EB-2020-0290

OEB Application for
Payment Amounts for OPG's Prescribed Facilities

Reply Argument

Ontario Power Generation Inc.

September 21, 2021

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OVERVIEW

While many complex and important issues were addressed with the approval of the settlement proposal in this application, those unsettled are significant. They encompass major components of the nuclear generating stations that are critical to Ontario's electricity supply today, and into the future. In its decision on the remaining issues, the OEB must consider parties' proposals:

i) that it fundamentally reinterpret the legislation governing the treatment of new nuclear generation planning and preparation costs, potentially preventing the recovery of significant amounts that OPG has spent and may spend over the coming years to prepare for the next generation of nuclear power in Ontario, all without any assertions that the costs themselves are inappropriate; and

ii) that it permanently disallow up to $400M of reasonable cost to construct the Darlington Heavy Water Storage and Drum Handling Facility (the "D2O Storage Project" or "project") based on incorrect and often unsupported claims that OPG designed and built the wrong facility in the wrong place and that OPG's mismanagement caused the project to cost more than reasonably necessary. The latter claim is made despite independent expert evidence, which demonstrates that the total amount OPG seeks to place in rate base is lower than the estimated cost to construct the project.

In these reply submissions, OPG responds in detail to the arguments submitted by OEB staff and the intervenors. As it did in its Argument-in-Chief ("OPG AIC"), OPG has organized its reply around the two remaining topics: planning and preparing for new nuclear generation at the Darlington site using small modular reactor ("SMR") technology, and the proposed in-service additions for the D2O Storage Project.

Small Modular Reactor Issues

Consistent with the expectations of the Minister of Energy, OPG continues to plan and prepare for new nuclear generation at the Darlington Nuclear Generating Station ("Darlington") site, based on SMR technology. In doing so, OPG proposes to continue recording non-capital new nuclear development costs in the Nuclear Development Variance Account ("NDVA") – including amounts related to SMR technology – based on the regime prescribed by legislation to address these costs. This approach accords with the prior treatment of such costs by the OEB. As in previous proceedings, the costs recorded in the NDVA will be subject to a prudence review to be conducted by the OEB, based on a full evidentiary record, before OPG is able to recover any such amounts.

The issues related to the development of a potential SMR generation facility in this proceeding are relatively narrow, limited to the scope of the legislated NDVA, and certain potential customer engagement and reporting requirements. However, some intervenors request that the OEB use these issues as a platform to make sweeping decisions with the potential to affect the landscape of Ontario's power system planning. Some parties ask the OEB to impose new restrictions on the operation of the NDVA established by Ontario Regulation 53/05 ("O. Reg. 53/05"), limiting the scope of the account to types of costs in a way that would be inconsistent both with the regulation and the OEB's prior approvals, and potentially preventing the recovery of significant amounts of planning and preparation costs, without providing OPG an opportunity to demonstrate their prudence. Other intervenors ask that the OEB use its decision to effectively engage with broader system planning and policy issues that are clearly beyond the scope of this proceeding and, in some cases, beyond the OEB's objectives and powers under the *Ontario Energy Board Act, 1998* ("OEB Act"). In contrast, OEB staff support OPG's proposals on each of the SMR-related issues in scope of this proceeding.

The D2O Storage Project

OPG constructed the D2O Storage Project as part of the larger Darlington Refurbishment Program ("DRP") to meet the needs of refurbishment and the ongoing operational needs of Darlington and the Tritium Removal Facility ("TRF"). The facility OPG built is the facility necessary to meet these purposes – no more and no less. Designing and constructing this first-of-a-kind facility presented many challenges, which OPG successfully overcame. The project is currently functioning to store heavy water as intended. The issue before the OEB is the reasonableness of the remaining costs OPG seeks to recover for the D2O Storage Project.

Below OPG offers a detailed reply, claim by claim, to the submissions of those parties who seek to permanently disallow up to $400M of the $509.3M that OPG invested to construct the D2O Storage Project. These submissions all argue some combination of - OPG built the wrong facility and mismanaged the project's execution. They are based on claims that do not accurately reflect the evidence and are often based on no evidence at all, as explained below.

