March 22, 2021

Ms. Christine Long
Registrar and Board Secretary
Ontario Energy Board
2300 Yonge Street
P.O. Box 2319
Toronto, ON M4P 1E4

Re: Ontario Power Generation 2022 to 2026 Payment Amounts
AMPCO Interrogatories
Board File No. EB-2020-0290

Dear Ms. Long:

Attached please find AMPCO's interrogatories in the above proceeding.

Best Regards,

Colin Anderson
President

Copy to: Ontario Power Generation Inc.

Association of Major Power Consumers in Ontario
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EB-2020-0290

Ontario Power Generation Inc.

Application for payment amounts for the period from January 1, 2022 to December 31, 2026

AMPCO Interrogatories March 22, 2021

A1-AMPCO-1

Ref: Ex A1 T1 S5

a) Please provide the date of OPG's Corporate Organizational Chart at Ex A1 T1 S5.

b) Please provide the number of business units under each group on the organizational chart.

c) Please map the number of FTES to each of the seven OPG Group Leads: Enterprise Operations, Enterprise Strategy, Enterprise Projects, Finance, Chief Administration Office, Law Division and Corporate Affairs.

d) Please provide OPG's Corporate Organizational Chart in place prior to the Chart at Ex A1 T1 S5 and indicate how long it was in effect.

e) Please provide details on the significant differences between the two Organization Charts and the drivers of the changes.

f) Please indicate where the nuclear Projects & Modifications group or equivalent is now located.

g) Please provide the individual organizational structures for each of the subgroups under Enterprise Operations, Enterprise Strategy, Enterprise Projects and Finance.

A1-AMPCO-2

Ref: Ex A1 T3 S3 P2

The Capacity Refurbishment Variance Account (CRVA) Eligible OM&A Expenses represent 2% of the revenue deficiency.

The CRVA eligible OM&A expenses include base, project and outage OM&A costs, for the Fuel Channel Life Extension Project, Fuel Channel Life Extension ongoing costs, and Pickering Optimization Shutdown enabling costs. The cumulative CRVA eligible OM&A costs are forecast to be approximately $60M higher over the 2022-2026 period relative to the EB-2016-0152 approved level for 2021.

Please provide a breakdown of the $60M related to the Fuel Channel Life Extension Project, Fuel Channel Life Extension ongoing costs, and Pickering Optimization Shutdown enabling costs based on the variances in base, project and outage OM&A costs.

A1-AMPCO-3

Ref: Ex A1 T4 S1 P2-3

a) Please provide the terms of reference or equivalent for each Committee of the Board of Directors.

b) Please provide the audits conducted by the Audit and Risk Committee relevant to this application for the years 2016 to 2020.

c) Please provide the proposed audit plan relevant to this application for the years 2021 to 2026.

A1-AMPCO-4

Ref: Ex A1 T4 S1 P2

OPG is led by the Enterprise Leadership Team comprising senior management members from across the organization and the President and CEO, who is also a member of the OPG Board.

Please provide the membership of the Enterprise Leadership Team.

A1-AMPCO-5

Ref: Ex A1 T4 S1 P4

In the second half of 2020, OPG integrated major project planning and execution responsibilities across the company under a single Enterprise Projects organization, and amalgamated business development and other strategic activities under an Enterprise Strategy organization. Enterprise Operations and Enterprise Projects report directly to the President and CEO.

Prior to this realignment, please describe OPG's organizational structure with respect to major project planning and execution responsibilities across the company.

A1-AMPCO-6

Ref: Ex A1 T4 S1, Attachment #2 P9 Section 9.1

The Memorandum of Agreement (MOA) between the Minister of Energy and OPG states:
9.1 The MOA shall be in effect for not more than five years from the date of execution.
9.2 The Shareholder and OPG Board Chair shall renew or revise this MOA by the expiry date, or earlier, as required. The MOA was executed in Q4 of 2015 so is time to renew or revise the MOA.

Please advise of OPG's plans to renew or revise the MOA.

A2-AMPCO-7

Ref: A2 T2 S1

OPG indicates its application is based on OPG's Amended 2020-2026 Business Plan.

a) Please provide a copy of the original Business Plan, prior to the amendment noted.

b) Please provide the date OPG's Board of Directors approved the Amended 2020 Business Plan and provide the meeting minutes.

A2-AMPCO-8

Ref: A2 T2 S1 P2

OPG indicates it selects a number of complex or high value projects to undergo a comprehensive PIR within each business planning period.

Please prepare a table that sets out the projects selected to undergo a comprehensive PIR within each of the years 2016 to 2020, the budgeted amounts compared to actual amounts for each project, and indicate if the comprehensive PIR has been completed on schedule.

A2-AMPCO-9

Ref: A2 T2 S1 Attachment 2

a) With respect to business planning, please describe the BPC Business Planning System, its function and indicate when it was implemented.

b) Please explain the GRC Resolver, its function and indicate when it was implemented.

A2-AMPCO-10

Exhibit A2-2-1 Attachment 2 P27

The Business Planning Instructions indicate Business Units are required to identify all capital, OM&A and provision-funded projects having cash flows within the business planning period. The submitted projects must be prioritized considering risks and OPG's business objectives, as well as efficient alignment with Business Unit strategies, facility life cycle plans (as applicable), condition assessments, asset management plans, and Shareholder expectations.

a) Please explain how projects are prioritized for funding within a Business Unit.

b) Please explain how projects are prioritized for funding corporately (i.e. between Business Units).

c) How many nuclear Business Units are putting forward projects with cash flows?

d) How does OPG address the pacing of investments?

e) Please discuss if a top-down cap was placed on capital and OM&A budgets over the planning period.

A2-AMPCO-11

Ref: Ex A2 T2 S1 Attachment#2 P27

Please provide a copy of the following documents:

- Planning BCS (OPG-FORM-0102)
- Nuclear: AIOT (Asset Investment Options Template)
- CIO: AISC Part A: Issue Characterization Form - IT-FORM-0022
- OPG-FORM-0076 Business Case Summary
- OPG-PROG-0004: Enterprise Risk Management Program
- OPG-PROC-0094: Enterprise Risk Management Reporting Procedure
- OPG-FORM-0099: Business Planning and Reporting Form

A2-AMPCO-12

Ref: Ex A2 T2 S1 Attachment #3

OPG indicates approval is required for the release of funds to undertake project work.

a) Please explain any differences in the business case process and required documents with respect to projects with total project costs greater than $20M, compared to projects with a total cost in the range of $5M to $20M, and less than $5M.

b) Please provide a copy of OPG's Organizational Authority Register (OAR) document.

D2-AMPCO-13

Ref: Ex D2 T1 S3

Please complete the following Table:

Nuclear Operations Project Portfolio Expenditures											
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Plan											
Project Portfolio - Capital											
Project Portfolio - OM&A											
Total Nuclear Portfolio											
Actual											
Project Portfolio - Capital											
Project Portfolio - OM&A											
Total Nuclear Portfolio											

D2-AMPCO-14

Ref: Ex D2 T1 S1 P2-3

OPG indicates it divided the Asset Investment Steering Committee (AISC) into two separate oversight committees in early 2018: the Asset Management Oversight Committee (AMOC) and the Project

Management Oversight Committee (PMOC). There are site AMOCs and PMOCs and one Nuclear AMOC and PMOC.

a) When was the AISC implemented and why?

b) Please discuss why the AISC is no longer effective at managing annual capital expenditures.

c) How many site AMOCs and PMOCs are there?

d) Please provide the Terms of Reference for the AISC, Nuclear AMOC, Nuclear PMOC and the site AMOCs and PMOCs.

e) Please provide the membership of the AISC, Nuclear AMOC, Nuclear PMOC and site AMOCs and PMOCs.

f) There is a site AMOC and site PMOC for Inspector & Reaction Innovation.
   I. Please explain the function of Inspector & Reaction Innovation.
   II. Please identify the projects that fall under Inspector & Reaction Innovation.

D2-AMPCO-15

Ref: Ex D2 T1 S1 P5

OPG indicates there are five phases in the life cycle of a nuclear project: Initiation, Development, Definition, Execution and Closeout.

a) Please discuss any changes in OPG's definition of the five phases in the life cycle of a nuclear project since EB-2016-0152 and the impact of the changes.

b) Please advise which of the five phases are funded by OM&A budgets.

D2-AMPCO-16

Ref: Ex D2 T1 S1 P5 Figure 2

Figure 2 provides the Project Life Cycle Phases and Gates.

Please provide OPG's internal document(s) that govern the Project Life Cycle Phases and Gates process.

D2-AMPCO-17

Ref 1: Ex D2 T1 S1 P6

Please explain how projects are prioritized between the different AMOCs.

D2-AMPCO-18

Ref 1: Ex D2 T1 S1 P6

OPG indicates a technical assessment will consider an asset replacement relative to the base case of maintaining the asset through preventative and/or corrective maintenance.

a) Please discuss the decision-making process OPG follows to make the technical assessment of replace versus maintain an asset. Provide any criteria used.

b) Please provide any internal documents that govern this technical assessment process.

c) How can ratepayers be assured that nuclear assets are not being replaced prematurely?

d) Does OPG expect any OM&A savings over the test period resulting from asset replacement versus preventative and/or corrective maintenance? Please discuss.

D2-AMPCO-19

Ref: Ex D2 T1 S1 P7

OPG provides the Value Framework with seven risk areas.

a) Please explain how cost and affordability is considered in the Value Framework.

b) Please explain how value for money is assessed in the Value Framework.

D2-AMPCO-20

Ref: Ex D2 T1 S1 P10

OPG indicates consistent with implementing an EPC contracting strategy, OPG has Extended Services Master Services Agreements (ESMSA) with three vendors.

a) Please provide the three vendors.

b) Has there been any change in the vendors since EB-2016-0152?

D2-AMPCO-21

Ref: Ex D2 T1 S1 P12

OPG indicates that as part of the realignment of the organization structure in 2020, major project execution groups from across the Nuclear and Renewable Generation business units have now been integrated into the EPO which will further align and leverage organizational expertise for improved project management and execution performance.

a) Please identify all of the major project execution groups that have been integrated into EPO and indicate where they came from within the organization.

b) Please provide the performance metrics established by OPG for the EPO.

D2-AMPCO-22

Ref: Ex D2 T1 S1 P12

The EPO issued an updated suite of nuclear project management processes and tools that came into effect in the first quarter of 2018. They promote a consistent and streamlined application of project management, controls, and other project-related functions across the enterprise.

Please provide the key documents that govern the nuclear project management processes.

D2-AMPCO-23

Ref: EB-2016-0152 Ex D2 T1 S1 P7-8

In EB-2016-0152, OPG identifies five main continuous initiatives in project management.

Please provide the implementation status of each of the five initiatives.

D2-AMPCO-24

Ref: Ex D2 T1 S1 Attachment 2 P4

a) Please provide the Terms of Reference for KPMG's Project and Modifications Project Management Audit Report.

b) Please discuss if an RFP process was followed to engage KPMG.

c) Please confirm the date KPMG commenced its work.

D2-AMPCO-25

Ref: Ex D2 T1 S1 Attachment 2 P12

KPMG indicates it selected the 10 projects based on a list provided by P&M representing its whole portfolio of projects as of April 2019.

a) Please confirm the number of projects on the April 2019 project list and the total value of the projects.

b) Please provide the list of projects provided by OPG to KPMG as of April 2019.

c) Please provide the spending forecast for 2019.

d) Did KMPG select the projects independently? Please explain the process followed to select the projects.

e) Please confirm all projects had exposure to the new governance procedures implemented by P&M in January of 2018.

f) Which of the 10 projects were completed at the time of KPMG's review?

g) Which of the 10 projects experienced challenges resulting in cost, schedule or scope variances?

h) Which projects reflect new component work?

i) Which of the 10 projects would OPG classify as complex?

j) Please provide any other details on how and why the 10 projects were selected.

D2-AMPCO-26

Ref: Ex D2 T1 S1 Attachment 2 P12 Table 6

Please complete the following Table:

Project #	Project Title	Business Unit	Contractor	Original Project Cost	Final Project Cost	Original In-service Date	Final In-Service Date	Summary of Business Cases w/Dates	Project Fife Cycle Phase/ Gate

D2-AMPCO-27

Ref: Ex D2 T1 S1 Attachment 2 P12 Table 6

a) Please provide the latest Business Case Summaries for each project in Table 6.

b) Please provides any subsequent approvals related to scope, cost, and/or schedule variances.

D2-AMPCO-28

Ref: Ex D2 T1 S1 Attachment 2 P12 Table 7

a) Please provide copies of the P&M procedures listed in Table 7.

b) Please provide the referenced sections from project management, scope and risk procedures that are related to Lessons Learned.

D2-AMPCO-29

Ref: Ex D2 T1 S1 Attachment 2 P15 Table 8

Please provide a summary of the team members interviewed for each project.

D2-AMPCO-30

Ref: Ex D2 T1 S1 Attachment 2 P16 Table 9

Please provide the projects that were not fully aligned under the categories: Schedule Management, Change Management and Lessons Learned.

