ONTARIO POWER GENERATION

Internal Audit

DNR Planning and Readiness – Unit 3

September 28, 2018

Report Rating: **Generally Effective**

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1.0 EXECUTIVE SUMMARY

1.1 Report Rating and Summary of Findings

Report Rating: **Generally Effective**

No.	Finding	Risk Type	Risk Rating[1]		
			High	Moderate	Low
1	Inconsistent health metrics and errors were identified in the Unit 3 Nuclear Projects Executive Team (NPET) Dashboard.	Operational		X	
2	The Gate 3 package template does not include lessons learned gate requirements.	Operational			X
Total		**2**	**-**	**1**	**1**

1.2 Background

Approval for the refurbishment of Unit 3 at Ontario Power Generation's ("OPG's") Darlington nuclear station was granted on 19 February 2018 by the Provincial Government. This will be the second of the station's four CANDU units to be refurbished.

The planned refurbishment outage sequence at Darlington calls for work on the preceding unit, Unit 2, to be completed before commencement of work on Unit 3 to allow for the implementation of lessons learned on Unit 3. Execution work on Unit 3 is planned to begin in October 2019 for approximately three years.

The refurbishment of Unit 3 is currently in the planning phase and will utilize operational experience from Unit 2 to develop a detailed plan to execute the work including the necessary preparatory work, defueling, and integration with existing station activities and the current Unit 2 activities.

The Darlington Nuclear Refurbishment ("DNR") Planning and Readiness Unit 3 audit, a risk-based audit identified in Internal Audit's ("IA") Strategic Audit Plan, was selected given the significant profile and criticality of the work stream to the overall DNR Project.

1.3 Objective & Scope

The objective of this audit was to independently assess the planning and current execution of Unit 3 refurbishment activities to ensure the project bundle is completed on time, on budget, and with quality.

[1] Please refer to Appendix A for risk rating definitions

In order to achieve the audit objective, the processes and underlying controls were reviewed and testing was performed on a sample basis to determine whether:

A. Unit 3 planning and scheduling

• The overall process used to plan Unit 3 was defined and aligned with industry standards to produce a defined scope of work including:
  ○ The identification of interfaces, dependencies and durations; and
  ○ Incorporation of 'OPG first of a kind' DNR work (i.e. Turbine Generator controls, access port installation on Steam Generators);
• The strategy and process for incorporating Unit 2 Lessons Learned was developed, documented, utilized during Unit 3 planning (i.e. Darlington Unit 3 Improvement Program) and incorporated at the work package level;
• Key early milestones are planned, monitored and a process exist to address deviations (i.e. preparatory work, de-fueling);
• The Project schedule / milestones are aligned with historic performance compared to program requirements (fuel handling reliability etc.);
• Long lead items are identified and addressed (including use of existing inventory);
• Resource profile / considerations (both OPG and Vendor) have been considered / accounted for in planning including external factors, demographics and overlap with other Units;
• Risks associated with new tools and first-of-a-kind work/process are identified and mitigation incorporated;
• Commercial and schedule impacts and changes were identified, reported and addressed; and
• Appropriate inputs and sign-offs from key stakeholders have been obtained.

B. Risk identification and mitigation
• There is a process in place to identify and escalate key risks associated with Unit 3; and • Responses and mitigation strategies are defined and implemented as appropriate.
C. Fraud Risk Considerations
• There was intentional misreporting of project status and information by modifying cost figures / estimates, work progress, schedule or financial information.

Scope period: The scope included activities associated with Unit 3 Planning and Readiness up to and including June 30, 2018 and lessons learned reviews from Unit 2.

1.4 Conclusion

The controls and processes being used to plan and prepare for the execution of Unit 3 are generally effective. However, there were a number of inconsistencies and errors noted in one of the Unit 3 Nuclear Project Executive Team ("NPET") Dashboards. Consistent and accurate project reporting are key in ensuring project issues and concerning trends are identified to senior leadership and key stakeholders for discussion, analysis, and corrective action in a timely manner.

Positive Observations

- The lessons learned process is well defined, documented and implemented. The project teams are actively using lessons from Unit 2 to more accurately prepare Unit 3 budgets and schedules, which should enable the project team to effectively track and control costs;
- The project teams are identifying the major risks associated with their project management processes and actively working to address them. For example, to address the number of changes associated with the Unit 2 Balance of Plant ("BoP") engineering completed by the vendors, modifications are being made to the BOP contracting strategy where OPG will assume the engineering responsibility for Unit 3; and
- External factors are considered to ensure the resourcing needs for Unit 3 and subsequent units will be met. These factors include the supply of workers, the demand for nuclear and other tradespeople, the retiring workforce and the new workforce in training within Ontario and within Canada. OPG also participates in Build Force, an industry led organization that provides labour market information on the construction industry, to gain an understanding of the current supply and demand of resources both within and outside of the nuclear industry.