In contrast, OPG offers a detailed and factual discussion of the evidence that demonstrates it overcame early challenges to successfully design and build a complex, first-of-a-kind facility that is required for refurbishment and ongoing operations and that will provide benefits for decades. The amount that OPG seeks to add to rate base is lower than the detailed estimate of the cost to construct a facility with the design and functionality of the D2O Storage Project on the project site as shown in the independent expert report prepared by Bates White Economic Consulting. As demonstrated below, OPG respectfully submits that the evidence supports full recovery of the remaining $494.7M in capital cost for the D2O Storage Project.

1.0 DARLINGTON SMALL MODULAR REACTOR ISSUES

As summarized in OPG's AIC, the SMR-related issues before the OEB in this proceeding are narrow (the "SMR Issues"). They consist of:

i. Whether OPG's SMR-related costs are consistent with the purpose of the NDVA and thereby appropriate to be booked in the account (Issue 13.1);

ii. How OPG could further improve its customer engagement process [in respect of a potential SMR generating station at Darlington] (Issue 1.2); and

iii. Whether the proposed reporting and record keeping requirements proposed by OPG are appropriate [in respect of a potential SMR generating station at Darlington] (Issue 14.1).

Several parties support OPG's proposals on the SMR Issues. As discussed in the sections that follow, OEB staff's submissions align with OPG's proposals on each SMR Issue, as do those of the PWU and the Society, and CME supports the recording of SMR-related amounts in the NDVA (CME argument, p. 23). Several other parties make no specific submission on the SMR Issues. The parties that oppose OPG's proposals generally focus their submissions on the recording of SMR-related amounts in the NDVA.

OPG replies to the opposing parties' submissions on each issue below, in Sections 1.1, 1.2 and 1.3, respectively.

1.1 Issue 13.1

Whether OPG's SMR-related costs are consistent with the purpose of the NDVA and thereby appropriate to be booked in the account

1.1.1 What is the Purpose of the NDVA?

To determine whether SMR-related costs may be recorded to the NDVA, the OEB must consider one central question: What is the purpose of the NDVA? In OPG's submission, s. 5.4 and 6(2)4.1 of O. Reg. 53/05 provide a clear and complete answer: The OEB's obligation under s. 6(2)4.1 of O. Reg. 53/05 is to ensure that OPG recovers the prudent capital and non-capital costs and firm

financial commitments to plan and prepare for the development of proposed new nuclear generation, and the NDVA is a mechanism by which the OEB fulfills that obligation with respect to these amounts.[1] Specifically, s. 5.4 of O. Reg. 53/05 requires OPG to establish the NDVA to record those non-capital costs incurred and firm financial commitments made in the course of planning and preparation for development of proposed new nuclear generation, to the extent not reflected in the approved payment amounts. This enables the OEB to track and assess the prudence of the historic non-capital amounts in respect of planning and preparation activities for new nuclear generation facilities on an actual basis, and in turn set appropriate payment riders to recover those amounts, consistent with its broader obligation under s. 6(2)4.1 of O. Reg. 53/05.

An SMR generation facility is a nuclear generation facility. These facilities are smaller in physical size and capacity than the traditional large scale reactor facilities, and use advanced technology such as advanced passive safety features and the ability to construct offsite. It is an undisputed fact that, regardless of the nature of the technology, the planning and preparation activities that OPG is undertaking are related to a new nuclear generation facility. Contrary to some of the parties' submissions, the use of SMR technology over traditional scale reactors does not distinguish the nature of the costs that OPG expects to record to the NDVA from those that it has historically tracked in the account. OPG has been planning and preparing for new nuclear generation facilities – and incurring costs in respect of those activities – throughout the history of OEB rate-setting for the company. As set out in Ex. JT3.13 and summarized below, OPG has incurred, and the OEB has approved recovery of costs for a range of such planning and preparation activities in multiple prior applications.

In EB-2007-0905, the OEB approved $142.5M of new nuclear development costs to be included in nuclear payment amounts for 2008 and 2009, which included costs for the environmental assessment, site evaluation, CNSC licensing, and various procurement and planning activities

[1] On September 14, 2021, the Government of Ontario posted notice to the provincial Regulatory Registry of a proposed amendment to O. Reg. 53/05, "to include the Darlington SMR project as a regulated facility prescribed within the OEB Act." https://www.ontariocanada.com/registry/view_posting.jsp;jsessionid=vtWT_blljtTrQYS67hS0ChH?language=en&postingId=38847

such as vendor assessment and selection. Subsequently in EB-2010-0008, the OEB approved a credit to ratepayers of $110.8M in the NDVA, as actual expenditures were lower than forecast (Ex. JT3.13). In EB-2013-0321, the OEB approved recovery of a $56.5M NDVA balance as of December 31, 2013. That balance included the cost of planning and preparatory activities, including regulatory hearing costs, site readiness activities, ongoing support for nuclear technology evaluation, vendor selection, project planning, and stakeholder consultation, incurred over the 2011-2013 period (Ex. JT3.13).

