managers on the use of the work breakdown structure-based cost variance reports and will monitor compliance to this expectation. <u>Owner:</u> Director, Project Controls – Projects and Modifications. <u>Target Completion Date:</u> October 30, 2012 – Work breakdown structure-based cost variance reporting. October 30, 2012 – Coaching on use of work breakdown structure based cost variance reports.

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
4.4	**Schedule Management – Standardized P6 Schedules**			
	A review of a sample of project schedules indicated that forecasts are not consistently updated in P6 and information such as "actual costs" being displayed in the P6 schedules is not reflective of the correct cost and is misleading. We reviewed the detailed P6 schedules developed (at different stages) for a sample of four projects. We identified that the schedules for the two execution phase projects displayed information as actual costs that in fact was not consistent with the Proliance and NFRA cost tracking and reporting systems and as such was incorrect and misleading. P6 is not used for project cost reporting purposes, the collection, tracking and reporting of actual costs. Instead, actual costs are captured in the NFRA system and reported separately in Proliance. Discussions with management indicated that the actual costs information displayed in the P6 schedules are erroneous and should not be used when evaluating the progress of individual projects. Risk Impact Analysis Project management's ability to respond to negative performance trends will be adversely impacted if standardized reports are not developed in the P6 scheduling tool and rolled out to the project teams, potentially resulting in unforeseen challenges as more projects are planned and executed.	MEDIUM	Project Controls should establish a project performance reporting framework (standardized reports) to be consistently used by Project Managers during performance reporting across the projects.	Action Plan(s): Management agreed with the finding. 1. Management will establish a set of standardized templates in the P6 scheduling tool, so that only active and relevant information is displayed and reported. This will ensure actual costs information is not shown in the P6 scheduling tool. Actual cost information will continue to be collected in the NFRA system and reported in Proliance. 2. Project Controls will provide monitoring through self assessments to determine if the quality and use of the standardized P6 project schedules are effective. Owner: Director, Project Controls - Projects and Modifications. Target Completion Date: December 30, 2012 – Establishing standardized templates in the P6 scheduling tool. May 30, 2013 - Perform self-assessment on the quality of the P6 schedules, after the standardized templates are rolled out and the operating experience is gathered

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
4.5	**Schedule Management – Use of Project Schedules**			
	Review of a sample of projects indicated that resource loaded P6 schedules were not used to track and report progress and performance during the project's definition phase. (E.g. water sewer and Darlington Maintenance Facility projects.) We reviewed, Front End Planning Process – Overall Process Guide, and N-PROC-AS-0039 Project and Portfolio Management, Scope Identification Worksheet SCOP-PROC-TP-002, together with the detailed P6 schedules (at different stages) developed for a sample of four projects, and a series of approved business cases releases. While project schedules are available early in the project stages in P6 and project deliverables are tracked and managed on the major milestones schedule. We identified that resource loaded schedules were not used to track, manage and report the progress of the definition phase project work activities for the Water and Sewer and the Darlington Maintenance Facility Projects, currently in the execution phase. It was also noted that prior to the execution phase, baseline schedules are not fully defined. Therefore, the ability to accurately track and report the progress against the overall project schedule during the pre-execution phases will be impaired. (Example - evidenced in the West Security Office Building, and the D20 Storage Facility projects that are not yet in execution phase.)	MEDIUM	1. Project Controls should ensure P6 schedules are developed and used to track and report on the progress and performance of project work activities, over the lifecycle of the projects, including the definition phase. 2. Project Management should ensure, that prior to obtaining approval for the fully-funded business case (during initiation and definition phases), a functional resource loaded schedule is established in P6 and used to track and report progress and performance. This schedule should include all major milestones, key deliverables, and highlight the major project activities.	Action Plan(s): Management agreed with the finding. 1. Management will establish and use a resource loaded schedule for tracking, managing and reporting the progress of project definition phase activities. 2. Management has revised the Terms of Reference for the Projects and Modifications Oversight Committee. Going forward, PMOC will review together with the Business Case (BCS) for each project: a functional resource-loaded P6 schedule and the Project Execution Plan (PEP) prior to submitting the Business Case for approval at either the Gate Review Board, Asset Investment Screening Committee, or the Project Investment Screening Committee to ensure readiness of Proliance to "receive" actual costs from NFRA upon approval of business cases. Owner: Director, Project Controls - Projects and Modifications. Target Completion Date: December 30, 2012 – Resource loaded schedule for D2O Storage Facility Project and any other projects in the definition phase.

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	Risk Impact Analysis As the Campus Plan Infrastructural Projects progress, management's ability to effectively manage and monitor the progress and performance of the project schedule activities over a lifecycle basis, will be adversely impacted, potentially resulting in delays to project deliverables. (Note: Management relies on ongoing use of major milestones schedules, project performance reporting, Director's review meetings and weekly project oversight meetings as compensating controls.)			July 25, 2012 – Action #2 is complete. Management has revised the Terms of Reference for the Projects and Modifications Oversight Committee. Going forward, PMOC will review together with the Business Case (BCS) for each project: a functional resources loaded P6 schedule and the Project Execution Plan (PEP) prior to submitting the Business Case for approval at the Gate Review Board, Asset Investment Screening Committee, or the Project Investment Screening Committee.
4.6	**Project Planning – Defining Project Requirements and Scope**			
	D2O project requirements and procurement strategy were not fully developed and/or defined, resulting in the cancellation of two RFPs within a nine month timeframe. We reviewed the deliverables required per the Gated Process, as well as the timelines and the high-level activities required to complete the D2O Project, including the current activities underway. We noted that two RFPs were cancelled within a nine timeframe due to: • The inclusion of insufficient Modification Design Requirement details relating to defining the scope of work that would have enabled the proponents to prepare and submit well-informed bid responses. • A changed approach to the contracting strategy, where proponents were required as part of the bidding process, to accept certain mandatory and	MEDIUM	Project management should ensure that project requirements, strategy and scope are fully developed, clearly defined and understood prior to issuing RFPs for future projects.	Action Plan(s): Management agreed with the finding and corrective plan was completed before the audit was completed. 1. To prevent a repeat of this issue, management has developed, issued and rolled out N-INS-00700-10007 Preparation of Modification Design Requirements, which outlines the process required for defining and developing Modification Design Requirements (MDRs). MDRs are required to be prepared and approved prior to the scoping phase of a project. 2. Management implemented the Extended Service Master Service Agreement (ESMSA) with a pool of approved vendors. The ESMSA includes "agreed-upon"