D2-AMPCO-31

Ref: Ex D2 T1 S1 Attachment 2 P17

KPMG states "Although Schedule Management was rated as "partially implemented" in Objective 2 – Implementation, we found that Schedule Management was effective in this assessment, as we identified that mitigating controls were in place that enabled P&M to manage its schedules effectively.

Please describe the mitigating controls that were in place.

D2-AMPCO-32

Ref: Ex D2 T1 S1 Attachment 2 P20

Please identify the projects with scope defined before January 2018.

D2-AMPCO-33

Ref: Ex D2 T1 S1 Attachment 2 P23

KPMG indicates OPG has a schedule management plan, which includes the following: scheduling methodology and the tools to be used for the project (Primavera P6); schedule release and iteration management; units of measure; level of accuracy; rules of performance measurement; reporting formats and control thresholds.

Please describe Primavera 6, it's function and when it was installed.

D2-AMPCO-34

Ref: Ex D2 T1 S1 Attachment 2 P38

With respect to the observation on OPG's Lessons Learned Procedure, KPMG indicates P&M's lessons learned processes are documented among different procedures. A stand-alone P&M procedure (or road map document) including all the processes of P&M Lessons Learned would improve the clarity around the recording and use of lessons learned.

Please provide OPG's response to this recommendation and if a stand-alone P&M procedure has been developed. If yes, please provide the new procedure. If not, when does OPG plan to comply with this recommendation?

D2-AMPCO-35

Ref: Ex D2 T1 S1 Attachment 2 Appendix D P50

With respect to project performance analysis, please explain how the following metrics are derived and provide these Earned Value Metrics for each project:

a) Planned Value (PV) = BCWS
b) Earned Value (EV) = BCWP
c) Actual Cost (AC) = ACWP
d) Schedule Performance Index (SPI)
e) Cost Performance Index (CPI)

D2-AMPCO-36

Ref: Ex D2 T1 S1 Attachment 2 Appendix D P50

Please provide the following for each project:

- Cost Variance (CV)
- Budget Variance (BV)
- Schedule Variance (SV)
- Forecast Variance

D2-AMPCO-37

Ref: EB-2016-0152 J15.8

J15.8 provides historical SPI and CPI values for the period 2012 to 2016 for the Projects and Modifications portfolio.

Please provide the SPI and CPI values for the Projects and Modifications portfolio (or equivalent) for the years 2017 to 2020.

D2-AMPCO-38

Ref: Ex D2 T1 S2 Table 4a – 4b

OPG overspent on its Portfolio Projects Capital Budget compared to OEB approved by $80.6M, $119.4M, $97.4M, $102.0M in 2017, 2018, 2019, 2020, respectively, and forecasts to overspend by $200.6M in 2021.

a) Please explain why OPG was unable to manage within its annual OEB Approved limits.

b) Please explain why OPG believes it is acceptable to overspend approved budgets consistently by large margins.

D2-AMPCO-39

Ref: Ex D2 T1 S2 T2 P2

OPG states "Portfolio Projects (Allocated)" are capital expenditures for projects that have a Project Management Oversight Committee ("PMOC") approved budget and an approved Business Case Summary ("BCS"). This includes major capital spares. The approved BCS for these identified projects can vary from a very preliminary development BCS (e.g., Class 5 estimate) to an Execution BCS (e.g., Class 3 or better estimate).

a) Please discuss where and how projects are added to the Portfolio Projects budget on an ongoing basis throughout the year. Who in the organization is responsible for reviewing newly identified projects, prioritizing projects within the portfolio and allocating portfolio funding to specific projects?

b) Please explain where and how contingency amounts are determined and allocated to capital projects.

D2-AMPCO-40

Ref: Ex D2 T1 S2 T2 P3

OPG indicates it manages its projects portfolio to maintain annual capital expenditures at the level of approved funding.

Please explain this statement in the context of OPG's overspending during the 2016 to 2021 period compared to OEB Approved.

D2-AMPCO-41

Ref: Ex D2 T1 S2 T2 P3

OPG indicates capital expenditures in the nuclear project portfolio over the IR term decline from $393.3M in 2022 to $191.8M in 2026. The trend primarily reflects the need for capital expenditures to

replace obsolete and/or life-expired plant equipment at Darlington, offset by the elimination of capital expenditures at Pickering by 2022 in anticipation of its planned shutdown by the end of 2025.

a) On what basis does OPG determine that equipment is obsolete?

b) Does an upgrade to an internal OPG driven standard render equipment obsolete?

c) Please explain how plant condition is factored into the decision to maintain existing plant instead of replacing it.

d) Please provide examples of projects over the test period where the option to maintain the asset was selected over replacing the asset.

D2-AMPCO-42

Ref: Ex D2 T1 S2 T2 P3

OPG states "Once the decision to refurbish Darlington and to extend its life was approved, OPG began an extensive program to replace obsolete and/or life-expired plant equipment resulting in higher project related investments at Darlington. This program continues throughout the IR term (there are 37 new Tier 1 projects compared to 18 new Tier 1 projects in EB-2016-0152)."

a) In what year did OPG begin its extensive program to replace obsolete and/or life-expired plant equipment at Darlington?

b) How many new projects >$5 M did OPG add during the 2016 to 2021 term.

c) Did OPG apply any constraints to adding new capital projects during the 2016 to 2021 term? If not, why not? If yes, please provide details.

D2-AMPCO-43

Ref: Ex D2 T1 S2 T2 P4

OPG states "In EB-2016-0152, the average project cost for active (ongoing or new) Tier 1 capital projects was $42.6M with the maximum being $129.5M for the Darlington Primary Heat Transport Pump Replacement/Overhaul. In this application, the average cost of the active Tier 1 projects (Ex. D2-1-3, Tables 1a, 1b, 1c and 1d) is $55.6M with a maximum of $278.8M for the Darlington 4kV Motor Refurbishment and Replacement project.

Please provide the average project cost calculation for Tier 1 projects in EB-2016-0152 based on actuals.

D2-AMPCO-44

Ref: Ex D2 T1 S2 T2

Please provide the latest Business Case Summary for project #31706, #82886, #80036, #82842, #84140, #83035, #80151, #84555, #84551, #84501, #83038, #80130, #83061 and #80022.

D2-AMPCO-45

Ref: Ex D2 T1 S2 T2 P11

With respect to a variance of 2021 Actual versus 2021 OEB Approved, OPG states "Ongoing projects from EB-2016-0152 at Darlington account for +$83.9M of the variance." The following five ongoing projects account for 51% of the ongoing project variance:

- #31524 Darlington Station Roofs Replacement (+$12.7M)
- #31535 Darlington Water Treatment Plant Interconnections (+$10.9M)
- #31544 Darlington Radiation Detection Equipment Obsolescence (+$8.9M)
- #80022 Darlington OH180 Aging Management Hardware Installation (+$6.0M)
- #80036 Darlington R22 Refrigerant Air Conditioning Unit Replacement (+$4.6M)."

a) Please provide the 2021 budget amounts compared to actuals for each project.

b) Please provide the reason for the cost variances of 10% or more for each of the projects listed.

c) Please provide a breakdown of the balance of the $83.9M variance.

D2-AMPCO-46

Ref: Ex D2 T1 S2 T2 P15

With respect to 2020 Actual versus 2020 OEB Approved, the evidence states "Ongoing Darlington projects that are the primary contributors to the variance are:

- #31524 Darlington Station Roofs Replacement (+$11.8M)
- #80036 Darlington R22 Refrigerant Air Conditioning Unit Replacement (+$8.7M)
- #80151 Darlington Fire Hazard Assessment and Fire Safe Shutdown Analysis 26 Modifications (+$6.3M)
- #80023 Darlington Steam Generator Level Control Valve Replacement (+$4.7M)
- #31516 Darlington Station Fluorescent Lighting Fixtures Retrofit (+$4.4M) 29
- #33819 Darlington Major Pump-sets Vibration Monitoring System Upgrades (+$4.3M)
- #80022 Darlington OH180 Aging Management Hardware Installation ($3.7M)
- #31535 Darlington Water Treatment Plant Interconnections ($2.9M)
- #31532 Darlington Powerhouse Water Air Condition Units Replacement ($2.7M)
- #31544 Darlington Radiation Detection Equipment Obsolescence ($2.7M)"

a) Please provide the 2020 budget amounts compared to actuals for each project.

b) Please provide the reason for the cost variances of 10% or more for each of the projects listed.

D2-AMPCO-47

Ref: Ex D2 T1 S2 T2 P15

The increase in Portfolio Projects (Allocated) at Pickering (+$27.0M) in 2020 is primarily due to the following projects:

• #83072 Pickering P58 Buried Boiler Blowdown Pipe Replacement (+$7.2M)
• #40972 Pickering PA Standby Generator Reliability Upgrades (+$5.6M)
• #84555 Pickering Unit 1and Unit 4 Third Power Supply Uninterruptible Power Supply Replacement (+$2.4M)
• #49154 Pickering B Replacement of Obsolete Instrumentation and Control Equipment (+$1.7M)
• #84511 Pickering Humidifier Condensate Return Line Modifications on MCR/CER HVAC (+1.6M)
• #84501 Pickering RAB Active Drainage Sump Pump Mesh Screen Installation (+$1.5M)
• #83038 Pickering P14 Digital Control Computer System Monitor (+$1.2M)
• #80130 Pickering Emergency and Mobile Satellite Communication Systems Replacement (+$1.1M)
• #83061 Pickering Stator Cooling Water Alkalization and Make-up Deoxygenation (+$1.0M)

a) Please provide the 2020 budget amounts compared to actuals for each project.

b) Please provide the reason for the cost variances of 10% or more for each of the projects listed.

D2-AMPCO-48

Ref: Ex D2 T1 S2 T2 P17

OPG indicates the projects and Minor Fixed Asset variance of $18M in 2020 is due in part to the following:

- #83965 PEXT Fire Water Supply Project (Capital) (+$3.5M)
- #84229 PEXT Emergency Power Generator 3 Permanent Installation (+$3.0M)
- #84653 PEXT PA Standby Generator Shaft Driven Fuel Pump Installation (+$2.8M)
- #84549 PEXT Universal Delivery Machine (UDM) East Annex Operations and Maintenance Area (+$2.3M)
- #84792 PEXT Firewater Buried Ring Header South (+$2.1M)
- #84794 PEXT Spacer Location and Relocation (SLAR) System Sustainability (+$1.9M)
- #84256 PEXT Algae Early Warning System (+$1.8M)
- #84603 PEXT Algae Mitigation Bubble Curtain (+$0.4M)

a) Please provide the 2020 budget amounts compared to actuals for each project.

b) Please provide the reason for the cost variances of 10% or more for each of the projects listed.

D2-AMPCO-49

Ref: Ex D2 T1 S2 T2 P20

With respect to 2019 Actual versus 2019 OEB Approved, OPG indicates the total variance for ongoing projects in Darlington from EB-2016-0152 (+$58.8M) is primarily due to the following projects:

• #31524 Darlington Station Roofs Replacement (+$15.2M),
• #31710 Darlington Shutdown Cooling Heat Exchanger Replacement (+$10.0M),
• #31426 Darlington Fuel Handling Inverter Replacement (+$6.3M),
• #31516 Darlington Station Fluorescent Lighting Fixtures Retrofit (+$4.8M), and
• #31526 Darlington Feeder Scanner Replacement (Capital) (+$4.5M) as well as a number of smaller variances totalling +$94.2M.

a) Please provide the 2019 budget amounts compared to actuals for each project.

b) Please provide the reason for the cost variances of 10% or more for each of the projects listed.

c) Please provide a further breakdown of the remainder $94.2M variance.

D2-AMPCO-50

Ref: Ex D2 T1 S2 T2 P20

The increase in Portfolio Projects (Allocated) at Pickering in 2019 is primarily due to the following projects:

• #83668 Pickering High Pressure Turbine Spindle Capital Spares (+$10.7M)
• #83072 Pickering P58 Buried Boiler Blowdown Pipe Replacement (+$7.0M)
• #40972 Pickering PA Standby Generators Reliability Upgrades (+$4.6M)
• #40691 Pickering PB Emergency Power Generator and Main Output Power Protective Relay Replacement (+$4.2M)
• #84861 Pickering A Emergency Service Water Pumps Replacement (+$2.9M)

a) Please provide the 2019 budget amounts compared to actuals for each project.

b) Please provide the reason for the cost variances of 10% or more for each of the projects listed.

D2-AMPCO-51

Ref: Ex D2 T1 S2 T2 P20

The increase in Portfolio Projects (Allocated) in Operations and Project Support in 2019 is primarily driven by the following projects:

• #83039 Darlington Rapid Delivery Machine (+$12.1M)
• #82929 Security Project B (+$6.4M)
• #82930 Security Project C (+$5.2M)

a) Please provide the 2019 budget amounts compared to actuals for each project.

b) Please provide the reason for the cost variances of 10% or more for each of the projects listed.