The eligible activities that OPG has previously undertaken, and the costs historically recorded to the NDVA, are analogous to the type of costs that OPG has incurred and expects to incur in respect of the potential SMR nuclear generating facility at Darlington. The planning and preparation work OPG is undertaking during the 2020-2021 period includes such activities as preparing for a CNSC construction license application, conducting technology reviews, vendor selection, and establishing initial project cost estimates (Ex. F2-8-1, pp. 3-5). The fact that these activities are for a nuclear generation facility that uses SMR technology, rather than traditional scale reactors, does not distinguish them from the planning and preparation activities that OPG has historically undertaken.

The parties opposing OPG's position propose that the OEB limit the scope of the NDVA in two main ways. Specifically, they argue that:

i. The form of the NDVA – i.e., a variance account rather than a deferral account – prohibits OPG from recording SMR-related planning and preparation costs, since the current payment amounts do not include amounts specifically related to SMR technology (Energy Probe, SEC, VECC); and

ii. Planning and preparing for a potential SMR nuclear generation facility at Darlington should be excluded from the NDVA because no such facility has been "proposed" to OPG's Board of Directors or its shareholder (Energy Probe, LPMA, VECC).

OPG fully responds to both of these arguments in Sections 1.1.2 and 1.1.3 below, respectively. As OPG explains in these reply submissions, the limits on the NDVA that the parties propose

would interfere with the OEB's ability to fulfill its obligation under s. 6(2)4.1 of O. Reg. 53/05 and are inconsistent with the historical treatment of the account.

The parties also make several additional submissions related to the NDVA. OPG replies to these arguments in Section 1.1.4.

1.1.2 The Form of the NDVA Does Not Bar the Recording of SMR-related Costs

The NDVA is a variance account. It records differences between the amounts included in OPG's payment amounts and the actual costs incurred and firm financial commitments made in respect of planning and preparation activities for new nuclear generation facilities. Three parties (Energy Probe, SEC, and VECC) argue that OPG should not be permitted to record SMR-related amounts to the NDVA because the current payment amounts (as established in EB-2016-0152) do not reflect any forecast expenditures related to SMR technology specifically. They argue that OPG proposes to improperly treat the NDVA as a deferral account. This submission is incorrect and should be rejected by the OEB.[2]

OPG is not proposing to treat the NDVA as a deferral account. The previously approved payment amounts are based on a revenue requirement that includes forecast new nuclear planning and preparation costs. This forecast is the reference amount against which the NDVA will reconcile. These forecasts costs are specifically related to planning and preparing for new nuclear at the Darlington site (Ex. L-F2-8-Staff-247(b) and EB-2016-0152, Ex. L-6.1-7-ED-017).

SEC also argues that OPG should not be allowed to record amounts related to SMR technology specifically, since OPG was not actively considering that form of reactor when the current payment amounts were approved (SEC argument, p. 7). In effect, SEC asks the OEB to impose a new limit on the NDVA, restricting the account not only to planning and preparation activities,

[2] O. Reg. 53/05 previously established a transition Nuclear Development Deferral Account ("NDDA") to record the cost of certain activities related to the development of new nuclear generation in the period prior to the OEB's first payment amounts order for OPG, which was effective April 1, 2008. The section establishing this account (s. 5.3) was revoked after OEB rate regulation began. As a transition account, the account was necessarily a deferral account. The form of this now revoked account is not relevant to the scope of the NDVA under s. 5.4 of O. Reg. 53/05.

but also to the specific type of reactor technology that OPG was contemplating at the time of the prior payment amounts application. This proposal is inconsistent with both the scope of the NDVA as set out in s. 5.4 of O. Reg. 53/05, and with the OEB's broader obligation to ensure that OPG recovers its prudent planning and preparation costs and firm financial commitments for new nuclear generation facilities under s. 6(2)4.1. Accordingly, the OEB should reject it.

