Board Staff Interrogatory #181

Interrogatory

Reference:
Exhibit E2 / Tab 1 / Schedule 1 / pp. 3, 8

Preamble:

OPG referenced improvements to outage execution performance and removal of scope from planned outages between 2017 and 2019.

OPG stated that the planned outage schedule incorporates lessons learned from past OPG outages and operating experience outside of OPG.

Question(s):

a) Please clarify how the impact of recent improvements to outage execution performance is reflected in OPG's nuclear production forecast to 2026.

b) Please clarify any further improvements anticipated and how they are reflected in OPG's nuclear production forecasts to 2026.

c) Please provide key examples of how the planned outage schedule incorporates lessons learned from past OPG outages and operating experience outside of OPG.

d) Please provide a tabular summary of trends in planned outage frequency and duration between 2016 and 2020 and comment on how these trends compare to OPG's forecasts to 2026. Please discuss whether the planned outage frequency and average duration are expected to increase, decrease or remain approximately the same and explain why.

Response

a) Refer to Ex. L-E2-01-VECC-022 for a discussion on how execution performance is incorporated in the production forecast for this IR term. Time to perform in-scope outage work is continually updated based on previous performance and expected improvements, both of which are factored into the future expected outage durations.

b) A number of the expected savings and future improvements reflected in the plan are described at Ex. E2-1-1, p. 3. Savings already incorporated into the 2022-2026 IR term are in the order of 274 days and include:
   a. Using Machine Delivered Scrape instead of conventional scrape saves 81 outage days at Pickering.
   b. Changing the strategy to manage fuel channel elongation at Pickering saves 32 outage days. To manage fuel channel elongation and show continued fitness for service per CSA N285.4-05, there are two acceptable maintenance strategies that can be adopted: reconfiguration, or fuel channel shifting. OPG elected to proceed with the latter strategy as this option reduced outage duration.
   c. Reduction of asset preservation scope for outages as Pickering approaches end of commercial operations. Compared to typical outages, this will save in the order of 70 days in the IR term.
   d. Removing Low Level Drains from Pickering scope saves 81 days.
   e. Inspection tooling and delivery system improvements at Pickering results in more predictable performance, thereby saving approximately 10 outage days.

c) After each outage, inspection and maintenance results are analysed, degradation rates are compared against predictive models, and adjustments are proposed to optimize scope for future inspection and maintenance campaigns. The process of continuous improvements through analysis, review and approvals underpins the annual Life Cycle Management Plan revision process and is incorporated into the future planned outage durations as part of the annual business planning process. One example is a reduction of feeder replacement scope in a Pickering 2023 outage, saving 5.5 days, based on additional inspection results and improved analysis.

   Consistent with the information provided in EB-2016-0152, Ex. L-5.1-1 Staff-080, OPG solicits external input from Bruce Power, Point Lepreau and CANDU Owners Group for major scope meetings and outage readiness reviews. This provides external challenges to scope, duration and execution strategy.

   As one example of continuous improvement, benchmarking planned outage unit start up durations at Point Lepreau identified improvement opportunities for Darlington units, saving 13 hours for each unit start up.

d) Outage frequency has occurred and is expected as described in Ex. E2-1-1 pp. 7, 10-11.

   The average outage duration for 2016-2020, and forecast average for 2022-2026 is shown below in Chart 1.

Chart 1 - Average Planned Outage Durations by Station (days)

	Station	
	Darlington	**Pickering**
2016-2020 (actual)	61.8	123.4
2022-2026 (forecast)	56.7	89.9

The average regular cyclical outage duration is expected to decrease at Pickering in 2022-2026 rate term. As the station approaches end of commercial operations, the required asset preservation portion of regular cyclical planned outages is reduced, decreasing outage duration.

Over the 2022-2026 rate term, the average planned outage duration at Darlington is expected to decrease as all units except for Unit 2 are undergoing refurbishments during that period, and thus are not subject to regular cyclical outages with pre-refurbishment scope. They will instead have two shorter post-refurbishment outages each as described in Ex. E2-1-1, p. 6. It is not until after 2026 that regular cyclical planned post-refurbishment outages resume on all units.