D2-AMPCO-52

Ref: Ex D2 T1 S2 T2 P23

With respect to 2018 Actual versus 2018 OEB Approved, OPG indicates increases in Portfolio Projects (Allocated) spending at Darlington (+$145.1M) are due in large part to the following projects:

- #80126 Darlington Emergency Power Generator 1 and 2 Replacement (+$22.8M)
- #83049 Darlington Copper Piping Replacement (+$15.9M)
- #80111 Darlington Generator Stator Core Spare (+$13.7M)
- #31710 Darlington Shutdown Cooling Heat Exchanger Replacement (+$10.8M)

a) Please provide the 2018 budget amounts compared to actuals for each project.

b) Please provide the reason for the cost variances of 10% or more for each of the projects listed.

D2-AMPCO-53

Ref: Ex D2 T1 S2 T2 P24

With respect to 2018 Actual versus 2018 OEB Approved, OPG indicates the increase in the Project Portfolio (Allocated) at Pickering (+$44.0M) is due in large part to project #83668 Pickering High Pressure Turbine Spindle Capital Spares (+$10.7M) and project #83088 Pickering A Low Pressure Feedwater Heat Exchanger Replacement (+$7.1M), which were both not identified until after the OEB submission.

a) Please provide the 2018 budget amounts compared to actuals for each project.

b) Please provide the reason for the cost variances of 10% or more for each of the projects listed.

D2-AMPCO-54

Ref: Ex D2 T1 S2 T2 P24

The increase in Operations and Project Support Portfolio Projects (Allocated) spending in 2018 (+$24.9M) is primarily due to projects #83039 Darlington Rapid Delivery Machine (+$7.5M), #82930 Security Project C (+$6.4M), and #82929 Security Project B (+$6.0M).

a) Please provide the 2018 budget amounts compared to actuals for each project.

b) Please provide the reason for the cost variances of 10% or more for each of the projects listed.

D2-AMPCO-55

Ref: Ex D2 T1 S2 T2 P25

Increases in Portfolio Projects (Allocated) spending at Darlington (+$56.4M) in 2017 is primarily due to ramp-up of capital spend of project #73566 Darlington Primary Heat Transport Pump Motor Replacement (+$25.3M), and project #31508 Darlington Fukushima Phase 1 Beyond Design Basis Event

Emergency Mitigation (+$17.7M). Additionally, a portion of the increase is due to the start of new projects, notably project #84235 Darlington Primary Heat Transport Liquid Relief Valves Modifications (Waterhammer) (+$13.1M), and project #83035 Darlington Powerhouse Upper Level Service Water Piping Replacement (+$7.8M).

a) Please provide the 2018 budget amounts compared to actuals for each project.

b) Please provide the reason for the cost variances of 10% or more for each of the projects listed.

D2-AMPCO-56

Ref: Ex D2 T1 S2 T2 P25

Increases in Pickering Portfolio Projects (Allocated) spending (+$61.2M) in 2017 is primarily due to two Fukushima-related projects #41027 Pickering Fukushima Phase 2 Beyond Design Basis Event Emergency Mitigation Equipment (+$14.7M), and #49158 Pickering B Fukushima Phase 1 Beyond Design Basis Event Emergency Mitigation Equipment (+$7.6M), as well as the reclassification of project #83088 Pickering A Low Pressure Feedwater Heat Exchanger Replacement (+$11.7M) from the OM&A Portfolio to Capital. The remaining variance is due to 45 projects, each with variances below $5.0M.

a) Please provide the 2017 budget amounts compared to actuals for project #41027 and #49158.

b) Please provide the reason for the cost variances of 10% or more for each of the projects listed.

D2-AMPCO-57

Ref: Ex D2 T1 S2 T2 P26

Increases in Operations and Project Support Portfolio Projects (Allocated) (+$11.9M) is due primarily to projects #66600 Pickering Machine Delivered Scrape (+$3.0M), #83051 Darlington Feeder and Fuel Channel Baseline Inspections (+$2.9M), #66594 Inspection and Maintenance Services CIGAR (Channel Inspection and Gauging Apparatus for Reactors) Gap System and Drive Reliability (+$1.9M), #82930 Security Project C (+$1.8M), and #83039 Darlington Rapid Delivery Machine (+$1.3M).

a) Please provide the 2017 budget amounts compared to actuals for project #41027 and #49158.

c) Please provide the reason for the cost variances of 10% or more for each of the projects listed.

D2-AMPCO-58

Ref: Ex D2 T1 S3

Please complete the Table below.

Nuclear Operations- Capital and ISA	2016 Actual	2017 Actual	2018 Actual	2019 Actual	2020 Actual	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast
CAPEX											
ISA											
ISA % of CAPEX											

D2-AMPCO-59

Ref: Ex D2 T1 S3 Tables 1a to 1d

Please complete the attached spreadsheet (D2-AMPCO-59 Attachment A) and provide the excel version.

D2-AMPCO-60

Ref: Ex D2 T1 S3 P2

OPG indicates all of the Tier 1 projects, with 17 exceptions have final in-service dates before or during the IR Term. The 17 exceptions are listed.

a) Please identify the Tier 1 projects with final in-service dates before the IR Term and provide the in-service date.

b) Of the 17 exceptions listed, please indicate which projects are ongoing from EB-2016-0152.

D2-AMPCO-61

Ref: Ex D2 T1 S3 P2-3

OPG indicates there are 79 Tier 1 projects, 91 Tier 2 projects and 117 Tier 3 projects for a total of 358 projects.

Please provide the number of Tier 1, Tier 2 and Tier 3 projects in EB-2016-0152 and the total number of projects.

D2-AMPCO-62

Ref: Ex D2 T1 S3 P3

OPG indicates there are a further 53 projects in the project portfolio unallocated category which are projects in the project identification or project initiation phase. OPG expects that some of these projects will move into the project definition and execution phase as part of the ongoing portfolio management process. At D2 T1 S1 Tables 5a and 5b, OPG provides a listing of these projects.

a) Please add a column to Table 5a and Table 5b to show the Business Unit that has identified each project.

b) Please add a column to Table 5a and 5b to indicate the applicable AMOC.

c) Please add a column to Table 5a and 5b to provide the forecast cost of each project.

d) As part of the ongoing portfolio management process, please explain where and how OPG prioritizes the movement of these projects into the project development and project definition phase.

D2-AMPCO-63

Ref: Ex D2 T1 S3 P5

Project #84235, Darlington Primary Heat Transport Liquid Relief Valve Modifications (Waterhammer), was listed in EB-2016-0152 as Project OM&A (#38933 Darlington Primary Heat Transport Liquid Relief Valve Modifications (Waterhammer) and was subsequently re-classified as capital.

a) Please provide the rationale for reclassifying the project as capital and indicate when it was approved.

b) Please provide the amount re-classified as capital.

D2-AMPCO-64

Ref: Ex D2 T1 S3 P5

Seven projects previously identified at Tier 2 in EB-2016-0152 are now classified as Tier 1 projects based on updated estimates.

- #31426 Darlington Fuel Handling Inverter Replacement
- #31516 Darlington Station Lighting Retrofit
- #80023 Darlington Steam Generator Level Control Valves Replacement
- #80036 Darlington R22 Refrigerant Air Conditioning Unit Replacement
- #80063 Darlington Standby Generators Protective Relay Replacement
- #33258 Darlington Replacement of Emergency Power System Uninterruptible Power Supply
- #40691 Pickering B Emergency Power Generator and Main Output Power Protective Relay Replacement.

a) Please provide the Business Unit responsible for each project.

b) For project #31426 and project #33258, please provide and explain the variance.

c) Please provide the Post Implementation Review for Project #40691.

D2-AMPCO-65

Ref: Ex D2 T1 S3 P10

With respect to Project #83480 Darlington 4kV Motors Refurbishment and Replacement, OPG indicates the purpose of this project is to proactively replace or refurbish approximately 130 4kV motors to avoid motor failure. The project will initially consist of a pilot to undertake seven strategically selected 4kV motor replacements to obtain operating experience. This pilot will provide better definition of scope

and costs and minimize risk prior to proceeding with the remaining replacements. Depending on the system in which the motor(s) are installed, motor failure could result in a lengthy forced outage/shutdown of reactor units. Total project cost is forecast to be $278.8M.

a) How many motors are installed in a system where motor failure could result in a lengthy forced outage/shutdown of reactor units.

b) Provide details on when a motor failure has resulted in a lengthy forced outage/shutdown of reactor units.

c) How many motor failures have occurred since 2010?

d) Please provide details on the average cost of motor failures.

e) Please explain why all 130 4kV motors are being replaced.

D2-AMPCO-66

Ref: Ex D2 T1 S3 P19

OPG indicates 16 Tier 1 projects have been completed since EB-2016-0152.

Please provide the Post Implementation Reviews for each project.

D2-AMPCO-67

Ref: Ex D2 T1 S3 P23

On the Air Compressors Replacement project, residential customers favoured replacing all of the identified compressors proactively, while business customers were essentially split between proactive replacement and maintaining an inventory of spares. OPG is planning to proactively replace all 19 air compressors at Darlington in alignment with customer feedback. This investment would mitigate operational risk as the identified compressors' condition is expected to deteriorate.

a) What is the cost of proactively replacing all 19 air compressors compared to maintaining an inventory of spares?

b) Were customers advised the potential cost of this project is >$20M?

D2-AMPCO-68

Ref: Ex D2 T1 S3 P23

On the Crane Project, residential customers were split between comprehensive and partial replacement approaches, while business customers preferred the partial replacement approach by a 10% margin. In alignment with customer feedback, OPG is planning to refurbish up to 14 cranes during the IR term and defer refurbishment of the remaining cranes.

Were customers advised the potential cost of this project is >$20M?

D2-AMPCO-69

Ref: Ex D2 T1 S3 P26

With respect to Project #31524, OPG indicates the results of the pilot are being finalized, with an expectation of a reduced project cost, and this will be factored into the Execution Phase BCS, which is planned to be submitted for approval in Q1 2021.

Please provide the Execution Phase BCS for Project #31524.

D2-AMPCO-70

Ref: Ex D2 T1 S3 P55

OPG provides a Business Case Summary Index and the approval date of the BCS.

a) Please add a column to the table to indicate the Business Unit.

b) Please add a column to the table to indicate the Contractor.

D2-AMPCO-71

Ref: Ex D2 T1 S3 Tables 1a-2g

Please provide an excel version of each table 1a to 2g.

D2-AMPCO-72

Ref: Ex d2-T1-S3 Page 26 Line 8

a) Please provide the Work Request sent to the ESMSA vendors and the vendor estimates that OPG's estimating group found reasonable and within industry estimating guidelines. Also provide OPG Estimating group industry benchmark costs for roof replacement in $/square foot replaced.

b) Please complete the attached spreadsheet (D2-AMPCO-72_Attachment A) and provide the excel version.

D2-AMPCO-73

Ref: Ex D2 T2 S2 P5

OPG began the third segment ahead of the High Confidence Schedule by approximately 28 days. The third segment involves the installation and reassembly of reactor components, and includes the installation of feeder pipes. This segment was completed in 105.9 more days than the planned duration. Thus, at completion of this segment, the U2 refurbishment outage was 78 days behind the High Confidence Schedule. Challenges experienced with the procurement and installation of feeder pipes affected the refurbishment schedule.

Delays were experienced in the receipt of the new feeders due to the required qualification of fabrication welding specifications, inspection of fabrication, and welding, fabrication and delivery issues. Quality non-conformances, found upon inspection, needed to be resolved. Higher than expected weld failure rates were experienced in field welds. Congestion was experienced on the reactor face, particularly as regards to scaffolding

OPG provides a summary of Feeder Lessons Learned and Actions at Ex D2 T2 S3 Attachment #6.

a) Please provide the root cause of the 78 day delay.

b) Please expand on the quality non-conformances that needed to be resolved.

c) Did OPG sufficiently leverage the reactor mock-up facility prior to commencing the installation of feeder pipes? If yes, provide details. If not, why not?

D2-AMPCO-74

Ref: D2 T2 S2 P2

OPG tracked its Program performance through the execution of the Unit 2 refurbishment both internally and to the public against the U2EE.

Ref: EB-2016-0152 Ex L, Tab 4.3, Schedule 1 Staff-055 Attachment 1 P8

As part of the U2EE, OPG indicates the LUEC of refurbishing and continuing to operate the Darlington units for a further 30 years remains at 8.1 ¢/kWh (2015$). There is no anticipated change to the economic assessment, and the LUEC of refurbishing and continuing to operate the Darlington station for a further 30 years remains at 8.1 ¢/kWh (2015$).

The DRP continues to contribute 3.3 ¢/kWh ($2015) to the LUEC estimate, and the post-refurbishment operations and support costs necessary to run the plant, including fuel, continue to contribute 4.8 /kWh ($2015) to the total LUEC.

Please update the LUEC estimate and the contribution of the DRP and post-refurbishment activities to the LUEC estimate.