Planning and preparing for a SMR generation facility at the Darlington site is, by its nature, nuclear development work. As discussed above, the NDVA tracks amounts related to planning and preparing for new nuclear development. SMR-related amounts being incurred by OPG are eligible for inclusion in the NDVA because they are new nuclear planning and preparation costs. In OPG's submission, whether SMR-related costs were specifically contemplated in the 2017-2021 payment amounts (as established in EB-2016-0152) is irrelevant – the nature of the costs is what determines whether they are to be recorded in the NDVA.

Importantly, and contrary to SEC's submissions, nothing in O. Reg. 53/05 limits the NDVA to the specific nuclear reactor technologies or the forecast categories of costs underlying approved payment amounts. As summarized in Section 1.1.1 of these submissions, for years OPG has been incurring costs to maintain the option of developing new nuclear generation and conduct other preliminary planning and preparation activities. OPG has recovered those costs through the NDVA over multiple applications. OPG is now taking the next logical step: planning and preparing for the development of a specific facility at the site. SEC's interpretation of the NDVA would produce an illogical result, allowing OPG to recover the costs of maintaining the site for future development, but not the cost of actually planning and preparing for such a facility.

It is not surprising or unexpected that the 2017-2021 payment amounts do not reflect forecast amounts specifically for SMR technology, since OPG was not actively considering the development of an SMR generating facility at the Darlington site at the time (Ex. L-A2-02-CCC-020, line 32). However, the lack of forecast SMR-related expenditures is not a basis to exclude those costs from the NDVA. Rather, it is consistent with the purpose of the account: allowing the OEB to discharge its broader obligation to ensure that OPG recovers the actual cost of planning and preparing for new nuclear generation facilities.

Furthermore, although OPG does not propose to track the NDVA against a nil amount, OPG is aware of no requirement that a variance account must vary against a non-zero amount. There is no legislated requirement in O. Reg. 53/05 that there be a non-zero forecast amount in payment amounts to vary against. Indeed, OPG's revenue requirement did not include any forecast amounts for new nuclear planning and preparation activities in either EB-2010-0008 or EB-2013-0321 (Ex. J1.2). As OEB staff note in their submissions:

> [W]hile the NDVA is referred to as a variance account, as opposed to a deferral account, O. Reg. 53/05 does not preclude the recording of variances between actual non-capital costs incurred associated with the planning and preparation for the development of new nuclear generation facilities to a nil figure in OPG's payment amounts. (OEB staff argument, p. 4).

There is nothing exceptional about a variance account that records amounts relative to a nil reference amount. Several of OPG's long-standing variance accounts record differences between a zero reference amount and the company's actual amounts, and have been approved for disposition on that basis in multiple prior proceedings. For example, both the Hydroelectric Surplus Baseload Generation Variance Account and the Gross Revenue Charge Variance Account record actual financial impacts relative to a nil forecast. The Capacity Refurbishment Variance Account ("CRVA") also captures variances between a nil forecast and actual costs for eligible projects that were not included in the prior rebasing application.[3]

1.1.3 "Proposed": The NDVA is Not Limited to Amounts for Facilities that were Contemplated in 2007, or that have been Formally Approved by OPG's Board of Directors, or its Shareholder

Some parties dispute whether SMR-related costs can be recorded to the NDVA since OPG has not submitted a formal "proposal" for a new nuclear generating facility based on SMR technology. Four parties adopt a variety of meanings for the word "proposed" in this section:

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[3] For example, the OEB has previously approved recovery of CRVA balances that included amounts determined by tracking actual costs against a nil reference amount for the Fuel Channel Life Extension project (see EB-2014-0370, Ex. H1-1-1, Table 12 and EB-2016-0152, Ex. H1-1-1, Table 11), as well as the Fuel Channel Life Cycle Management Project and Pickering B Continued Operations (see EB-2010-0008, Ex. H1-1-2, Table 2). For the 2017-2021 period, the CRVA has a nil reference amount for the Annulus Spacer Life Management project (Ex. L-F2-03-Staff-234) and a nil capital reference amount for Pickering Extended Operations work (Ex. L-F2-02-Staff-229).