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	non-negotiable contractual terms and conditions outlined in the newly implemented Extended Service Master Service Agreement (ESMSA). Discussions with management indicated that their intention was to move the project along and ahead of schedule, as well as improving productivity and efficiency around contract negotiations by implementing the terms and conditions of the ESMSA. While the nine months' time lapse may not have any immediate impact on the D2O project schedule, management should be efficient in the use of the time available, and project requirements and strategies need to be developed and defined before issuing RFPs in the future. This will also become more important as additional projects are planned and executed. <u>Risk Impact Analysis</u> Project management's ability to meet project objectives with regard to schedule, cost and quality could be adversely impacted if project requirements and scope are not fully developed, defined and properly understood in a timely manner.			contractual terms and conditions between OPG and the pool of vendors and the main objective is to improve efficiency by reducing the time spent negotiating terms and conditions leading up-to the awarding of contracts. <u>Owner:</u> Director, Miscellaneous Projects – Projects and Modifications. <u>Completion Date:</u> February 15, 2012 – Action #1 is complete. Management implemented the ESMSA. The main objective of the ESMSA is to minimize contract negotiation time with EPC contractors. April 30, 2012 – Action #2 is complete. Management was aware of the issue before the audit started and has implemented mandatory instructions N-INS-00700-10007 to provide assurance that Modification Design Requirements (MDRs) are defined, developed and approved prior to the scoping phase of each project.
4.7	**Risk Management – Risk Management Activities Throughout The Project Lifecycle**			
	Review of a sample of projects indicated that risk management activities are currently not formally or consistently documented beyond the definition phase of the projects. (E.g. updating the project's risk register.)	MEDIUM	Project Management through Project Controls should monitor and update risk activities for projects with execution phase durations of one year or	<u>Action Plan(s):</u> Management agreed with the finding and will: 1. Review, rollout and issue a Project Risk Management Guide for use by the Project Managers to address project risk

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	The purpose of project risk management is to identify, assess, prioritize and mitigate key risks to obtain the desired project outcomes in terms of schedule, cost and project performance. The project risk management process is needed to ensure significant risks to the success of the project are identified and managed in a timely and cost-effective manner. We reviewed the current risk management governance framework and the risk management process established for four projects at different stages of the project lifecycle. While risk management activities appeared to be reasonably established during the initiation and definition phases (example, established risk management plans, risk registers and risk assessment supporting business cases etc.), we noted that risk management activities during the project execution phase were not updated/documented in the risk registers as required by the risk management plan for the Water & Sewer and DNGS Maintenance Facility Projects. Specifically, the following risk management activities were not documented beyond the definition phase (Gate 3): • Updating the status of existing/new risks in the project's risk registers. • Evaluating the outcomes of the risk mitigation strategies implemented during the earlier phases of the projects to assess whether or not the desired outcomes were achieved and/or if the risks were adequately/appropriately mitigated.		longer to ascertain that risk management is performed and recorded throughout project lifecycle (as also required by Project Risk Management Process N-INS-00120-10014). Specifically, Project Management should perform periodic risk reviews throughout all stages of the projects, update the project risk registers on an ongoing basis, and evaluate the effectiveness of the outcomes of the risk response strategies.	management activities on an ongoing basis. This will include the use of the Project Control Centre for risk management during execution phase activities. 2. Perform a formal self assessment of the Project Risk Management Guide, six months after the implementation to determine if risk management requirements in accordance with the guide are being performed. <u>Owner:</u> Director, Project Controls – Projects and Modifications. <u>Target Completion Date:</u> December 30, 2012 - Issuing the Project Risk Management Guide. May 15, 2013 - Performing the self assessment.

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	• Periodic risk reviews throughout the project lifecycle. This is also a requirement of the Project Risk Management Process N-INS-00120-10014. Management indicated that risks are managed during each phase of the project through review meetings, weekly oversight meeting, weekly Directors' meetings and project meeting. In addition, risk management oversight during the execution phase is performed and documented using the Project Control Centre. This is an enhancement to the traditional project management risk registry updating. <u>Risk Impact Analysis</u> Project Team's ability to identify, plan for and respond to significant project risks in an appropriate and controlled manner may be adversely impacted if the risk management process does not encompass the lifecycle of the projects.			
4.8	**Contingency Management – General Contingency**			
	A review of contingency for two execution phase projects indicated that, except for two specific risks, project contingency is identified and tracked as "general contingency". We reviewed the requirements outlined in the current governance framework and the processes used to establish and manage contingency. While the process used to establish contingency for the projects reviewed indicated that contingency amounts were established based on identified project risks, we noted that	MEDIUM	Project Management should increase the rigor around establishing and tracking contingency through implementation of risk- specific contingency management process for projects that are in the execution phase, to provide reasonable assurance that contingency amounts will be managed effectively to	<u>Action Plan(s):</u> Management agreed with the finding and has already directed Project Managers to differentiate between specific and general contingency when identifying contingency requirement. In addition, a guide will be developed and rolled out to staff on use of specific contingency. <u>Owner:</u> Director, Project Controls – Projects and