D2-AMPCO-75

Ref: D2 T2 S2 P12

For the Unit 2 Early-In-Service projects, F&IP and SIO, compared to the OEB approved amount in EB-2016-0152 of $377.2M, there is a forecast total over-variance $171.2M. This variance is the result of increased costs of $100.9M for these projects, and declaring in-service $70.3M for new Unit 2 Early-In-Service projects.

Ref: D2 T2 S9 Table 1

a) Please provide a breakdown and description of the $100.9M variance.

b) For each of the Early In-service, F&IP and SIO projects shown below, please provide a schedule that sets out the forecast capital and in-service capital additions compared to actuals for each of the years 2010 to 2020.

DN	Breathing Air Capacity Enhancement[4]	73537	Unit Refurb - Early In-service
DN	Fuel Handling Powertrack Refurbishment[4]	73162/ 73562	Unit Refurb - Early In-service
DN	Water & Sewer Project [2]	73802	F&IP
DN	Darlington Energy Complex [2]	73803	F&IP
DN	Retube & Feeder Replacement Island Support Annex [2]	73810	F&IP
DN	Refurbishment Project Office [2]	73815	F&IP
DN	Third Emergency Power Generator	73360	SIO
DN	Containment Filtered Venting System	73365	SIO
DN	Shield Tank Overpressure Protection	73380	SIO
DN	Electrical Power Distribution System [2]	73821	F&IP

c) Please provide the contractor for each project.

d) Please provide the business case for each project.

e) Please provide any Project Over Variance Approvals.

f) Please provide the CPI and SPI performance metric results for the Facilities & Infrastructure Projects for the years 2015 to 2020.

g) Please provide the CPI and SPI performance metric results for the Safety Improvement Opportunities projects for the years 2015 to 2020.

D2-AMPCO-76

Ref: D2 T2 S2 P15

In accordance with the OEB's Decision and Order in EB-2016-0152,15 OPG produced annual reports on the DRP in each of 2018, 2019 and 2020 which summarized Program performance, including the refurbishment of Unit 2. Copies of the 2018 and 2019 reports are provided in Attachments 1 and 2.

Please provide the 2020 Report.

D2-AMPCO-77

Ref: Ex D2 T2 S9

a) Table 1: Please add Plan amounts to Table 1 for the years 2016 to 2019.

b) Table 2 & Table 3: Please add the following columns to Table 2 and Table 3: Original In-service Date, In-service Date Variance (days), Original Project Cost, Project Cost Variance ($M), and Inservice amounts for the years 2010 to 2019. .

c) Please provide excel versions of Table 2 and Table 3 incorporating part b).

D2-AMPCO-78

Ref: Ex D2 T2 S9 Table 4

Please identify the nine Unit Refurbishment - Early In-service projects.

D2-AMPCO-79

Ref: Ex D2 T2 S10

a) Please provide an excel spreadsheet listing of all D2O Storage Project related Station Condition Reports (SCR), from all data bases, with the following headings:

- Initiation Date
- SCR Number
- Title
- Resolution Category
- Significance Level
- Status

b) Please provide the full SCR detailed reports with attachments, evaluations, corrective actions, and closure notes for all SCRs with resolution category A, B, and C

c) Please provide any SCR Effectiveness Reviews related to the D2O Storage Project.

D2-AMPCO-80

Ref: Ex D2 T2 S10

a) Please provide a table that summarizes the Budget compared to Actual capital expenditures and in-service capital additions by year from the beginning of the D2O Storage Project to the end.

b) Please provide a copy of all D2O Storage Project related Available For Service (AFS) documents and the associated Report of Equipment In-Service (REIS) documents.

D2-AMPCO-81

Ref: Ex D2 T2 S10

a) Please provide any internal audits of the D2O Storage Project undertaken by OPG's Audit and Risk Committee.

b) Please provide any external audits of the D2O Storage Project.

c) Please provide all reviews/reports undertaken by a third party related to the D2O project.

D2-AMPCO-82

Ref: Ex D2 T2 S10 P4

With respect to D2O Storage Project key documents, OPG provides the following:

- 2a - Project Charter: Adding Heavy Water Storage/Drum Handling Facilities dated October 13, 2005
- 2b - Project Charter: Refurbishment, Operational Improvement and Long Term D2O Storage dated August 18, 2010
- 2c - Project Charter: Refurbishment, Operational Improvement and Long Term D2O Storage dated June 20, 2011

Please provide any subsequent Project Charters.

D2-AMPCO-83

Ref: Ex D2 T2 S10 P9

The primary purpose of the D2O Storage Project is to support heavy water management for the DRP and, for the management of heavy water over the life of the Ontario nuclear fleet. 1,700 m3 of the 2,100 m3 of heavy water storage contained in the project will be used to support DRP; 400 m3 supports ongoing operations at Darlington and the TRF.

Please complete the following table:

D2O Storage Project Heavy Water Management Costs

Project Purpose	**Forecast Cost 2011 $M**	**Forecast Cost 2015 $M**	**Forecast Cost 2018 $M**	**Actual Cost 2020 $M**
1700 m3 storage to support DRP				
400 m3 storage ongoing operations at DNGS and TRP				
Total 2100 m3 storage				

D2-AMPCO-84

Ref: Ex D2 T2 S10 P8

The purpose of the D2O Storage Project includes providing 400 m3 of storage to improve ongoing heavy water operations at Darlington and at the Tritium Removal Facility (TRF). The TRF provides detritiation services (i.e., the process of removing excess tritium from moderator and PHT systems in CANDU 7 reactors to stay within operating and regulatory limits) to all the operating nuclear generating stations in Ontario.

Ref: Ex D2 T2 S10 P11

With regard to TRF operations, the additional capacity created by the D2O Storage Project will: (1) allow greater storage of TRF feed and product to address any gaps between TRF availability and the demand for tritium removal, (2) enable the storage of additional heavy water to address periods when the TRF is undergoing an outage, (3) facilitate a more flexible schedule for heavy water shipments to and from Pickering and Bruce, and (4) potentially assist with heavy water management once Pickering operations end.

a) How many reactors did TRF provide detritiation services to at its inservice date of 1989?

b) How many reactors was TRF supporting in 2005?

c) How many reactors will TRF be supporting at the end of 2025?

d) Prior to the D2O Storage Project, what was the existing heavy water storage capability at Darlington and at the TRF in terms of volume and number of drums?

e) Please provide the economic assessment/cost benefit analysis related to improving ongoing heavy water operations at Darlington and at the TRF.

f) Please provide the business case for TRF operations to assist with heavy water management once Pickering operations end.

D2-AMPCO-85

Ref: Ex D2 T2 S10 P6-7

The total cost of the D2O project is $509.3 M. The 2013 Full Release Execution Business Case anticipated spending on the project of $110 M. At pages 6-7, OPG provides the major elements of the project's construction.

a) Please provide the final costs to undertake each of these major elements, compared to the original budget.

b) Please indicate which Contractor was responsible for starting and completing each major construction element.

c) Please identify all challenges related to undertaking each major construction element.

d) Please identify the major project elements allocated to only DRP Storage.

e) Please provide all Project Over-Variance Approvals related to the D2O Storage Project.

f) Please provide the CPI and SPI performance metric results for the D2O Storage Project by year.

D2-AMPCO-86

Ref: Ex D2 T2 S10 P5

OPG provides the chronology of Business Case Summaries (BCS) from 2006 to 2018 as follows:

Attachment 2k - 2006 Developmental Release BCS
Attachment 2l - 2011 Draft Developmental BCS
Attachment 2m - 2012 Full Release Definition BCS
Attachment 2n - 2012 Partial Release Execution BCS
Attachment 2o - 2013 Full Release Execution BCS
Attachment 2p - 2015 Superseding Release Execution BCS
Attachment 2q - 2018 Superseding Release Execution BCS

a) Please provide the contingency amounts provided in each BCS and the rationale.

b) Please provide a breakdown and description of all contingency amounts used for the D2O Storage Project.

c) Please provide the original risk register related to the D2O Storage Project and any subsequent updates to the risk register.

D2-AMPCO-87

Ref: Ex D2 T2 S10

The drum handling, storage, testing and cleaning facility supports the regular transportation of heavy water to and from the Pickering and Bruce stations for Detritiation, and supports occasional heavy water transactions with other parties.

a) Did OPG evaluate the options for drum cleaning? If yes, please provide the cost benefit analysis that was performed in support of the business case of alternatives to construct, operate, and maintain a drum cleaning facility.

b) Did OPG obtain cost information from vendors for off-site drum cleaning services? If yes, provide the service cost per drum.

c) How is OPG currently cleaning drums?

d) How many drums are cleaned per year at Darlington and Pickering and at what cost?

e) How many D2O drums have been disposed of at Darlington and Pickering over the last 15 years?

f) What is the final cost for the drum handling, storage, testing and cleaning facility?

D2-AMPCO-88

Ref: Ex D2 T2 S10

This exhibit presents the D2O Storage Project's history from its pre-Darlington refurbishment origins in 2005 through to its completion in 2020, when the facility supported the refurbishment of Unit 3 by storing the heavy water drained from its PHT system.

a) Please confirm if all the U3 Moderator and PHT D2O was drained directly to the new D2O facility during Refurbishment. If not, why not and how much U3 D2O was stored elsewhere?

b) Please provide the U2 and U3 Refurbishment Moderator and PHT D2O draining start and end dates and total volume drained for each unit and each system.

D2-AMPCO-89

Ref: Ex D2 T2 S10

a) For each of the years 2005 to 2020, please identify the Business Unit accountable for the D2O Storage Project and explain any changes.

b) Please provide the organizational structure of the D2O Storage Project over the course of the project.

c) Please provide a list of Project Managers (PM) for the D2O Storage Project over the course of the project. Please provide the years of experience of each PM and a list of the other projects they were managing simultaneously.

d) Please provide the forecast versus actual overtime costs allocated to the D2O Storage Project by year over the course of the project for all staff, contractors and trades workers.

e) Please provide all correspondence to contractors instructing or approving them to work premium overtime hours.

D2-AMPCO-90

Ref: Ex D2 T2 S10 P15

Almost half of the D2O storage facility is located underground with the floor of the seismic dike located 13 m below ground level.

a) Please provide the meeting notice when the final decision to build tanks below grade was presented including:

    - Attendees with job title, employer name, and years of experience in role

- Meeting presentation materials including economic evaluation and estimates for the below grade vs above grade storage tank location
- Meeting minutes

b) Who was the final OPG authority to approve a below grade storage tank facility? Please provide a copy of the approval document.

D2-AMPCO-91

Ref: Ex D2 T2 S10 P2, P51

OPG describes the D2O project a first of a kind and one-of-a-kind facility.

a) On what basis does OPG characterize the D2O project as a first of a kind and one-of-a-kind facility?

b) What is the industry norm/best practice with respect to storing D2O during refurbishment activities?

c) What is unique about the scope of the D2O project compared to industry best practice?

D2-AMPCO-92

Ref: Ex D2 T2 S10 P12 Chart 1

In Chart 1, OPG provides a breakdown of the capital costs primarily by management categories.

Please provide a breakdown and description of the costs undertaken by B&M and Sub-Contractors, CanAtom and Sub-Contractors and Other Sub-Contractors.

D2-AMPCO-93

Ref: Ex D2 T2 S10 P12 Chart 2

In Chart 2, OPG provides capital additions by year.

Please provide a breakdown and description of the components placed in service by year.

D2-AMPCO-94

Ref: Ex D2 T2 S10 P37

OPG engaged Trow Associates ("Trow") to perform a geotechnical assessment of the site.

Please provide a copy of Trow's Geotechnical Report.

D2-AMPCO-95

Ref: Ex D2 T2 S10 P41

In 2012, the Full Definition BCS included another alternative to construct a "drum warehouse" inside the protected area. This alternative would have used drums to store 1700 m3 of DRP heavy water, and still required construction of a smaller D2O facility to meet operational improvement needs and for TRF life extension. This alternative was rejected because it would have had an unacceptable impact on the DRP critical path. This time and associated cost would have added to the critical path of each unit's refurbishment outage with an estimated total generation revenue loss of $480M.

a) How many drums are required to store 1700 m3 of DRP heavy water?

b) Please provide the calculation of the estimated total generation revenue loss of $480M and provide all assumptions.

D2-AMPCO-96

Ref: Ex D2 T2 S10 P42

OPG indicates it reviewed an external operating experience report that collected information on issues related to heavy water management at the HWMB and their resolution. This report was compiled as part of preparation for the earlier operational improvement project.

Please provide a copy of this report.

D2-AMPCO-97

Ref: Ex D2 T2 S10 P42

In April 2011, OPG convened a value-engineering workshop. A major focus of this workshop was to re-evaluate the potential sites for the project. After reviewing all potential sites identified, participants agreed that the site adjacent to the HWMB was superior from a cost and operational perspective, despite the constructability, site preparation and environmental issues identified.

a) Please provide the Value Engineering Workshop Notice of meeting including:

- Attendees with job title, employer name, and years of experience in current position and with employer
- Meeting minutes
- Value Engineering report and all subsequent revisions.

b) Please provide the same information for all other project Value Engineering Workshops or Meetings that were held, or planned and subsequently cancelled.

c) Please summarize the constructability, site preparation and environmental issues identified at that time.