i. LPMA and VECC argue that the SMR costs that OPG expects to record to the NDVA are not in respect of a facility that has been proposed (i.e., to the company's Board of Directors or its shareholder), and therefore should not be eligible to record in the account. VECC further submits that the SMR-related costs that OPG is incurring are "exploratory" in nature, in contrast with specific proposed facilities. Energy Probe similarly argues that OPG "did not propose any SMR nuclear generation facilities", and Environment Defence states that "it is not clear whether OPG's work relates to a "proposed facility"" (LPMA argument, p. 3; VECC argument, p. 5; Energy Probe argument, p. 2; Environmental Defence argument, p. 3).

ii. Energy Probe argues that the word "proposed" limits the scope of the NDVA to only the reactor designs that OPG was contemplating in its initial payment amounts application, EB-2007-0905, as listed in an environmental assessment report that OPG subsequently filed with the Canadian Nuclear Safety Commission ("CNSC") in 2008 (Energy Probe argument, p. 5).

These arguments are flawed as a matter of statutory interpretation, and are fundamentally inconsistent with the OEB's past approvals on the NDVA. The parties interpret the word "proposed" in s. 5.4(1) as imposing an otherwise-undefined threshold that a new nuclear development project must cross before amounts are eligible to be recorded in the NDVA.[4]

Legislation should be read through the lens of plain language, seeking a meaning that is logically consistent with the scheme of the legislation and the ordinary meaning of the text. In this case, a reasonable plain language reading of s. 5.4(1) is that the NDVA records amounts to plan and prepare for a new nuclear generation facility that is "proposed" in the sense of "being considered."

In that context, OPG submits that it is planning and preparing for a proposed project. OPG announced in November 2020 that the company had resumed planning activities for new nuclear generation at Darlington including an SMR facility, with the support of the Minister of Energy,

[4] This interpretation immediately gives rise to a range of interpretation problems: What constitutes a proposal? To whom must this proposal be made? Are amounts eligible to be recorded once they have been proposed, or only after they have been approved (again, by whom)?

Northern Development and Mines, and the Minister of Indigenous Affairs (Ex. L-F2-08-Society-013). While an investment decision for continued project development of an SMR generating facility at Darlington has not yet been put forward for approval by the OPG Board of Directors or shareholder, the OPG Board of Directors approved the SMR-related new nuclear planning and preparation costs in the company's 2020-2026 Business Plan underpinning this application (Ex. A2-2-1, Attachment 1, pp. 7 and p. 26). As discussed above, these costs are clearly being undertaken with a view to develop a new nuclear generation facility, which OPG has been actively considering since 2020 (Ex. L-A2-02-CCC-020). Furthermore, in his concurrence with OPG's business plan, the Minister of Energy, Northern Development and Mines has also requested that OPG continue to advance SMR development and deployment (Ex. L-A2-02-CCC-014, Attachment 1, p. 2). Taken together, these public announcements and approvals demonstrate that OPG is actively considering the development of a proposed SMR generating facility.

The parties' narrow interpretation of the word "proposed" being a project that has the approval of the Board of Directors or shareholder would imply that the very costs necessary to enable a project decision would be ineligible for recovery under s. 5.4(1) of O. Reg. 53/05. These include planning and preparation costs that would be typical (and prudent) for evaluating any project, but especially when considering the development of a new nuclear generating facility, prior to an investment decision. In addition to being inconsistent with the OEB's broader obligation under s. 6(2)4.1 of O. Reg. 53/05, OPG submits that it is unreasonable that the costs to enable an informed investment decision by OPG's Board of Directors or its shareholder would be ineligible for recovery. On the contrary, s. 5.4(1) specifically contemplates costs for "the planning and preparation <u>for the development of</u> proposed new nuclear generation facilities" (emphasis added).

With reference to the fact that OPG is in the process of evaluating SMR technology options and partners, VECC argues that the SMR-related costs amounts that OPG is incurring are "exploratory" and therefore should not be eligible to be recorded in the NDVA. VECC does not provide or cite a specific definition for "exploratory" but rather uses it to suggest that OPG's SMR-

related costs are somehow distinct from the types of costs that have historically and appropriately been recorded to the NDVA.