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	following determination of the project's contingency amount, contingency is aggregated, recorded, and tracked as "general contingency" and is not allocated to specific risks. Examples include – 80% of the $7.6M contingency for the Water and Sewer Project was categorized as "general", and 76% of the $7.1M contingency for the Darlington Maintenance Facility Project was categorized as "general". <u>Risk Impact Analysis</u> Without adopting a more comprehensive and risk-specific approach to managing contingency, project management's ability to fund materialized risks could be adversely impacted, as contingency may be allocated to unanticipated risks, or used to cover shortages on anticipated risks.		support the needs of the projects.	Modifications. <u>Target Completion Date:</u> November 15, 2012
4.9	**Change Management – Change Control Process**			
	Inconsistent adherence to project management's change control process requirements. We reviewed the change control process outlined in N-PROC-AS-0039 Project and Portfolio Management, and the Front End Planning – Overall Process Guide, together with a sample of seven change order requests valuing $1,395,862 approved for the Darlington Maintenance Facility Project, and one contract change request valuing $731,361 approved for the Water and Sewer Project. We noted that, while the change control process requirements appeared to be adequately designed, the current practice is not always consistent with the	MEDIUM	Project management should ensure: 1. Cost and schedule impacts are clearly identified, evaluated, and approved using the required mechanisms outlined in the current change control process documentation. 2. The OAR approver verifies by signature, that the cost and	<u>Action Plan(s):</u> Management agreed with the finding and will: 1. Review and update the forms (such as Contract Change Form, N-10029 Form, and the PCRAF Form) currently in place to ensure the cost and schedule impacts resulting from change orders are assessed and identified prior to the approval of change orders. 2. Provide coaching to project staff with regards to complying with the requirements of the change control process, including the incorporation of change order impacts into

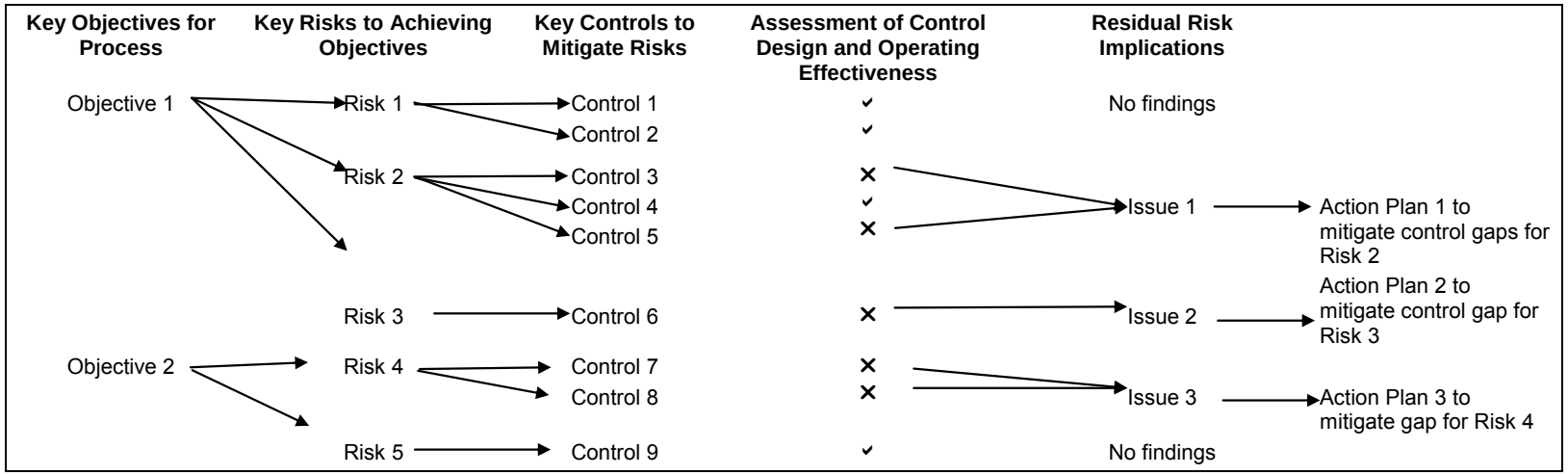
#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	change control process requirements. The following exception was noted: • Three change order requests approved by the OPG project team for the Darlington Maintenance Facility Project amounting to $230,497 did not have the schedule impact identified or noted. (Change Orders - CO#1 for a foundation design alternative, CO#3 for adding optional scope, and CO#4 for structural design change.) Also, the schedule impact for a contract change approved by the OPG project team for the Water and Sewer Project amounting to $731,361 was not identified. Currently, schedules of affected projects do not identify the impact, nor the integration of the additional work included in the change orders and the contract change. As the projects are ramping up, it will become more critical for project management to identify, evaluate and coordinate the integration of the impacts resulting from project changes in an efficient manner over the lifecycle of the projects. <u>Risk Impact Analysis</u> Project management's ability to manage and monitor the overall project scope, schedule, and performance over the project lifecycle will be impaired if the activities outlined in the change orders and contract changes are not integrated into the project schedule in a timely and efficient manner (i.e. lost or forgotten scope).		schedule impacts are identified in the change control documentation. 3. The impacts of project changes (cost, schedule, scope etc) are incorporated into the project schedules in a timely manner. 4. The project teams comply with the overall requirements outlined in the change control process documentation.	the appropriate schedules. Monitoring will be performed during the Projects and Modifications Oversight Committee meetings. <u>Owner:</u> Director, Project Controls – Projects and Modifications. <u>Target Completion Date:</u> October 31, 2012 - Review and update the Change Control Forms. November 15, 2012 – Provide coaching with regards to adherence to the existing requirements of the change control processes.