D2-AMPCO-98

Ref: Ex D2 T2 S10 P43

In early 2012, Faith & Gould (F&G) presented its "overnight estimate" of forecast construction costs, which excluded interest, escalation and contingency.

a) Please provide OPG's engagement document for F&G.

b) Please provide F&G's overnight estimate.

c) Please provide the then-existing preliminary design documents.

D2-AMPCO-99

Ref: Ex D2 T2 S10 P43

OPG hired EXP, a division of CH2M Hill Canada Limited and the successor company to Trow, to perform a supplemental geotechnical study.

Please provide a copy of EXP's report.

D2-AMPCO-100

Ref: Ex D2 T2 S10 P44

OPG indicates an RFP was distributed to six potential proponents in May 2011. The RFP sought engineering services for all phases of the project (i.e., preliminary, detailed, construction support, commissioning, available for service ("AFS") and close out). OPG received four proposals in response to the RFP. OPG considered these proposals, but ultimately decided to cancel the RFP as it was not satisfied with any of the technical proposals.

a) Please identify the six proponents and the four who provided proposals to OPG.

b) Please provide the Scope of Work (SOW) document.

c) Please provide the criteria used to evaluate the proposals.

d) Please indicate why OPG was not satisfied with the technical proposals.

D2-AMPCO-101

Ref: Ex D2 T2 S10 P45

Over the remainder of 2011, OPG refined the documentation for the project and created the technical specifications for a second engineering services RFP. The second engineering services RFP was issued in late 2011. The RFP featured a more developed scope of work ("SOW"), which provided greater detail on OPG's expectations for the project and also included certain mandatory criteria that proponents had to meet in order for their proposal to be considered. OPG received three proposals, but its initial review of compliance with the mandatory criteria determined that none of the proposals complied. As a result, OPG suspended further evaluation of the proposals and cancelled the RFP.

e) Please identify the proponents that received the RFP and the three who provided proposals to OPG.

f) Please provide the more detailed SOW document.

g) Please provide the mandatory criteria that proponents had to meet.

h) Please identify the mandatory criteria that could not be met and why the three proponents did not meet the criteria.

D2-AMPCO-102

Ref: Ex D2 T2 S10 P45

OPG decided to undertake the D2O Storage Project on an Engineer, Procure, and Construct ("EPC") basis within the ESMSA framework. This approach was chosen to enable OPG to gain operational experience with both EPC contracting and the ESMSA framework on a large and complex project prior to starting unit refurbishment. The D2O Storage Project was OPG's first large and complex EPC project to be executed under the ESMSA.

a) Did OPG apply the same mandatory criteria as the RFP issued in late 2011? If not, why not?

b) Please provide the criteria used to evaluate the proposals of ES Fox and B&M.

c) Please identify any criteria that could not be met by ES Fox or B&M.

D2-AMPCO-103

Ref: Ex D2 T2 S10 P46

OPG indicates the SOW that formed part of the work request also outlined OPG's required schedule, deliverables and procedures.

Please provide the SOW and preliminary design requirements.

D2-AMPCO-104

Ref: Ex D2 T2 S10 P47

OPG first evaluated both proposals (Fox and B&M) based on the technical criteria and concluded that both proposals should progress to the next stage, the pricing evaluation. The results of the initial evaluation placed ES Fox ahead on technical criteria and B&M ahead on price.

a) When performing the technical evaluation, did OPG assess the capability and experience of RCM Technologies Canada Corporation (RCMT) (B&M engineering subcontractor)?

b) How was this technical evaluation conducted?

c) Did OPG review the experience RCMT had as the designer for large seismically qualified civil structures, new multi story building designs, heavy water management and tritium control systems, new first of a kind full system designs, and tank storage systems? If yes, please summarize the experience RCMT has.

d) Provide the list of RCMT related projects reviewed by OPG.

D2-AMPCO-105

Ref: Ex D2 T2 S10 P47

OPG indicates the RFP process that selected B&M was fair, equally weighted bid price and technical factors, and aligned with the processes that OPG used for other RFPs under the ESMSA for DRP prerequisite projects.

Please confirm if the mandatory criteria from the cancelled RFP (page 45 line 5) was met when awarding to B&M. If not, explain why not.

D2-AMPCO-106

Ref: Ex D2 T2 S10 P44-47

OPG outlines the contracting history for the D2O Storage Project.

a) Please provide the Design Requirements generated for the RFPs and provide all subsequent revisions.

b) Please provide the Conceptual Design report generated for the RFPs and provide all subsequent revisions.

c) Please provide the Engineering Change Control (ECC) Design Requirements from initial issue and all subsequent revisions.

D2-AMPCO-107

Ref: Ex D2 T2 S10 P44

OPG also began soil and water testing at the D2O Storage Project site to test for the presence of tritium on the proposed site of the D2O Storage Project. OPG had done sampling following a 2009 spill at the Injection Water Storage Tank, which indicated elevated tritium levels in the soil and groundwater in the area north of the site.

Please discuss how the presence of tritium in the site's soil and the water contributed to any cost overruns, schedule delays and scope changes on the project and quantify the impact.

D2-AMPCO-108

Ref: Ex D2 T2 S10 P44

Any change to a Darlington system, structure, or component, which affects or alters its design, function, or method of performing its function must follow OPG's modification process.

Please describe OPG's modification process and provide copies of any supporting internal governance documents.

D2-AMPCO-109

Ref: Ex D2 T2 S10 P49

OPG indicates the D2O Storage Project design activities were carried out under OPG's Engineering Change Control ("ECC") process.

Please provide OPG's internal document(s) that governs the ECC process.

D2-AMPCO-110

Ref: Ex D2 T2 S10 P49

Any change to a Darlington system, structure, or component, which affects or alters its design, function, or method of performing its function must follow OPG's modification process.

Please provide all internal documents that relate to OPG's modification process.

D2-AMPCO-111

Ref: Ex D2 T2 S10 P50

OPG required a Modification Outline for the D2O Storage Project.

Please provide the Modifcation Outline for the D2O Storage Project.

D2-AMPCO-112

Ref: Ex D2 T2 S10 P50

OPG indicates and significant modification must undergo OPG's constructability, operability maintainability and safety ("COMS") review process whereby a series of meetings are held with OPG personnel representing the relevant areas of Darlington to assess each design against the COMS criteria.

a) Please provide the COMS criteria.

b) Please provide a list the dates for all COMS meetings and provide the following materials for each meeting:

- Meeting Notice
- Attendees with job title, employer name, and years of experience
- Meeting minutes
- Disposition of COMS participant inputs.

D2-AMPCO-113

Ref: Ex D2 T2 S10 P53

Soil testing revealed low levels of tritium in some of the soil.

What was the project total costs associated with tritium contaminated soil management and final disposal?

D2-AMPCO-114

Ref: Ex D2 T2 S10 P56

There were numerous buried services (e.g., water, electrical, gas and communications) that intersected the D2O Storage Project site and the underground pipe chase connecting the project to the HWMB. The active services were rerouted around the project. The abandoned services were cut and capped at the project site boundaries and any material within the project area was removed to avoid interference with the excavation.

Please discuss how buried service requirements contributed to cost overruns, schedule delays and scope changes on the project and quantify the impact.

D2-AMPCO-115

Ref: Ex D2 T2 S10 P56

The 30 inch diameter Low Pressure Service Water (LPSW) pipe required rerouting because it crossed the footprint of the D2O Storage Project site. After the LPSW pipe became available for service, OPG conducted a review of the LPSW pipe relocate to investigate the reasons why it was delayed. One of the review's major conclusions was that the amount of work required for the LPSW pipe relocation was initially understated. OPG's early design documents did not sufficiently distinguish the relocation of this very large pipe from other buried service relocation work and the contractor failed to include sufficient scope to execute this complex task in its bid. The review also noted that schedule delays had the impact of moving the work into the winter, which added further challenges to completing the relocation. The LPSW pipe reroute ultimately resulted in a two-month delay in the TRF outage and delayed the start of installing the project's caisson wall and excavating the seismic dike.

a) Please provide OPG's review of the LPSW pipe relocate.

b) Which Business Unit is responsible for the early design documents related to buried services? Please provide an explanation as to why this large pipe was not properly identified.

c) Please provide details on the cost impacts related to the delay in relocating the LPSW pipe.

D2-AMPCO-116

Ref: Ex D2 T2 S10 P59

The project also installed some of the tie-ins to the moderator and the primary heat transport supply systems for connection to and from the new storage tanks once the D2O Storage Project was completed.

Please provide the final cost for the tie-ins for piping connections.

D2-AMPCO-117

Ref: Ex D2 T2 S10 P59-60

OPG provides details on the Other Buried Services that had to be moved or removed.

Please provide any incremental costs related to this work.

D2-AMPCO-118

Ref: Ex D2 T2 S10 P63 line 4
Ref: Ex D2 T2 S10 P6 line 2
Ref: Ex D2 T2 S10 P67 line 4

a) Did OPG conduct scope review board meetings for any changes or additions to the project including changes as a result of COMS input or any other drivers?

b) Provide all the project scope review board meeting dates and materials including:

- Meeting Notice
- Attendees with job title, employer name, and years of experience
- Meeting presentation materials including scope being reviewed
- Meeting minutes
- Disposition of scope changes
- Position and title of who authorized the scope change
- Provide a list of scope additions and reductions with associated project cost impacts and if any of these scope items are identified in a BCS.

D2-AMPCO-119

Ref: Ex D2 T2 S10 P64

The experience with creating and verifying the preliminary design documents raised questions about whether the May 15, 2013 milestone for design completion was realistic in light of RCMT's capacity to produce quality designs and OPG's capacity to review them in the time available.

Please provide any internal or third party assessments of RCMT.

D2-AMPCO-120

Ref: Ex D2 T2 S10 P69

After evaluating the merits of continuing with B&M, OPG terminated B&M's D2O Storage Project PO on October 16, 2014. The termination letter cited issues with B&M's performance in carrying out its

obligations related to estimating, scheduling and managing the D2O Storage Project and with meeting the standard of care established under the ESMSA in performing the project.

Does OPG still use B&M as an ESMSA contractor? If yes, please explain.

D2-AMPCO-121

Ref: Ex D2 T2 S10 P91

The evidence states "A series of meetings occurred early in 2017 to better understand the basis for CanAtom's cost claims and to explore ways to jointly mitigate them. Through commercial discussions between the parties, OPG accepted responsibility for about $7.5M for claims related to scope or estimation issues, leaving some $37.5M in dispute. This sum related primarily to redesign of the steel superstructure and seismic dike top slab."

Please provide a detailed list of $7.5 million in scope OPG accepted responsibility for and why.

D2-AMPCO-122

Ref: Ex D2 T2 S10 P102

At year-end 2019, CanAtom prepared an estimate of its cost to complete the D2O Storage Project. Using the $70M maximum guaranteed payment and an additional $1.9M that OPG had agreed to pay for changes to project scope and a settlement of CanAtom claims to year end 2019.

Please provide a detailed list of $1.9 million in scope change OPG agreed to pay and why.

D2-AMPCO-123

Ref: Ex D2 T2 S10 P105

The 2011 Draft Developmental BCS differed from the 2006 Developmental Release BCS in that it captured the increased scope to address Darlington refurbishment needs.

Please describe in detail the scope of the Darlington Refurbishment needs including the basis for the needs given DNRU2 was completed without using the D2O Facility.

D2-AMPCO-124

Ref: Ex D2 T2 S10 P105

The 2006 Developmental Release BCS had estimated the project cost based on the operational improvement scope of work, which included 400 Mgs of D2O storage, a new drum handling, cleaning, and testing facility, and office space. In addition to these requirements, the 2011 Draft Developmental BCS for the merged project includes 1,700 Mgs of storage to meet refurbishment needs (bringing total storage requirements to 2,100 Mgs).

a) How many additional Curies of tritium will be removed and stored annually as a result of the operational improvements?

b) What are the project costs associated with each of the operational improvement scopes?

D2-AMPCO-125

Ref: Ex D2 T2 S10 P110

The 2015 Superseding Release Execution BCS contemplated an accelerated schedule to achieve a partial in-service date of June 2016 that would allow the project to accept heavy water from Unit 2 refurbishment, and full project completion in May 2017.

a) Please provide the incremental costs to accelerate the schedule.

The 2015 Superseding Release Execution BCS also analyzes the reasons why project costs had increased. The factors identified, which have been discussed above, were:

• The change to a stand-alone building rather than a three-sided building attached to the TRF.

• Increased materials quantities for piping, valves and equipment due to design changes and the need to install stand-alone systems rather than tying into existing systems at the TRF.

• Increased construction costs due to changes from the preliminary to the final design

• The required installation of the pipe chase given the reconfiguration of the building and to address water-hammer issues found with the preliminary design.