As discussed above in Section 1.1.1, and as OEB staff note in their submissions (OEB staff argument, p. 4), the types of activities that OPG proposes to record to the NDVA in respect of a potential SMR nuclear generating facility are "directly associated with the planning and preparation for the development of a proposed new nuclear facility at Darlington [and therefore] are eligible to be recorded in the account." (OEB staff argument, p. 4). These amounts are also analogous to the types of planning and preparation activities, including technology and vendor selection, that OPG has historically recorded and has been approved to recover through the account.

As noted, Energy Probe argues that costs and financial commitments may only be recorded to the NDVA if they were incurred or made in respect of three reactor designs that were included in an Environmental Assessment report ("EA Report") that was prepared in September 2009 in respect of potential new nuclear generation at Darlington (Energy Probe argument, p. 5).[5] In Energy Probe's submission, the only new nuclear generation facilities that have been "proposed" are those related to the three reactor designs cited in the EA Report (a CANDU reactor, and two pressurized water reactor designs by Areva and Westinghouse). Therefore, Energy Probe argues, the only amounts that can be recorded to the NDVA are those related to these three reactor designs.

OPG cannot identify a logical basis for Energy Probe's proposal to limit the scope of the NDVA to the reactor designs identified in the EA Report. The EA Report was submitted to the CNSC as part of its application for the Darlington New Nuclear site preparation licence. It does not constitute a proposal nor does it limit the technologies that may be considered for development of nuclear generation facilities at the Darlington site. In fact, the site preparation license that resulted from that proceeding is not limited to any specific reactor technology, as Energy Probe

[5] Energy Probe did not enter the EA Report into evidence nor did it raise the report in interrogatories or with OPG's witnesses. For reference, a copy of the EA Report can be found on OPG's website, at: https://archive.opg.com/pdf_archive/Nuclear%20Licencing%20Documents/Darlington%20New%20Nuclear/EIS_Report_-_28Sept09.pdf.

acknowledges in its submissions (Energy Probe argument, p. 5). Given this, OPG submits that it would be unreasonable to conclude that the legislature intended to limit the scope of s. 5.4 of O. Reg. 53/05 to the specific reactor technologies outlined in the EA Report.

1.1.4 **Other NDVA Submissions**

Some parties make discrete submissions under Issue 13.1 that do not fall into the two main categories of argument discussed above. OPG has consolidated its response to those discrete submissions in this section.

1.1.4.1 <u>There is no reasonable basis or need for a cap on the firm financial commitments that can be recorded to the NDVA</u>

Energy Probe argues that the OEB should impose a limit on the amount of "firm financial commitments" that may be recorded to the NDVA. The only authority for this proposal that Energy Probe cites is its dissatisfaction with OPG's response to an undertaking which requested a definition of what constitutes a "firm financial commitment" (Energy Probe argument, p. 6).

OPG does not agree that its response to Undertaking J1.2 is deficient. The undertaking was to "describe the circumstances and means by which [OPG] would record firm financial commitments in the NDVA." In its response, OPG explained that the impact of any firm financial commitments are recorded by it to the NDVA "in the circumstances and at [the] point in time that they give rise to a non-capital cost recognized in OPG's financial statements under generally accepted accounting principles" (Ex. J1.2, p. 1). Indeed, the response addresses the very concern that Energy Probe cites in its submissions, which appears to be that OPG could record the full value of a vendor contract in the account at the time it is entered (Energy Probe argument, p. 6). In addition to any amounts in the account being subject to a prudence review, the concern is unfounded because, under generally accepted accounting principles, such commitments do not, in the normal course, give rise to cost recognition prior to the work being performed.

More importantly, the cap that Energy Probe proposes to impose on the NDVA is wholly inconsistent with the OEB's obligation under s. 6(2)4.1 to ensure that OPG recovers the costs

and firm financial commitments to plan and prepare for new nuclear generation. The obligation set out in the regulation is without limitation other than the requirement to demonstrate prudence.

1.1.4.2 The nature and prudence of any amounts recorded to the NDVA will be subject to OEB review when OPG proposes to recover any balance in the account

Several parties make submissions on the OEB's eventual review of any amounts proposed for recovery from the NDVA, and the risk that OPG bears prior to OEB review of any NDVA balance. Environmental Defence argues that the OEB should not rule on NDVA eligibility of SMR-related costs beyond the end of 2021 (Environmental Defence argument, p. 2). LPMA proposes that the OEB defer its decision on the inclusion of SMR-related amounts in the NDVA "to a proceeding when clearance of the account is requested. At that time the OEB and other parties could test whether such costs qualify for inclusion in the account and if the costs are prudent" (LPMA argument, p. 3). AMPCO/CCC propose that the OEB not opine on the eligibility or prudence of SMR-related amounts that may be recorded to the NDVA (AMPCO/CCC argument, p. 10).