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
4.10	**Project Governance Documentation – Project Execution Plan**			
	A review of project documentation indicated that the Project Execution Plan (PEP) document has not been developed (although the elements to form the PEP were in place) for the DNGS Maintenance Facility Project, estimated at $44.2M and currently in the execution phase. The objective of a Project Execution Plan (PEP) is to provide guidance in ensuring effective planning and execution of the project, as well as to assist the project manager in the implementing of the planned strategies to ensure effective project execution. While the elements (basis of estimate, risk management plan, project organization chart, schedule, quality management plan etc.) of the Project Execution Plan (PEP) were established, we noted that the PEP documentation was not established to support the needs of the projects during the execution phase. Discussions with management indicated that, the Darlington Maintenance Facility is a legacy project that was approved by Asset Investment Screening Committee prior to the implementation of the current Gated Process where project deliverables are validated as projects passes through the Gated Process. Management recognized the importance of having the PEP created for all projects where it is required and considered this issue a "performance management" related exception. Management also indicated that this issue is not indicative of how projects are managed.	LOW	1. This matter requires prompt attention and Project Management should develop and issue the Project Execution Plan (PEP) to support the execution of the project. 2. Project Management should monitor to ensure project deliverables are validated to guard against projects with incomplete deliverables proceeding through the Gates and being approved.	<u>Action Plan(s):</u> Management agreed with the finding and will: 1. Create and issue the PEP for the DNGS Maintenance Facility. 2. Management has revised the Terms of Reference for the Projects and Modifications Oversight Committee. Going forward, PMOC will review together with the Business Case (BCS) for each project, a functional resources loaded P6 schedule and the Project Execution Plan (PEP) prior to submitting the Business Case for approval at the Gate Review Board, Asset Investment Screening Committee, or the Project Investment Screening Committee. <u>Owner:</u> Director, Infrastructure Projects - Projects and Modifications. Director, Project Controls – Projects and Modifications. <u>Completion Date:</u> August 3, 2012 – Action #1 is complete. Issued the PEP. July 25, 2012 – Action #2 is complete. Management has revised the Terms of

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	Risk Impact Analysis Project management's ability to plan and effectively manage the execution of the may be adversely impacted if key project planning documentation is not established.			Reference for the Projects and Modifications Oversight Committee. Going forward, PMOC will review together with the Business Case (BCS) for each project, a functional resources loaded P6 schedule and the Project Execution Plan (PEP) prior to submitting the Business Case for approval at the Gate Review Board, Asset Investment Screening Committee, or the Project Investment Screening Committee.

APPENDIX A
OVERVIEW OF AUDIT RATING METHODOLOGY

IA's ratings for operational audits of OPG business processes are derived from an assessment of the management controls that are in place to mitigate key risks to the achievement of process objectives. The diagram below illustrates IA's basic approach to conducting an audit. If control deficiencies are identified that prevent IA from providing reasonable assurance that the process objective will be met (i.e. key risks are adequately mitigated), an audit issue will be noted and a corrective action plan from management will be required.



The ratings for the audit will be assigned based on a two-tiered assessment of residual risk exposure. The first tier rating assesses the residual risk at the local, process level and is guided by an evaluation of the 5 interrelated components of control, as defined by the COSO Internal Control Framework (i.e. control environment, risk assessment, control activities, information and communication, monitoring). This results in one of the following audit opinions:

- *Not Adequate*: a management control system is not in place or not operating effectively.
- *Generally Adequate*: sufficient controls are in place and generally operating effectively with some improvements required.
- *Adequate*: an appropriate management control system is in place and operating effectively.

The second tier to IA's audit rating is an indication of the implications of the residual risk at the broader, enterprise level. This rating of "High", "Moderate" or "Low" is intended to answer the "so what?" question for senior management and the Audit and Finance Committee by giving context to audit results in terms of their impact on OPG as a whole.

ONTARIO POWER GENERATION

Internal Audit

Contractor Applications for Payment Audit – Nuclear Projects

February 2014

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1.0 EXECUTIVE SUMMARY

Audit Rating[1]: Not Effective

Enterprise Level Impact: High

Internal Audit (IA) has completed an audit of the Contractor Applications for Payment in Nuclear Projects and Modifications (P&M) area. P&M has responsibility for the safe and cost effective execution of the project work program while maintaining quality and the project schedules (this does not include the Darlington Refurbishment Program). This audit, identified in IA's 2013 Strategic Audit Plan, was based on several factors including:

- A growing project work program (expected to be $350M in 2014 – including the Campus Plan/Refurb[2]);
- Transitioning from a separate Engineering/Construction model to an Engineer/Procure/Construct (EPC) project execution model, leveraging the Extended Services Master Service Agreement (ESMSA); and
- The objective of reduced staffing levels while increasing project management competency in the area.