• Additional cost to address tritiated soil and water.

• Underestimation of effort by the original contractor.

b) Please provide the cost of each of the above increases.

D2-AMPCO-126

Ref: Ex D2 T2 S10 P88 & Attachment 5

With respect to Storing Unit 2 heavy water during construction, OPG decided to temporarily store the heavy water drained from Unit 2 in the HWMB. Accomplishing this required OPG to minimize heavy water inventories in the HWMB, repurpose some HWMB tanks and ship some heavy water to Pickering and Bruce.

a) Please provide the temporary storage (m3) provided at the HWMB for Unit 2.

b) Please provide the total amount shipped to Pickering and Bruce (m3) and explain how it was shipped.

c) Please provide a detailed breakdown of total costs to temporarily store Unit 2 heavy water.

D2-AMPCO-127

Ref: Ex D2 T2 S10 P90

In October 2016, CanAtom issued Project Change Notice (PCN) 67 which sought an increase of $37.4 M.

a) Please provide PDC 67.

b) Please provide a summary of all Project Change Notices related to the project.

D2-AMPCO-128

Ref 1: EB-2016-0152 Exhibit L, Tab 4.3, Schedule 2 AMPCO-052, Attachment 3, P73 of 90

With respect to the delay in D2O Storage at the Tritium Removal Facility, OPG references less than adequate project management and risk assessment led to delays and associated economic impact.

Ref 2: EB-2016-0152, Exhibit L Tab 4.3, Schedule 1 Staff-072, Attachment 5, Page 30 of 31 P1983 1984

Campus Plan	The D20 Storage Facility work has been delayed and the contractor's performance has been subpar	• Continue to devote adequate resources to recover the D20 Storage Facility's schedule. • OPEX from this project should be used to guide management of the future Execution Phase	• D2O Storage remains a significant threat to Refurbishment • Contractor performance and P&M's failure to actively manage the work have resulted in cost overruns and continued schedule

Attachment #5 references P&M's failure to actively manage the work has contributed to cost overruns and continued schedule.

Please quantify the impact of P&M's failure to actively manage the work on the final cost and schedule of the D2O Storage Project.

D2-AMPCO-129

Ref: Ex D2 T2 S10

Please identify and explain any CNSC events related to the D2O Storage Project.

D2-AMPCO-130

Ref 1: Exhibit D2-2-10, Attachment 2l, Page 11

The 2011 Developmental Release BCS provide the following with respect to the Post Implementation Review (PIR) Plan:

7/ POST IMPLEMENTATION REVIEW

Type of PIR:	Targeted Final AFS Date:	Targeted PIR Approval Date	PIR Responsibility (Sponsor Title)
Comprehensive	15-Apr-15	15-Apr-16	TRF Manager

	Measurable Parameter	Current Baseline	Targeted Result	How will it be measured?	Who will measure Person / Group?
1.	2100 Mgs of operational D2O storage capacity installed	Insufficient storage to improve TRF operation and support refurbishment.	Sufficient storage for operational improvements and simultaneous overhaul of two reactor units.	Volume of installed capacity against the modification design requirements.	TRF Manager
2.	Business benefit of $6,000k per year achieved with additional operation improvements storage.	Current set up is costing organization $6,000k per year in lost opportunities and additional costs.	Additional savings and new business of $6,000k a year with new operational improvements.	1. Measure and compare new transportation costs to historic D2O transportation costs 2. Compare new shipments from Bruce to historical average. 3. Compare new 3rd party business to historical average.	TRF Manager
3.					
4.					
5.					

A detailed PIR will be finalized for the future Partial Release BCS.

Ref 2: Exhibit D2-2-10, Attachment 2p P13

The 2015 Superceding Release Execution BCS provides the following with respect to the PIR Plan.

Part H: Post Implementation Review (PIR) Plan		
Type of PIR Report	Final Target In-Service or Completion Date	Target PIR Completion Date
Comprehensive PIR	01-MAY-2017	01-MAY-2018

Measurable Parameter	Current Baseline	Target Result	How will it be measured?	Who will measure it? (person/group)
Heavy water storage volume to meet needs of Refurbishment Project	No refurbishment storage	1,700,000L heavy water storage ready for Refurb project draining of Unit 2	Storage volume available in time for Refurb draining of Unit 2	VP Execution, Nuclear Refurbishment
Heavy water storage volume for TRF Operations	Insufficient storage to support optimal TRF operations	400,000L provided for improved TRF operation	Storage volume for operational improvements	SVP DNGS
Amount of Drum Handling, Cleaning and Testing Facility at DNGS	No capability to clean and test drums in-house	Ability to clean and test 100/drums per year	Amount of drum cleaning and testing.	SVP DNGS

Ref 3: Exhibit D2-2-10 Attachment 2q P11

The 2018 Superceding Release Execution BCS provides the following with respect to the PIR Plan.

Part H: Post Implementation Review (PIR) Plan		
Type of PIR Report	Target In-Service or Completion Date	Target PIR Completion Date
Comprehensive PIR	31-May-2019	31-May-2020

Measurable Parameter	Current Baseline	Target Result	How will it be measured?	Who will measure it? (person/group)
Heavy water storage volume to meet needs of Refurbishment Project	No refurbishment storage	1,700,000L heavy water storage ready for Refurb project draining of Unit 3	Storage volume available in time for Refurb draining of Unit 3	VP Execution, Nuclear Refurbishment
Heavy water storage volume for TRF Operations	Insufficient storage to support optimal TRF operations	400,000L provided for improved TRF operation	Storage volume for operational improvements	SVP DNGS
Amount of Drum Handling, Cleaning and Testing Facility at DNGS	No capability to clean and test drums in-house	Ability to clean and test 100 drums per year	Amount of drum cleaning and testing.	SVP DNGS

With respect to the Measurable Parameter "Heavy water storage volume to meet needs of Refurbishment Project", the target changed from sufficient storage for operational improvements and simultaneous overhaul of two reactor units in 2011, to 1,700,000 L heavy water storage ready for Refurb project of draining of Unit 2 in 2015 to 1,700,000 L heavy water storage ready for Refurb project of draining of Unit 3 in 2018.

There is a significant disconnect between the final target for the D2O Storage Project and the original need to provide sufficient storage for simultaneous overhaul of two reactor units six months in advance of the earliest potential start date for the refurbishment of Unit 2, which was then considered to be October 2015.

a) Please discuss how ratepayers are receiving value for money for this project.

a) Please provide the Comprehensive PIR for the D2O Storage Project.

D2-AMPCO-131

Ref: Ex D2 T2 S10 Appendix 2k

In December 2004, Kinectrics Inc. completed a study "Strategic Option Study or OPG Heavy Water Storage and Drum Handling." In April 2006, Kinectrics Inc. was contracted by this Project to further investigate the issues at Darlington and Pickering and to develop options that would address OPG's D2O management needs.

Please provide copies of all reports prepared by Kinectrics Inc. related to D2O storage.

D2-AMPCO-132

Ref: Appendix 2p - 2015 Superseding Release Execution BCS P17

The 2015 Superseding Release Execution BCS shows a project variance of $270.9 million. On page 19, OPG provides a Change Summary. These items are included in the table below.

Ref: Appendix 2q - 2018 Superseding Release Execution BCSD

The 2018 Superseding Release Execution BCS shows a project variance of $117.4 million.

Please modify and complete the attached table to summarize the key drivers of the increase in costs at the 2015 provide Superseding Release Execution BCS, the 2018 Superseding Release Execution BCS and at project completion.

D2O Storage Project Cost Variance Drivers

Events	**Variance $M 2015 BCS**	**Variance $M 2015 BCS**
The relocation of the building 7 metres to the west		
Increased materials quantities for piping, valves and equipment		
Requirement to have process piping run in a pipe chase/tunnel buried 7 metres below grade		
Design Scope growth required to meet design requirements		
OPG Requested Scope Changes		
Environmental Requirements		
Under estimate of effort		
Dewatering Requirements		
Client Requested Changes		
Schedule Extension		
Schedule Acceleration		
EPSCA		
TOTAL		

D2-AMPCO-133

Ref: Ex D2 T2 S11 Attachment 1 P28

Burns & McDonnell/Modus were contracted to perform independent updates on Unit 2 execution that were reported to the Darlington Refurbishment Committee (DRC) of the OPG Board. This group was also requested by the DRC to perform an evaluation of the process used by OPG in developing the control budget and schedule for Unit 3, which was completed in November 2019.

Please provide the November 2019 report.

D2-AMPCO-134

Ref: Ex D2 T2 S11 Attachment 1 Page 70

a) Please provide a copy of No. NK38-NR-PLAN-09701-1000.

b) Please provide a copy of Ontario Power Generation, Darlington Refurbishment Program Assurance Program Management Plan, Doc. No. NK38-NR-PLAN-09701-10001, Sheet No. 0011, Rev. 003, June 29, 2018.

c) Please provide a copy of Ontario Power Generation, Darlington Refurbishment Project Assurance: 2020 Update & 3-Year Outlook, November 11, 2020.

D2-AMPCO-135

Ref: Ex D2 T2 S11 Attachment 1 P28

At the end of 2019, the contract with Burns & McDonnell/Modus was mutually agreed to expire and the Board moved the role of the Refurbishment Construction Review Board (RCRB) to the role of Independent Oversight. OPG will continue to utilize other oversight groups (e.g. Internal Audit) as appropriate.

a) Please provide all Burns & McDonnell/Modus reports between 2016 and the end of 2019, not filed with the application.

b) Please provide all internal audits of the DRP.

D2-AMPCO-136

Ref: Ex D2 T2 S11 Attachment #3

Bates White compares the D2O Storage Project to the Salt Waste Process Facility (SWPF), located at the Savannah River Site in Aiken, South Carolina, as a means to test the reasonableness of Bates White's estimate for the D2O Storage Project.

D2-AMPCO-137_Attachment A provides the US Department of Energy (DOE) February 2020 project management dashboard for the SWPF which shows the cost has soared from $900 million to $2.3 billion and start-up has been delayed since 2013.

a) Please explain why Bates White selected the SWPF project as a comparator.

b) Please provide the decision criteria used to select comparator projects.

c) Please provide other projects considered as comparators but not selected and indicate why.

d) Please confirm the $2.3 billion costs for the SWPF doesn't include other operating costs.

D2-AMPCO-137

Ref: Ex D2 T2 S11 Attachment #3 Appendix B

Please provide the following documents:

a) Page 44

CNSC Correspondence	**33**
Regulatory Correspondence_All HMBW West Annex Reg Corrs.xls	1
Regulatory Correspondence_August 2013 - August 2019, 32 CNSC and OPG letters	32

b) Page 44

Design Documents	**13**
Design Plan ~12320-10001, 10002, 10004, 1005 (Several Revisions)	11
Design Plan with design rev R01.pdf	1
Modification Design Requirements 2017.pdf	1

c) Page 44

Design Manual_Drum Handling_NK38-DM-38910-00001--000.pdf	1

d) Page 45

Dewatering Modification Design	**1**
Dewatering Modification Design Req.pdf	1

e) Page 45

1. SPEC Document List.xlsx	1

f) Page 46

1. EC List for Document Library - Henry Lo.xlsx	1

g) Page 47

Organizational Charts	**18**
Black&McDonald - D2O Org Chart - 01Aug2014.pdf	1
Black&McDonald_2014.01.14_D2O Team.pdf	1
Black&McDonald_Core Team Employee List.pdf	1
CanAtom_D2O Commissioning Organization Chart (May 1, 2019 and May 23, 2019 versions)	2
CanAtom_D2O Org Chart April, 2019.pdf	1
CanAtom_D2O Project Org Chart 04-05-19.pdf	1
D2O OPG Org Chart 24-Feb-2015.pdf	1
D2O Storage Project OPG Communication Matrix Rev6.pdf	1
EllisDon - D2O Team - July 2014.pdf	1
EllisDon D2O - 7334 Org Chart - Dec. 24-13.pdf	1
OPG - Simplified Org Chart April, 2019.pdf	1
OPG-CAN Zipperplan Apr 2019_1.pdf	1
RCMT - D2O Team - 24July2014.docx	1
RCMT D2O Project - Organization Control Chart R2 (Draft A 2014-07-24).docx	1
SNC Aecon_D20 Early Works Org Chart 11-1-17.pdf	1
SNC Aecon_D2O Project Org Chart - March 30 2016.pdf	1
SNC Aecon_D2O Project Org Chart -20160817.pdf	1

h) Page 48

P6 Schedules, Critical Path	**10**
Dec 2012_Schedule_31555 Presentation.pdf	1
Dec 2012_Schedule_48070014-LTR-019.pdf	1
Dec 2012_Schedule_BMPGR120302 - HWMBWA - DNGS Heavy Water Management Building West Annex.pdf	1
Jan 2013_31555 After 03Jan13 DD Update.pdf	1
Jan 2013_Schedule_431555 NR Layout for BM.pdf	1
Jan 2013_Schedule_Visio-2013.01.07_D20_Storage_Simple Schedule.pdf	1
July 2012 - Heavy Water Mnmnt Building WA - DNGS Heavy Water Management Building West Annex (D2O)_Submittal_1.pdf	1
Nov 2012_Schedule_48070014-LTR-013.pdf	1
Nov 2012_Schedule_DNGS - (D2O) HWMBWA Schedule_Submission - Nov-07-2012.pdf	1
Sep 2012_Schedule_D2O-TOTAL SCHEDULE-Sep 142012 (2).pdf	1