OPG expects that treatment of the NDVA will be consistent with the OEB's typical "record-review-recover" practice for deferral and variance accounts. OPG would record the amounts in the NDVA that it believes are eligible, and the OEB would review the nature and prudence of those amounts in a subsequent application when the company proposes to clear the account. As OPG's witnesses confirmed, the amounts recorded to the NDVA would be subject to a prudence review before being approved for recovery (Tr. Vol. 1, p. 85). In OPG's view, this post-facto review is sufficient and appropriate protection for ratepayers from any potential uncertainty around the treatment of a SMR generating facility at the Darlington site in the future.

As discussed in Section 1.1.1 above, the planning and preparation costs that OPG is incurring with respect to potential new nuclear generation at the Darlington site are consistent with the purpose of the NDVA as set out in O. Reg. 53/05 and with the costs historically recorded to and approved for recovery from the NDVA. Accordingly, OPG believes that they are eligible amounts and should ultimately be recoverable, subject to the OEB's determination of their prudence.

1.1.4.3 There is no Reverse-onus on Intervenors when Reviewing Deferral and Variance Account Balances

VECC argues that if the OEB allows OPG to record the costs in the NDVA now, intervenors will bear the burden of proving that these costs should not properly be reimbursed by ratepayers (VECC argument, p. 6). OPG is aware of no such reverse-onus in the context of an application to recover a deferral or variance account balance. As set out in s. 7.1 of O. Reg. 53/05, OPG recovers the balances recorded in the NDVA to the extent the OEB is satisfied that the costs were prudently incurred. As the applicant, OPG would continue to bear the burden of demonstrating that any amounts recorded to the NDVA are appropriately recorded to the account and are prudent.

1.1.4.4 There is No Need to Establish a New Account to Record SMR-related Amounts

AMPCO/CCC and QMA argue that the OEB should establish a new account to record SMR-related amounts. AMPCO/CCC's proposal is based on consistency with the CRVA established pursuant to s. 6(2)4 of O. Reg. 53/05 (AMPCO/CCC argument, p. 4). QMA's argument is that a separate account is required to keep the costs of a SMR generating facility "clean" and separate from any potential planning and development of other nuclear facilities (QMA argument, pp. 2-3).

OPG does not believe that a separate account for SMR-related planning and preparation costs is appropriate or necessary. The CRVA was not explicitly established by O. Reg. 53/05. As a consequence, the OEB established the CRVA in order for it to fulfill its statutory obligation under s. 6(2)4 of O. Reg. 53/05. In contrast, s. 5.4 does explicitly establish the NDVA (in conjunction with the OEB's statutory obligation under s. 6(2)4.1). There is therefore no basis or need to establish a second account for the recovery of NDVA eligible amounts. Indeed, the purpose of a second account proposed by AMPCO/CCC is not clear to OPG, nor is it clear how the two accounts would interact, or what benefit the OEB or any other party would derive from the second account. A separate account is also not needed to address QMA's proposal. OPG will provide detailed evidence on the actual amounts recorded to the NDVA with respect to the proposed SMR generating facility at the Darlington site when it seeks recovery of the balance in the account in a subsequent application.

On the above basis, OPG submits that it is a legislative requirement to establish the NDVA to record amounts for the planning and preparation of new nuclear development, and that there is no need to have a separate account to accomplish the objectives set out by the parties.

1.2 Issue 1.2

How could OPG further improve its customer engagement process?

Most parties either make no submissions on this issue, or support OPG's proposal that no change to its customer engagement activities are required, appropriate or practicable in respect of the development of a potential SMR. In agreement with OPG, OEB staff submit that it would not have been possible to include consideration of SMRs in the customer engagement for this application due to timing issues, and that no OEB-directed customer engagement is necessary going forward, given the broader discussion by government bodies and in the context of CNSC-mandated engagement activities (OEB staff argument, p. 6).