The overall objective of the audit was to independently assess the effectiveness of OPG controls in the P&M area that provide assurance that contractor applications for payment are supported by a complete set of documentation, appropriate to the circumstances and in compliance with OPG governance, budgetary requirements and the contract terms and conditions. IA reviewed P&M project work programs in the period January 1, 2012 to July 30, 2013.

The majority of P&M projects leverage the ESMSA contracts established in February of 2012 through a primary competitive process (not reviewed in this audit). Black and McDonald (B&M) and ES FOX were selected as the ESMSA contractors. OPG payments to the ESMSA contractors are managed through Oncore (OPG's contractor time management system) administered by Finance. Contractors manually enter timesheet information directly into Oncore and timesheets are approved in Oncore by OPG Contract Administrators and Contract Owners. Oncore also contains rates from rate tables updated by OPG staff.

The ESMSA agreements were developed with the following benefits in mind:

- Streamline award of work process through the use of the master agreement.
- Obtain most favourable terms for OPG by offering two vendors the incentive of substantial business over an extended time period.
- Enable implementation of EPC contracting model.

Some of the key findings resulting from this audit are as follows:

1. **Increase in the number of Labour Rate Categories and Average Rates**

   Our review of the ESMSA labour rate tables and discussions with management identified that:

   a. Non-trade labour rate categories have increased considerably since the ESMSA was signed in February 2012. Although the rates for each rate category have not increased, the addition of new rate categories for specific skill sets has collectively increased the average rates. As a result of the increased labour rate categories, the average non-trade labour rates have grown by 21.8% with some increasing up to 60%. For example, the Planner classification went from 4 categories with an average group labour rate of $81.28 to 13 categories with an average group labour rate (for Planner's) of $109.86.
   b. There was a lack of Supply Chain involvement in reviewing and approving additional rate categories.

[1] *Please see Appendix A for ratings definition*
[2] *Nuclear Oversight Committee Presentation – November 13, 2012*

2. **Monitoring and Approval of Labour and Non-labour charges**
   Although the Project Managers and Contract Monitors are engaged in oversight and monitoring activities, we found inconsistent approaches to the monitoring of labour and non-labour charges against projects. Improvements in control effectiveness are required for: a) the monitoring of non-labour work performed remotely from contractor's sites, and b) monitoring and approval of construction labour time.

3. **Exercising OPG's Right to Audit**
   OPG has not exercised its right to audit contractors. The right to audit is a key component of the ESMSA and a control mechanism that allows OPG to verify the accuracy of invoices compared to actual costs incurred by the contractors. This control is of particular importance in reimbursable performance fee agreements.

4. **Management of Returnable Mobilization Payment Limits**
   Returnable Mobilization Payment was negotiated between OPG and ESMSA Contractors and formalized in the contract amendment to the ESMSA. The amendment states that OPG will periodically review its balance of payments and increase or decrease it at its own discretion, but it does not establish an upper limit for the amount of Returnable Mobilization Payment. Management advised IA that the objective of introducing Returnable Mobilization Payment was to remove OPG's obligations for "cash neutrality" and maintain lower labour rates negotiated with ESMSA Contractors by stripping out any "finance cost" component[3], which we understand was included in contractor prices prior to the ESMSA being adopted.

5. **Support for ESMSA Milestone Payment**
   The Amendment to the ESMSA (June 24, 2013) added $3.1M in potential Milestone Payments for the contractors to enhance capability of the ESMSA Contractors in a shorter time frame. At the time of the audit, we noted, with respect to certain milestone payments that there were no detailed, time-phased plans obtained from the contractor that would demonstrate how and when the milestones were to be achieved. Without such plans, OPG's ability to monitor contractor's progress in achieving the milestones could be impaired.

This audit was assigned an overall audit rating of **Not Effective** with an enterprise risk impact of **High**.

Findings have been reviewed by management and they have committed to specific action plans to address the findings. Please see Section 2.0 for specific details of these findings along with the associated risk impact and management action plans. Internal Audit would like to take this opportunity to thank the management of P&M, Finance and other staff for their co-operation during this audit.

Approved By:

Michael Braude
(Acting) Vice-President Assurance & Chief Audit Executive

[3] *We did not audit these assertions.*

2.0 AUDIT FINDINGS

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
1.1	**Increase in the number of Labour Rate Categories and Average Rates** Our review of the ESMSA labour rate tables and discussions with management identified that: a. Non-trade labour rate categories in the Black and MacDonald contract have grown from 55 to 166 (or 200%), since the ESMSA contract was signed in February 2012. Management explained that the addition of new categories was as a result of Oncore system requirements. b. Although the rates for each rate category have not increased, the addition of new rate categories for specific skill sets has collectively increased the average rates. As a result the average non-trade labour rates have grown by 21.8% with some increasing up to 60%. For example, the Planner classification went from 4 categories with an average group labour rate of $81.28 to 13 categories with an average group labour rate (for Planner's) of $109.86. c. There was a lack of Supply Chain involvement in reviewing and approving additional rate categories. The initial ESMSA rates compare favourably to the previous MSA rates for the same contractors. ESMSA trade and non-trade labour rates were lower on average by 10-11% when compared to the older 2011 rates. However, management advised that the ESMSA Contractors interpreted contractual requirements respecting the use of the rate tables differently and requests for changes from one of the vendors were accepted by OPG. There is a risk that this initial advantage will not continue unless appropriate rate controls are in place for the duration of the contract. Rate tables are a key control over value for money and in supporting effective resourcing of projects. The contract is silent on additions of new rate categories. P&M Management stated that while the original rate tables were based on then known scopes of work, new rate categories have been	**High**	• It is recommended that management establish comprehensive non-trade labour rate tables that will allow both OPG and ESMSA Contractors to use appropriate resources for the work. These comprehensive non-trade labour rate tables should be based on the original tables, incorporated into ESMSAs and only revised on an exception basis through a controlled mechanism. Management should ensure adherence to and consistent interpretation and use of these rate tables going forward. • The responsibility for reviewing and approving rate category and rate information should be transferred from the Contract Management function to Supply Chain, consistent with existing practice for other contractors within OPG.	• Management will establish comprehensive non-trade labour rate tables. • These comprehensive non-trade labour rate tables will be incorporated into ESMSA agreement and only revised on an exception basis through a controlled mechanism. • Management will ensure adherence to and consistent interpretation and use of these rate tables going forward with all ESMSA Contractors. Owner (Name and Title): Phil Reinert, VP Supply Chain and Riyaz Habib, Director, Contract Management Target Completion Date: April 30, 2014 Review and approval of rate category and rate information has been transferred from Contract Management to