Key Finding & Recommendation

Inconsistent reporting of health metrics and incorrect figures were identified in a Unit 3 NPET Dashboard. The health indicator for the Cost Flow Plan vs Actual table was reported as "Excellent" (green), which was inconsistent with the reported "Moderate" (yellow) health of the Cost Performance Summary. Also, the program contingency life to date target was recorded as a negative, ($834K) instead of a positive $834K. This calculation error has been corrected in subsequent reports.

IA recommends that the parameters applicable to health indicators be formally defined to allow consistent reporting and identification of issues, automation of data generation and implementation of a more effective review process.

Opportunities for Improvement

- OPG procurement standards (NK38-MAN-09701-10005) for Unit 3 indicate that the required long lead time should be greater than 180 days. However, the criteria used to define long lead materials' when compiling the Long Lead Materials Identified Milestone List was greater than 90 days. The migration of information from the milestone list to the Procurement Tracking Tool (PTT) system resulted in items that had a lead time greater than 90 days but less than 180 days being flagged as long lead. IA recommends that management continues to address the long lead issue, ensure that the PTT system only identifies items greater than 180 days and to utilize the PTT system for all newly identified materials; and
- NK38-GUID-09701-10054 Lessons Learned Guide and the 'Lessons Learned Overview' presentation tier requirements are not aligned. Specifically, the Lessons Learned Guide defines tier 2 as having potential cost savings of greater than $1M whereas the Lessons Learned Overview defines tier 2 as having a potential cost saving of greater than $500K. Management is aware of the issue and should complete the updates to the guide to address the discrepancy.

2.0 DETAILED AUDIT FINDINGS

Internal Audit identified the following detailed findings and recommendations which have been risk rated based on the definitions outlined in Appendix A.

1. Inconsistent health metrics and errors were identified in the Unit 3 NPET Dashboard.	**Moderate**

IA reviewed the July 2018 Unit 3 NPET Dashboard and found the following inconsistencies and errors:

- The life to date cost variance metrics for a significant number of project bundles were negative resulting in a reported total underspend to date of approximately $50 million, and as a result the health indicator[2] in the Cost Performance Summary by Bundle table was reported as “Moderate” (yellow). However, the corresponding health indicator for the Cost Flow vs Actual table in the dashboard was inconsistent as it was reported as “Excellent” (green) despite the underspend to date against budget and forecasts
    - The Cost Flow vs Actual table in the June NPET dashboard had a health indicator rating of “Moderate” (yellow), yet the same table was report as “Excellent” (green) in the July dashboard as noted above. This represented a 2 level jump in a positive direction despite significant lag in actual cost spending;
- The dashboard indicated Level 1 schedule performance as “Excellent” (green). On the basis that underspend against anticipated targets / cash flow can indicate project schedule delays and challenges, IA had concerns regarding the accuracy of the reported schedule metrics. However, management indicated that the project was still largely on schedule for the following reasons/explanations:
    - While some elements of the project are currently underspent due to missed milestones, there are a significant number of elements where the cash flow allocation is not reflective of the current anticipated spend, including a $12.8K underspend in the Turbine Generator life to date cost performance; and
    - The revised Unit 3 estimate and cash flow forecast that will be issued in early 2019 is expected to address the inconsistencies in cash flow allocation.
- Within the Cost Performance Summary by Bundle, the program contingency life to date target was recorded as a negative, ($834K) instead of $834K. The project team confirmed that this was an error, likely the result of manual entry, and has been corrected in subsequent reports.

Once identified, the inconsistency related to the Cost Flow vs Actual health index and the error in program contingency were subsequently corrected in the August 2018 NPET Dashboard before the end of the audit.

Management confirmed that there are currently no formally defined parameters for health indicators.

[2] The Unit 3 Status Dashboard assigns an indicator to each section that signifies the status of that section. The classifications include excellent, good, moderate and poor.

Potential Cause & Impact
Potential Causes: • Lack of defined parameters for selection of health indicator colour; • Incorrect cash flow allocations for contingency due to manual process; and • A lack of appropriate quality checking prior to issue. • The Unit 3 reporting program is still in the early development stage and the July NPET dashboard was only the second monthly report created. Management is still working on refining the process and quality of the metrics. Potential Impact: • Incorrect or misleading project performance metrics can mask project issues and prevent the early identification and implementation of corrective actions; and • Errors in cost metrics may hide underspend against anticipated targets / cash flow, which can be an indicator that the project is experiencing schedule delays and challenges.
Recommendation
• We recommend that the parameters applicable to health indicators be formally defined to allow consistent reporting and identification of issues; • The project team should review cash flow allocations on the NPET dashboard and correct errors as necessary; and • To enable accurate reporting and monitoring of project performance, the project team should consider implementing a formal review and sign-off process for the NPET report and assess opportunities for automating processes and calculations where applicable.
Management Action Plan
Management will develop formal parameters for the NPET report health indicators for each section of the report. If Management disagrees with a specific rating, the rating will be reported in line with the defined parameters but a text box will be added beneath the section for Management to provide comments. Where possible, management will continue to automate sub-reports required for the NPET dashboard to minimize the opportunity for manual entry errors. As well, there will be a review and sign-off process implemented for the Unit 3 reporting package once execution estimates are finalized in Q1 2019. Owner: Ian Sansom, Director Project Controls Target Completion Date: July 15, 2019