P6 Schedules, SNC and AECON	**23**
Schedule_Visio-HWMB WA Roadmap R0-E dd-Apr-12-2019.pdf	1
Apr 2015_Schedule_JV ORIGINAL BASELINE - 2015-09-24-D2O-JV-Scheudle.pdf	1
D20 Phase 2 Full Schedule dd 23-Aug-2019(1).pdf	1
D2O Full Construction Schedule dd 19-July-19.pdf	1
D2O Full Schedule (8 examples April through June 2019)	8
D2O_Schedule_ Driving Critical activities (March & December 2016 and February 2017 versions)	3
D2O-Schedule- Full schedule dd 26-Apr-19.pdf	1
Dec 2015_D2O_Schedule_Critical Path20151203.pdf	1
Dec 2016_D2O_Schedule_ Critical activities 20161209.pdf	1
Mar 2016_D2O_Schedule_ Critical Stream20160311.pdf	1
Mar 2016_D2O_Schedule_ Near Critical activities 20160311.pdf	1
Nov 2015_D2O_Schedule_Near Critical Path20151124.pdf	1
Nov 2015_D2O Complete Schedule20151110 (2 parts)	2

i) Page 48

Seismic Classification

Design COMS Decl Form.pdf	1
Memo re Team Tech Rev.pdf	1
Memo re Tech Review 002.pdf	1
Memo re technical review.pdf	1
Scoping Phase COMS Presentation.pptx	1

j) Page 49

Soil Management	20
Borehole Drilling Investigation.pdf	1
Elev Tritium Levels.pdf	1
Elevated Tritium Concentrations Found in Groundwater Monitoring Well Samples.pdf	1
EXP Geotechnical Report - Additional Comments.pdf	1
EXP Geotechnical Report D2O Site.pdf	1
F1 soil management plan (Original and Revision 1)	2
Foundation Structural Analysis.pdf	1
Initial Survey for D2O Expansion - Buried Services Scan.pdf	1
Kinectrics Soil Sampling Report.pdf	1
Memo re Disposal&Mgmt.pdf	1
OPG Memo-Temp Use of DNNP site with D2O Soil Management Plan attached.pdf	1
Radiological Risks with soil.pdf	1
RCMT re Raising the Foundation El.pdf	1
Soil Handling Meeting.docx	1
Soil Management plan (original and revised)	2
Soil Sampling Mgmt-(original and update)	2
Trow Geotechnical Report for site.pdf	1

k) Page 49

Other	70
Design_Specification_TSM_NK38-TSM-38000-10001_000.pdf	1
DNGS Heavy Water Management Final Report.pdf	1
16-31555 Work Breakdown Structure.xlsx	1
2017-01-12-D2O-Storage-Project-ETC-Jan2017.xlsx	1

l) Page 50

Burns_Modus_Oversight Report_(8 reports, 3rd quarter 2013 to 4th quarter 2015)	8
D_PLAN_NK38-PLAN-38000-10016_000.pdf	1
NK38-SOW-38000-10014 R00.pdf	1
Nov 13 2017_SNC Purchase Order - Previously Compiled Info.xlsx	1
Procurement Tracking File-2Nov2015.xlsx	1

D3-AMPCO-138

Ref: Ex D3 T1 S1

a) Please provide the Business Unit organizational structure for Support Services.

b) Please provide the average number of forecast FTEs for Information IT and Real Estate for the period 2022-2026 compared to 2016 to 2020.

c) Please provide OPG's key IT metrics and targets for the period 2022 to 2026.

D3-AMPCO-139

Ref: Ex D3 T1 S1 P1

The evidence states Business Units may request the addition of higher priority out-of-plan projects driven by changing priorities.

a) Please discuss how OPG works within the constraints of an OEB approved budget to accommodate new priorities.

b) How many IT projects were cancelled, deferred or re-scoped during the 2016 to 2020 period?

D3-AMPCO-140

Ref: Ex D3 T1 S1 P6

OPG indicates these tools provide OPG with many benefits, including security protection, cost savings opportunities, as well as productivity improvements through increased mobility and ability to collaborate on work using the Cloud platform.

a) Please identify and quantify the forecast cost savings over the period 2022 to 2026 and explain how they are reflected in OPG's cost structure.

b) Please identify and quantify the cost savings over the period 2016 to 2020.

D3-AMPCO-141

Ref: Ex D3 T1 S2 Table 1a

a) Please provide the final in-service date from EB-2016-0152 for each of the four projects.

Ref: Ex D3 T1 S2 Table 2a

b) With respect to the completed/deferred projects from EB-2016-0152 and Ongoing Projects from EB-2016-0152, please provide the Final Inservice Date and Total Cost from EB-2016-0152.

c) Please identify the projects in part b) that have a BCS status of superceding or over variance and provide the variance.

d) Please provide the Post Implementation Review for the completed projects.

Ref: Ex D3 T1 S2 Table 2b, Table 2c, Table 2d

e) Please identify the projects that have a BCS status of superceding or over variance and provide the variance.

F2-AMPCO-142

Ref: A1 T3 S1 Chart 3

Please provide a detailed breakdown and description of the variance in Chart 3 to better explain the shift in costs and change in functional responsibilities.

F2-AMPCO-143

Ref: Ex F2 T1 S1 Table 1

OPG forecasts Total Operating Costs of $3,504.2M in 2021.

Ref: EB-2016-0152 Final Draft Payment Amounts Order Appendix A Table 5

The OEB approved Total Operating Costs of $2,734.5M in 2021.

Please explain the $769.7M increase in forecast Total Operating Costs in 2021 since EB-2016-0152.

F2-AMPCO-144

Ref: EB-2016-0152 Decision P54 Table 19

Please provide an updated version of Table 19 based on actuals for the years 2016 to 2020 and a forecast for the years 2021 to 2026.

F2-AMPCO-145

Ref: F2 T2 S1 P5

OPG indicates the Resource Type "Other" (Table 2 Line 8) includes costs for miscellaneous items such as variable low and intermediate level waste expenses, travel, and inventory obsolescence provision.

Ref: F2- T2 S1 Table 2

"Other" costs total $48.2M, $47.6M, $46.5M, $37.3M, and $21.1M in the years 2022, 2023, 2024, 2025 and 2026, respectively.

a) Please provide a further breakdown and description of the costs included under "Other".

b) Please describe and explain the trend in "Other" costs from 2016 to 2026.

F2-AMPCO-146

Ref: F2 T2 S1 Table 1

Please explain the increase in "Other Support" under Operations and Project Support, from $13.6M in 2017 to $37.2M in 2018.

F2-AMPCO-147

Ref: F2 T2 S1 Table 4-8a

The variance for CRVA Eligible Costs is $14.3 M in 2017, $5.5M in 2018, $8.8M in 2019, $13.4M in 2020 and $23.9M in 2021.

Please explain the variances.

F2-AMPCO-148

Ref: Ex F2 T2 S1 Table 3

a) Please explain how OPG derives the budget for the Tritium Removal Facility at Darlington NGS.

b) Please explain the forecast increase in costs from $16.5M in 2016 to $25M in 2025.

F2-AMPCO-149

Ref: EB-2016-0152 Ex F2 T3 S1 P1

In EB-2016-0152, OPG indicates that the final decision on whether work will be classified as a nuclear project (capital & OM&A) is made by the Asset Investment Screening Committee (AISC).

Where is the final decision made now?

F2-AMPCO-150

Ref: EB-2016-0152 Ex F2 T3 S1 P2

OPG indicates Portfolio Projects (Allocated) is the sum of the AISC-approved budgets for all projects that have an approved business case summary ("BCS"). Portfolio Projects (Unallocated), is the remaining budget available to cover the cost of projects that are progressing through the review and approval process but do not have an AISC-approved budget or an approved BCS.

How is the sum of the Portfolio Projects (Allocated) determined now?

F2-AMPCO-151

Ref: Ex F2 T3 S1 P2

OPG indicates the BCS approval date for the Fuel Channel Life Extension Project (Project #80014) is Aug-2016.

a) Please provide any subsequent approvals on Project #80014.

b) Please provide all previous BCS for Project #80014.

c) Please provide the original total project cost and inservice date.

F2-AMPCO-152

Ref: F2 T8 S1 P1

OPG is seeking approval of annual OM&A costs of $2.2M, $2.2M, $2.3M, $2.3M, and $2.3M for the years 2022-2026, respectively.

OPG indicates the forecast OM&A costs during the IR term are for work to preserve the option to build new nuclear at Darlington, and do not assume development of an Small Modular Reactor (SMR) generating station, pending the investment decision on the project.

a) Please explain in more detail what the test period costs are for.

b) What is the status of OPG's investment decision on SMR?

c) Please provide all OPG approvals to date related to the SMR proposal and include supporting documentation.

d) What is OPG's business driver for SMR?

e) Has the Province of Ontario directed OPG to pursue SMR? If yes, please provide the Directive.

f) When does OPG expect to seek OEB approval of SMR?

F2-AMPCO-153

Ref: F2 T8 S1 P2

OPG indicates subject to approvals from the Canadian Nuclear Safety Commission ("CNSC"), OPG is planning to construct an SMR nuclear generating station at the Darlington site with a projected in-service by the end of this decade.

g) Please provide the forecast inservice date.

h) Please provide a chronological evolution of OPG's SMR proposal from the beginning.

i) How many SMRs is OPG planning to construct? What is the proposed size of each SMR?

j) Please provide all analysis related to the economic assessment of the proposal including benefits to ratepayers of SMRs and provide all assumptions.

k) Please provide the $/MW forecast related to OPG's SMR proposal.

l) Please provide all peer/expert reviews of OPG's SMR proposal.

m) Please provide the Business Unit and organizational structure for the SMR proposal. Provide the years of experience of each project member.

n) Please provide the Project Charter and Business Case for SMR.

o) Please provide all other Business Planning documents related to the SMR schedule, scope of work, execution plan, and project controls.

F2-AMPCO-154

Ref: Ex A2-2-1 Attachment #1 P7

OPG states "Over 2020 and 2021, OPG expects to devote $272 million[1] in non-capital spending related to preliminary planning and preparation for grid-scale SMR development in Ontario and the renewal of the site preparation licence for the New Nuclear Darlington site, which can accommodate SMRs. Upon completion of the preliminary planning activities, OPG expects to put forth a detailed business case to the Board for approval and the Shareholder for concurrence to proceed with SMR development and construction activities. The plan does not reflect SMR expenditures or project team ramp up beyond the preliminary planning phase. This determination is expected to be made as part of next year's business plan."

a) When does OPG expect to submit a detailed business case to the OPG Board for approval?

b) Investments in the current Business Plan (2020 to 2026) do not currently include any capital expenditures for grid-scale SMR development.

   Does OPG expect next year's business plan to include a project team ramp up, capital expenditures related to SMR and in increase in OM&A costs over the 2022 to 2026 period? If yes, provide details.

c) Does OPG have any current planning estimate of total capital and OM&A costs to engineer, design, build, and commission this SMR generating station. If so, please provide it. If not, why not?

d) Has OPG conducted a jurisdictional review of SMR? If yes, please provide the results.

e) What is the value for money proposition of OPG's SMR proposal?

f) Does OPG consider its SMR proposal a First-of-A-Kind?

[1] $66 M in 2020 & $206 M in 2021

g) Given the significant start-up costs, what is the breakeven point? How many SMRs need to be constructed for OPG's proposal to be cost effective?

F2-AMPCO-155

Ref: Ex A2-2-1 Attachment #1 P26

"Planned New Nuclear OM&A costs include $272 million over 2020 and 2021, as approved by the Board in August 2020, in support of preliminary planning phase work for grid-scale SMR development and renewal of the New Nuclear Darlington site preparation licence expiring in 2022. OPG submitted a site preparation licence renewal application to the CNSC in June 2020, with a CNSC hearing scheduled for June 2021. The grid-scale SMR preliminary planning phase costs include such activities as technology selection, engineering and preparation for a licence to construct application."

Ref: Ex F2 T8 S1 P1

OPG will record preliminary planning and preparation amounts in 2020 and 2021 related to the SMR in the Nuclear Development Variance Account.

a) Please provide a detailed breakdown and description of the actual costs in 2020 related to SMR, and provide a detailed breakdown and description of the forecast costs in 2021.

b) Please provide the expected outcome of the preliminary planning process at the end of 2021.

c) How many FTEs are allocated to SMR for each of the years 2020 to 2026?

d) Please explain how OPG has the capacity to spend $202 million in one year on SMR.