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	added based on additional requirements being identified. The practice of adding rate categories based on individual hires is not however a common practice in contract administration. Risk Impact Analysis • Increased risk of appearance of vendor favouritism; • Inconsistent interpretation of the contract terms related to non-trade labour rate tables by ESMSA Contractors and OPG may increase contract administration burden and also result in delays in timely payment to vendors; and • Lack of Supply Chain involvement in reviewing and approving additional non-trade labour rate categories may result in an inconsistent approach across OPG.			Supply Chain. Owner (Name and Title): Phil Reinert, VP Supply Chain and Riyaz Habib, Director, Contract Management Target Completion Date: Complete
1.2	**Monitoring and Approval of Labour and Non-labour charges** Effective monitoring of labour, non-labour and materials charges impacts effective contract deliverables and cost to OPG. Although the Project Managers and Contract Monitors are engaged in oversight and monitoring activities, we found inconsistent approaches to the monitoring of labour and non-labour charges against projects. a. Improvement is required in the monitoring of non-labour work performed remotely from contractors' sites. Although charges are entered into Oncore, it is currently difficult for Approvers to confirm that the hourly charges being claimed by the contractors are justified if work is performed off-site. An example of this issue was noted on project 34000 (Darlington Auxiliary Heating System) wherein the engineering costs were estimated to be approximately $4.5M. By the time the subcontractor had spent over 80% of the engineering cost, only 35% of the engineering work had been completed. This resulted in an increase of $3M to the cost of the	**High**	• Management should benchmark industry practice for monitoring labour, non-labour and materials charges to validate payment to the contractors by implementing the most effective and practical approach to strengthen monitoring controls for contractor presence. • OPG should exercise its right to audit contractors under section 8.13 of the ESMSA agreement on a regular basis	As per Nuclear Finance's proposal accepted by the Executive Team a recommendation by an external service provider to be provided. Owner (Name and Title): Carla Carmichael, VP Nuclear Finance Target Completion Date: June 30, 2014. See item 1.3

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	project and revision of the estimate for this work to $7.5M. Similarly, there is no easy way for Approvers to confirm contractor's project management staff hourly charges. b. We noted that the existing job clock system (implemented in 2011) designed to create site presence records for reimbursable construction labour to allow validation of hourly charges inputted in Oncore by the contractors is not being used consistently. We noted that the job clock data is either not available at all or not available on a timely basis. Contract Administrators maintain logbooks to validate the contractor timesheet inputs into Oncore. However, we noted a number of inconsistent practices in how logbooks are created and applied in validating contractor time records. Risk Impact Analysis Increased risk to OPG of being overcharged for labour costs; and increased risk of fraud.		in order to validate time charged by vendors. This is of particular importance in the validation of non-trade labour charges. The qualification of contractors should include a periodic detailed review of their time keeping systems and billing process to ensure an acceptable level of integrity, accuracy and efficiency is built into the process.	See item 1.3
1.3	**Exercising OPG's Right to Audit** OPG has not exercised its right to audit contractors under section 8.13 of the ESMSA agreement. The right to audit is a key component of the ESMSA agreement and a control mechanism that allows OPG to verify the accuracy of invoices compared to actual costs incurred by the contractors. This is especially important in reimbursable performance fee agreements. As at the time of the audit, an audit plan had not been developed and an annual audit had not been conducted at either ES Fox or B&M. Risk Impact Analysis • Reduces OPG's ability to validate compliance to contract with the	**Medium**	• Develop a plan for conducting regular independent audits to establish and document contractor compliance with the terms and conditions of the ESMSA. The audit scope should include validation of all labour, material and equipment charges, verification of contractor staff salaries against rates charged to OPG and other testing to validate that OPG is being charged appropriately.	Engage a third party service provider to conduct contract audits. This will include a review and qualification of ESMSA contractor internal time keeping systems. Management will also develop a plan regarding the timing and frequency of these audits. Owner (Name and Title):

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	contractors and subs; • Reduces OPG's ability to validate value for money; and increases the risk of fraud.		• As discussed in the recommendation to point 1.2, the qualification of contractors should include a periodic detailed review of their time keeping systems and billing process to ensure an acceptable level of integrity, accuracy and efficiency is built into the process. The audit process should be used to fully understand and document contractor's processes for time collection, billing and payroll to identify, document and test contractor's controls in these areas on a regular basis.	Riyaz Habib, Director Contract Management Target Completion Date: Audit of the two ESMSAs to be complete by August 31, 2014.
1.4	**Schedule Alignment Issues** Project Managers use the contractor's estimates to develop the initial budget, schedule and projected cash flows for projects. Although project milestones align with the OPG schedule, the cost account structure in Oncore set up to model after the contractors' cost breakdown structure, does not consistently align with the OPG WBS.	**Medium**	• The P&M team has started working to adopt a process wherein OPG schedulers and contractor schedulers work together to develop a level II project schedule at the initial phase of a project. It is recommended that OPG management continue with this plan and implement this process on all projects.	The P&M team has started working to adopt a process wherein OPG schedulers and contractor schedulers work together to develop a level II project schedule at the initial phase of a project. It is expected that most projects will have aligned schedules by December 31, 2015. Owner (Name and Title): Jamie Lawrie, Director Project Controls