2. The Gate 3 package template does not include confirmation that lessons learned gate requirements have been met.	**Low**

NK38-GUID-09701-10054 Nuclear Refurbishment Lessons Learned requires that Gate 3 Release Packages are to include project confirmation that Lessons Learned have been incorporated and managed through the Lessons Learned process. This must be described in the body of the Gate Package with the copy of the Lessons Learned Tracking File included in an appendix as evidence of completion to the Gate Review Board. Following a successful Gate, the Lessons Learned Program Team will denote the Gate and Date in which lessons learned were validated by the project into the Lessons Learned Tracking File.

IA's review of the Gate 3 Release Package for Balance of Plant and Shutdown Layup identified that there was no reference to lessons learned in the supporting documents. Interviews with selected individuals present at the meeting confirmed that the incorporation and evaluation of lessons learned were reviewed at the meeting. The Lessons Learned Manager acknowledged that although the correct reviews took place, the Gate 3 documents did not meet process expectations.

Potential Cause & Impact

Potential Causes:

- The lessons learned process is relatively new, having been implemented during the course of this audit. As a result, the Gate templates have not been updated to match the lessons learned review requirements; and
- The Balance of Plant and Shutdown Layup Gate Review was conducted on June 25, 2018, only days after the lessons learned process was approved on June 21, 2018. As a result, the templates used for the presentation were developed prior to the execution of the lessons learned process.

Impact:

Incomplete documentation reduces the ability of the project team to properly demonstrate due diligence and compliance with procedures, and the lack of lessons learned requirements in the gate package may diminish the importance of ensuring the correct reviews have taken place.

Recommendation

The Gate 3 Presentation Template should be revised to include the requirement for Lessons Learned to be demonstrated at Gate 3 meetings for subsequent units.

Management Action Plan

Management will update the Gate 3 Presentation Template to include the Lessons Learned Phase 2 Process requirements.

Owner: Steve Reeves, Manager Project Management Office
Target Completion Date: August 31, 2018

APPENDIX A – RISK RATING DEFINITIONS FOR AUDIT FINDINGS

Ratings are derived through professional judgment by the audit team and discussion with management. The ratings for individual control findings are outlined below.

Rating	Definition
High Risk	The finding results in levels of risk exposure for the organization that, if not mitigated, could have a potentially severe/major impact on safety, project excellence, operational excellence and reliability, regulatory compliance, social license, environment, or financial results. The finding requires immediate attention.
Moderate Risk	The finding presents a risk that could potentially have a moderate impact on safety, project excellence, operational excellence and reliability, regulatory compliance, social license, environment, or financial results. If not remediated, the risk could escalate.
Low Risk	The finding could potentially have a minor impact on safety, project excellence, operational excellence and reliability, regulatory compliance, social license, environment, or financial results. Implementation of the recommendation may lead to improvement in the quality and/or efficiency of the area or process being audited.

OVERALL REPORT RATING SCALE

An overall report rating has been assigned as an indication of the overall design, existence and effectiveness of the components of the internal control structure that was subject to the internal audit. The internal audit rating should be considered in conjunction with the definitions noted above.

- *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.

APPENDIX B – PROCESS OWNER & DISTRIBUTION LIST

Distribution:

Dietmar Reiner
SVP Nuclear Projects

Bill Owens
VP Refurbishment Execution – Unit 3

Paul Ross
Project Director – Unit 3

cc:	Jeff Lyash	President & Chief Executive Officer
	Ken Hartwick	SVP Finance, Strategy, Risk and Chief Financial Officer
	Liane Kim	VP Assurance Chief Risk & Audit Executive
	Cynthia Domjancic	VP Nuclear Finance
	Carla Carmichael	VP Project Assurance & Contract Management
	Gary Rose	Deputy Site VP
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	Michael England	Director Project Assurance Commercial Strategy
	Zar Khansaheb	Director Operations & Maintenance, Darlington
	Andy Moeck	Director Nuclear Oversight
	Jennifer Ennis	Manager Refurbishment Program Support & Integration
	Jennifer Vulanovic	Manager Refurbishment Management System Oversight