F2-AMPCO-156

Ref: Ex A2-2-1 Attachment #1 P10

The evidence states:

"OPG expects SMRs to be a key element of the energy sector, and the Province's, efforts to support decarbonization. As Canada's largest nuclear operator with extensive experience and a strong safety record, OPG is well-positioned to advance and secure acceptance of both grid-scale and off-grid SMRs across Canada and beyond. To that end, in 2020, OPG formed a joint venture with Ultra Safe Nuclear Corporation and the Global First Power, with the goal of developing a proposed Micro Modular Reactor™ SMR at the Chalk River Laboratories site. The joint venture is the first commercial partnership on the development of an SMR in Canada and can serve as a model for future off-grid SMR projects. The plan allocates noncapital expenditures of•••• toward OPG's portion of funding for this demonstrator reactor.

Additionally, OPG is progressing preliminary planning phase work for grid-scale SMR development in Ontario and the renewal of the site preparation licence for the Darlington New Nuclear site, which can

accommodate SMRs. In collaboration with other major utilities, OPG recently concluded a due diligence process and is working to advance engineering and design work with three grid-scale SMR developers. Subject to the OEB's approval, the preliminary planning phase costs are recoverable in the future through an authorized regulatory account. Prior to finalizing plans to proceed with grid-scale SMR development beyond the preliminary planning phase, OPG will seek approval from the Board and concurrence from the Province. The plan does not reflect project development expenditures or resource requirements beyond the preliminary planning phase".

a) Are any costs related to the joint venture included in this application? If yes, please provide details of the costs.

b) Please provide details of the due diligence process. Please identify the other major utilities OPG collaborated with.

c) Please identify the three grid-scale SMR developers.

d) Has OPG entered into any agreements with the three grid-scale SMR developers? If yes, please provide details.

F2-AMPCO-157

Ref: Ex F2 T8 S1 P3

OPG indicates the provinces of Ontario, New Brunswick, and Saskatchewan signed a Memorandum of Understanding ("MOU") in 2019 committing to collaborate on the development and deployment of SMRs in Canada.

Please provide a copy of the MOU.

F2-AMPCO-158

Ref: Ex A2-2-1 Attachment #1 P21

OPG is targeting the following goals in support of a low-carbon future:

- Being a net zero carbon company by 2040: this means implementing and investing in CO2 reductions that achieve an overall balance between direct carbon emissions produced and carbon emissions removed from the atmosphere; and
- Being catalyst to help the markets where we operate achieve net-zero carbon economies by 2050: this means OPG will be a leading energy innovation company, advancing clean technologies and solutions like SMRs.

a) Please discuss why OPG believes it should lead the development of SMR and be the catalyst to help markets with solutions like SMR.

b) When did OPG decide it will be a leading energy innovation company?

F2-AMPCO-159

Ref: F2 T8 S1

a) Does OPG consider SMR technology to be mature and proven today?

b) Is OPG aware of any utility scale, commercially operating SMR currently in service? If so, where is it located, when was it commissioned and what has its reliability been like since commissioning?

c) Is it OPG's opinion that all costs (capital and OM&A) associated with engineering, designing, building, and commissioning an SMR Reactor should be covered by the ratepayer through its OEB Applications (this one and/or subsequent ones)? If so, why should the ratepayer be the sole source of funding for a currently unproven technology? If not, what costs does OPG think should be covered by the ratepayer? Where should additional funding come from?

d) Does OPG feel that SMR technology advances Government policy objectives regarding the environment, carbon, climate change, etc?

e) Has OPG investigated tax-based funding from Government for any portion of this SMR initiative? If so, what has been discussed (please provide documentation of the discussions). If not, why not?

F4-AMPCO-160

Ref: F4 T3 S1 P5 Figure 2

Please provide the total number of regular and non-regular employees at the end of 2019.

F4-AMPCO-161

Ref: F4 T3 S1 P7

OPG presently expects that the planned Pickering shutdown will eliminate over 3,000 positions across the organization, including direct station operations, Operations and Project Support functions and corporate Support Services. OPG is not seeking recovery of transition and downsizing costs in this application. All such costs incurred during the IR term will be recorded in the Pickering Closure Costs Deferral Account. During the IR term, OPG will continue to work with the unions and seek ways to reduce the organizational risks and cost implications of the Pickering shutdown.

Please provide OPG's best estimate of these costs.

F4-AMPCO-162

Ref: F4 T3 S1 P10 Figure 3

a) Does the Total Compensation in Figure 3 include the lump sum payment and share performance plan?

b) Please provide the total number of OPG employees including regular and non-regular employees at the end of 2015.

c) Please provide the percentage of regular employees that worked directly in, or support of nuclear facilities at the end of 2019.

d) Please provide compensation as a percentage of revenue requirement for each of the years 2016 to 2026 including overtime.

F4-AMPCO-163

Ref: F4 T3 S1 P10 Figure 3
Ref: EB-2016-0152 F4 T3 S1 P6 Figure 3

Please provide Figure 3 on the same basis as EB-2016-0152 by adding the number of FTEs and Total Compensation (K$/FTE).

F4-AMPCO-164

Ref: F4 T3 S1 P11 Figure 4

Figure 4 shows the breakdown by Management, Society, PWU and non-regular employees (including Terms and ETEs), for nuclear facilities (including allocation of corporate support services).

a) Please recast Figure 4 on a Total Nuclear Full Time Equivalents basis. Please include EPSCA FTEs in the total.

b) Please indicate if Figure 4 excludes banked overtime.

c) Please provide the number of FTEs allocated from corporate services for each of the years 2016 to 2026.

F4-AMPCO-165

Ref: EB-2016-0152 F4 T3 S1 P7 Figure 4

In EB-2016-0152, in describing Figure 4 - Nuclear Full Time Equivalents, OPG indicates staffing levels peak in 2017 and then decline by over 500 FTEs by 2021. Figure 4 shows 8,801 FTES in 2017 and 8,430 and 8,293 FTEs in 2020 and 2021, respectively.

Ref: F4 T3 S1 P7 Attachment #1

Attachment #1 shows 2017 actuals of 8,791 and 2020 and 2021 actuals of 8,965 and 8,995, respectively. This represents a variance of 265 FTEs in 2020 and 662 FTEs in 2021.

Please explain the reason for the increase in actual FTEs in 2020 and 2021 compared to Plan.

F4-AMPCO-166

Ref: EB-2016-0152 F4 T3 S1 P13 Figure 9

In EB-2016-0152 Figure 9, OPG indicates overtime costs for OPG's Nuclear facilities are expected to decline significantly, by approximately 50 per cent, between 2013 and 2021. In 2013 overtime costs are $159.2M compared to $118.6 M in 2019 and $81.1M by 2020.

Ref: F4 T3 S1 P21 Figure 10

OPG's actual overtime costs increase from $125.6 M in 2016 to $145.3M in 2019, then decrease to $125.6M in 2020.

Please explain the change in the forecast trend that resulted in overtime costs in 2020 that are 55% higher than planned.

F4-AMPCO-167

Ref: EB-2016-0152 Decision P78 Table 23

Please update Table 23: Nuclear Business Full Time Equivalents to include actuals for the years 2017 to 2020 and Plan for the years 2021 to 2026.

F4-AMPCO-168

Ref: F4 T3 S1 Attachment #1

Please breakdown the staff levels in Attachment #1 between Regular and Non-Regular staff.

F4-AMPCO-169

Ref: F4 T3 S1 Attachment #1

a) Please define EPSCA.

b) Please add Executive as a Staff category.

c) Please separate Salary and Incentive Pay costs.

d) Please separate Benefits and Pension & OPEB costs.

e) Please add Plan data to the table for 2016, 2017, 2018, 2019 and 2020.

f) Please provide an excel version of Attachment #1 that reflects part (b), part (c), part (d) and part (e).

F4-AMPCO-170

Ref: F4 T3 S1 Attachment #1

Please provide the amount capitalized by year.

F4-AMPCO-171

Ref: F4 T3 S1 Attachment #1

Please breakdown Attachment #1 between Darlington from Pickering.

F4-AMPCO-172

Ref: F4 T3 S1 Attachment #1

Please provide the forecast of overtime costs for each of the years 2016 to 2020.

F4-AMPCO-173

Ref: EB-2016-0152 Exhibit L Tab 6.6 Schedule 1 Staff-147 Page 3

The total projected costs associated with the "lump sum payments" made in the first two years of the respective collective agreements, and the Share Performance Plan for the remaining years of the respective collective agreements, attributed to the nuclear facilities are $92M over the 2017-2021 period ($26M in 2017, $24M in 2018, $15M in 2019, $14M 21 in 2020, and $13M in 2021).

a) Please provide the actual Lump Sum and Share Performance Plan payments made in each year.

b) Please provide the forecast for each of the years 2021 to 2026.

c) Please provide the number of nuclear employees eligible for the Share Performance Plan for each of the years 2022 to 2026.

F4-AMPCO-174

Ref: F4 T3 S1

a) Please identify any significant changes OPG has made to its employee non-pension benefits plan since EB-2016-0152.

b) Please complete the following table:

Nuclear Regular Employees – Actual and Forecast Attrition

	2016 Actual	2017 Actual	2018 Actual	2019 Actual	2020 Actual	2021 Plan	2022 Plan	2023 Plan	2024 Plan	2025 Plan	2026 Plan
Retirement											
Other											
Total											

c) Please provide the average number of vacancies by year for each of the years 2016 to 2020.

d) Please provide the average number of days it takes to fill a vacancy for each of the years 2016 to 2020.

e) Please discuss if OPG experienced any hiring lags for each of the years 2016 to 2020.

f) Please provide the calculation of OPG's Turnover Rate for the years 2016 to 2020 and provide all assumptions.

g) Please provide OPG's resource utilization rate (wrench time) calculation for each of the years 2016 to 2020 and provide all assumptions.

h) Does OPG track stand down or standby time of staff and contractors due to for example construction schedule conflicts? If yes, please provide the cost to OPG for stand down time for each of the years 2026 to 2020.

F4-AMPCO-175

Ref: EB-2016-0152 Exhibit L Tab 6.6 Schedule 2 AMPCO-145

OPG provides key OPG Human Resource (HR) metrics for regular employees as follows:

- Actual and business plan headcount
- External hires
- Actual and forecast attrition
- overband staff
- Sick leave
- safety

a) Please provide the data for the above metrics in the same format as AMPCO-145 for the years 2016 to 2020.

b) Please provide targets for 2022 to 2026.

c) Please discuss if OPG is tracking any new key HR metrics.

F4-AMPCO-176

Ref: EB-2016-0152 Exhibit L Tab 6.6 Schedule 15 SEC-003 Attachment #4

OPG provides copies of its 2014 to 2016 corporate scorecards. The Corporate 2016 Balanced Scorecard is at Attachment#4.

a) Please provide the 2016 scorecard results.

b) A 10% weighting was given to the Refurbishment Campus Plan - 3rd Emergency Power Generator engine set and Containment Filtered Venting System both inservice and D2O Heavy Water Storage Facility Ready to Receive Unit 2 PHT Water. The Target in the Business Plan was Nov 30. The Threshold was Dec-31 and the Stretch Target was Nov-02.

- Please provide the inservice date for the 3rd Emergency Power Generator engine set and Containment Filtered Venting System.

- Please confirm the D2O Heavy Water Storage Facility Ready was not ready to receive Unit 2 PHT Water by the target dates.

c) Please provide the Corporate Balanced Scorecards for the years 2017 to 2020 and the results.

d) Please provide the Corporate Balanced Scorecard for 2021.

G2-AMPCO-177

Ref: Ex G2 T1 S1 Table 1

a) Please provide the forecast amounts for the years 2016 to 2019.

b) Please explain the increase in Heavy Water Sales & Processing in 2017.

c) Please explain the decrease in Isotope Sales (Cobalt 60 + Tritium) in 2017.

H1-AMPCO-178

Ref: Exhibit H1 Tab 1 Schedule 1 Page 38

The 2021 Overearnings Variance Account was established by the OEB in EB-2020-0248. The account will record any actual regulated earnings achieved by OPG's regulated business in 2021 that are more than 300 basis points above the OEB-approved return on equity ("ROE") as reflected in OPG's payment amounts in effect for 2021. In the event that OPG's 2021 regulated ROE does not exceed 300 basis points over the OEB-approved ROE, no entry is to be made to the account. The variance account applies only to the 2021 year.

Ref: C1 T1 S1 Table 8

The Return on Equity (ROE) for 2019 is 15.72%.

Each year, OPG is required to file an analysis of the actual annual regulatory return, after tax on rate base, both dollars and percentages, for the combined regulated business (i.e., both hydroelectric and nuclear). This analysis includes a comparison of the regulated business' achieved ROE against the approved ROE included in the payment amounts. OPG proposes that this reporting requirement

continue to be the basis for determining if its actual ROE is outside the +/-300 basis point trigger established by the RRF for determining whether a regulatory review may be initiated.

Please provide the report filed with the OEB for 2019.