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	<table><tr><th>Oncore entry submitted by contractor</th><th>Corresponding activity in OPG schedule</th></tr><tr><td>11600010 – Commissioning</td><td>1. AAAA111290: SG1 Commissioning 2. AAAA111800: SG3 Commissioning 3. AAAA111960: SG2 Commissioning 4. AAAA112120: SG2 Commissioning</td></tr></table> This is due to the misalignment of OPG's and contractor's schedule and the fact that the Oncore cost account structure was aligned with the contractor's schedule. Discussions with management indicated that the P&M team has started working to adopt a process wherein OPG schedulers and contractor scheduler's work together to develop a level II project schedule at the initial phase of the project. As part of this process, the preliminary schedule developed by the contractor will include the same activities codes and milestones included in the preliminary schedule developed by OPG. This will be done to ensure congruent schedule tracking between OPG and contractor. <u>Risk Impact Analysis</u> Currently, the lack of alignment between contractor's schedule with OPG's internal schedule may impact OPG's ability to effectively monitor and execute work.			<u>Target Completion Date:</u> December 31, 2015
1.5	**Disallowed Administrative Labour costs** There is no prior approval process for disallowed administrative labour charges outlined in Schedule 5 of the ESMSA. Schedule 5 outlines disallowed costs that are to be covered by the overhead amount paid to the ESMSA contractors. However, such costs are permissible with OPG's	**Medium**	It is recommended that management establish a proper approval process for disallowed administrative labour charges outlined in Schedule 5 of the ESMSA.	Update the ESMSA worksheet to incorporate approval process for disallowed administrative labour charges.

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	consent. Project Managers determine what incremental overhead requirements may exist in exceptional cases to support their projects. Our discussion with P&M Management indicated that the consent is considered to be given through the bid process when the contractors submit their estimates for OPG's work request and such bids are accepted, as well as when individual charges come through in Oncore. However, discussions with project managers indicated that they were unaware of what the total expected costs would be for these disallowed costs and how these costs were itemized and made visible in the initial bid. The ESMSA Worksheet does not require these costs to be flagged and itemized as exceptions under the ESMSA agreement. Additionally, the contract does not specifically outline the OPG consent mechanism required to give consent to the contractors to charge these costs. In our review of all ESMSA projects, we found $1.5M in charges that appear to be classifications identified in section 5 of the agreement. 86% of these charges were from ES FOX. <u>Risk Impact Analysis</u> • Potential increase in costs to OPG, as OPG may be paying for overhead that is already covered in the labour rates; • Potential delays in payment; and • Increases risk of inappropriate behaviour.			<u>Owner (Name and Title):</u> Riyaz Habib, Director Contract Management <u>Target Completion Date:</u> Complete
1.6	**Management of Returnable Mobilization Payment Limits** The ESMSA amendment states that OPG will periodically review its performance of balance of payments and increase it or decrease it at its own discretion, but it does not establish an upper limit for the amount of Returnable Mobilization Payment. Returnable Mobilization Payment was negotiated between OPG and ESMSA Contractors and formalized in the	**Medium**	Finance/Management should perform a review of the total advances to all OPG contractors, to assess overall cost and cash flow impact to OPG.	Future potential capital requirements based on future work plans for ESMSA Contractors should be forecasted during the next business planning cycle.

#	Finding	Process Risk Rating	Recommendation	Management Action Plan
	contract amendment to the ESMSA Agreement made as of June 28, 2013. The objective of introducing Returnable Mobilization Payment was, according to management, to remove OPG's obligations for "cash neutrality" and maintain lower labour rates negotiated with ESMSA Contractors by stripping out any "finance cost" component, which we understand was included in contractor prices prior to the ESMSA being adopted. Risk Impact Analysis • Without a managed process, the balance outstanding with the contractors can grow thus increasing the impact on OPG's cash flows; • If a similar clause were applied to the other large projects, there would be a substantial negative impacting to OPG's cash flows.			Management will continue streamlining its invoice payment processes to ESMSA Contractors including retaining a Lean Process expert to provide appropriate solutions to reduce the payment cycle time for this contract. Internal OPG approval process to increase or decrease the Returnable Mobilization Payment should be clarified/documented and ensure that it is aligned to the OAR. Owner (Name and Title): Leo Saagi, Director, Nuclear Projects Target Completion Date: December 2014 Management has ensured that the mobilization payments are appropriately accounted for in all material aspects, for financial reporting purposes.

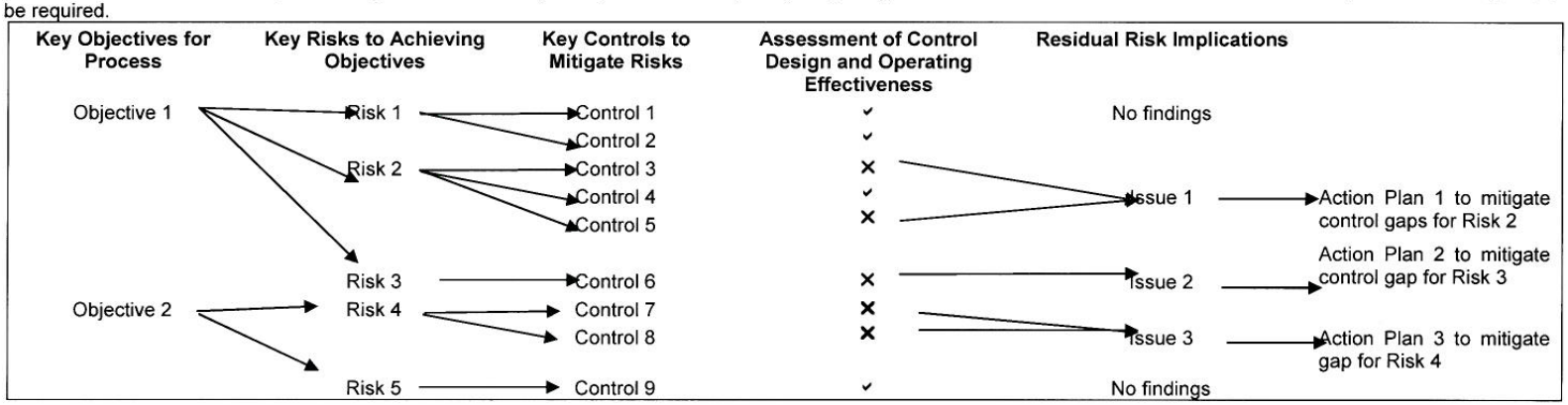
#	Finding	Process Risk Rating	Recommendation	Management Action Plan
1.7	**Support for ESMSA Milestone Payment** The Amendment to the ESMSA Agreement (June 24, 2013) added $3.1M in potential Milestone Payments for the contractors to enhance capability of the ESMSA Contractors in a shorter time line.[4] They include milestones related to: 1. Quality Management (Three milestones. Total value $600,000) 2. Core Team Established (One milestone. Value $1,000,000) 3. Nuclear Safety (Four milestones. Total Value $1,000,000) 4. Establishment of Estimating Capability (One milestone. Value $500,000) At the time of the audit, we noted, with in respect of to the milestones payments above, that there were no detailed, time-phased plans obtained from the contractor that would demonstrate how and when the milestones were going to be achieved. Without such plans, OPG's ability to monitor contractor's progress in achieving the milestones could be impaired. (While IA noted that the amendment to the agreement established requirements for the vendor to satisfy milestone #2 above, there were no contractor execution plans available for review). <u>Risk Impact Analysis</u> • Potentially weakens Incentive/Disincentive compensation structure under the contract due to additional payments to the vendor; • Inability to ensure that the contractor achieves the subject milestones effectively and timely; and • Inability to demonstrate value for money impact to OPG.	**Medium**	• It is recommended that Management require the ESMSA contractors to provide detailed, time phased plans for the achievement of the milestones discussed in the amendment. Such plans need to be satisfactory to OPG both from the scope of work and timing perspective and should be approved by OPG, and linked to ESMSA contract terms supporting payments. The contractors should be held accountable for achievement of the milestones within the deadlines. • OPG should evaluate ESMSA vendor performance toward achieving the milestones on an ongoing basis. There should be appropriate mitigation if the contractors fail to demonstrate the required competencies and achieve the milestones by the time required.	Compile detailed, time phased plans for the achievement of the ES MSA milestones identified in the amendment. <u>Owner (Name and Title):</u> Riyaz Habib, Director Contract Management <u>Target Completion Date:</u> March 31, 2014 ESMSA Steering Committee reviews, on a quarterly basis, the status of the ES MSA milestones. <u>Owner (Name and Title):</u> Riyaz Habib, Director Contract Management <u>Target Completion Date:</u> Complete

[4] We did not audit vendor selection, tender processes or the evaluation of required contractor core competencies as part of this audit.

APPENDIX A

OVERVIEW OF AUDIT RATING METHODOLOGY

IA's ratings for operational audits of OPG business processes are derived from an assessment of the management controls that are in place to mitigate key risks to the achievement of process objectives. The diagram below illustrates IA's basic approach to conducting an audit. If control deficiencies are identified that prevent IA from providing reasonable assurance that the process objective will be met (i.e. key risks are adequately mitigated), an audit issue will be noted and a corrective action plan from management will be required.



The ratings for the audit will be assigned based on a two-tiered assessment of residual risk exposure. The first tier rating assesses the residual risk at the local, process level and is guided by an evaluation of the 5 interrelated components of control, as defined by the COSO Internal Control Framework (i.e. control environment, risk assessment, control activities, information and communication, monitoring). This results in one of the following audit opinions:

- *Effective*: control and risk management practices provide reasonable assurance that business process objectives will be achieved and may include minor improvements and/or opportunities for improvement.
- Generally Effective: control and risk management practices require more than minor but less than significant improvements to provide reasonable assurance that business process objectives will be achieved.
- *Requires Improvement*: control and risk management practices require significant improvements in high risk and/or core areas to provide reasonable assurance that business process objectives will be achieved.
- *Not Effective*: control and risk management practices are not designed and/or are not operating effectively.

The second tier to IA's audit rating is an indication of the implications of the residual risk at the broader, enterprise level. This rating of "High", "Moderate" or "Low" is intended to answer the "so what?" question for senior management and the Audit and Risk Committee by giving context to audit results in terms of their impact on OPG as a whole.