Three parties argue that the OEB should direct further customer engagement on SMR nuclear generation in particular, each of which OPG addresses in turn below.

While acknowledging that "the ultimate decision on whether to go ahead with a SMR belongs to the Minister of Energy", CME nonetheless submits that "OPG should consult with customers regarding SMR development" (CME argument, p. 23). CME does not provide further submissions on the form or scope of that engagement, or how it would supplement the engagement activities and broader policy discussions that OPG identified in its Argument in Chief (OPG AIC, pp. 5-6). As set out in those prior submissions, OPG believes that there will be appropriate engagement on the development of SMR generating facilities in the coming years, and that OPG will be a voice in that larger discussion. However, the company maintains that there would be no practical scope for any additional engagement in connection specifically with its business planning.

LPMA submits that OPG should engage customers on "several aspects of the SMR approach", including (i) the cost of power, (ii) whether the Darlington site is the optimal location for such a facility, (iii) what alternatives to SMR generation exist, and (iv) whether the facility should be rate-

regulated (LMPA argument, p. 4). The issues LPMA raises are all system planning and policy matters that ultimately rest with the Minister of Energy, and none of them are within the scope of OPG's business planning process. Accordingly, OPG does not believe that it would be appropriate for the OEB to mandate that OPG conduct customer engagement on these topics.

OAPPA argues that the OEB should "order OPG (and provide advance warning to the Ministry of Energy) that plans for the SMR must include investments in setting the stage for community acceptance via in-depth stakeholder consultation" (OAPPA argument, p. 4). Based on a high-level cross-examination of OPG's stakeholder engagement costs – a topic that OAPPA did not raise prior to the hearing – OAPPA concludes that "OPG has not invested and has not planned to invest the necessary level of costs for stakeholder consultation required for this pivotal moment in electric power in Ontario" (OAPPA argument, p. 2). OAPPA also submits that it is "either disingenuous or naïve for OPG to conclude that 'the decision as to the progress and construction of an SMR is a system planning decision that rests with the Ministry of Energy'" (OAPPA argument, p. 2).

OAPPA provides no factual basis for the assertion that OPG has not budgeted for sufficient stakeholder consultation on the development of SMR-based generation. The only evidence that OAPPA cites in support of this argument is that the amounts for new nuclear planning and preparation activities in OPG's revenue requirement are approximately $2.3M (OAPPA argument, p. 1). OAPPA cites no basis for its conclusion that this level of expenditure is insufficient, nor did it pursue the substantive sufficiency of OPG's stakeholder consultation activities during the proceeding. Furthermore, OAPPA does not consider the possibility that further amounts related to stakeholder engagement could be incurred, if the development of an SMR generation facility at Darlington should proceed beyond the current planning and preparation phase. Accordingly, the OEB should give no weight to OAPPA's submissions on the sufficiency of OPG's SMR-related stakeholder consultation budget.

OAPPA asks the OEB to step beyond the scope of this proceeding, and beyond its duty to set just and reasonable payments amounts under s. 78.1 of the OEB Act. It is not OPG's role, or the role of the OEB, to send "warnings" to the Minister of Energy, nor to dictate the public

consultations that the Government of Ontario and other stakeholders should conduct in respect of energy planning in the province. Furthermore, it is neither disingenuous nor naïve to state that the decision to proceed and construct an SMR generation facility rests with the Minister of Energy – it is a fact. OPG is an important stakeholder in the project, to be sure, but the decision to proceed with the project lies with the Minister, and other major aspects of the project lie with other parties, including the IESO and the CNSC, as described in OPG's AIC. OAPPA's proposal is beyond the scope of this proceeding, and likely beyond the scope of the OEB's statutory jurisdiction. It is inappropriate and should be disregarded.

1.3 Issue 14.1

Are the proposed reporting and record keeping requirements, including performance scorecards proposed by OPG, appropriate?

This issue is settled except with respect to SMR-related reporting and record keeping requirements. Pursuant to the approved settlement proposal in this application, OPG will provide a suite of quarterly and annual reports to the OEB and publicly on its website (Settlement Proposal, Appendix A). OPG's annual reporting will include a nuclear performance report on 27 measures that cover four performance outcomes: safety, reliability, cost effectiveness, and human performance. In addition, OPG will file unaudited balances of deferral and variance accounts within 60 days after each calendar quarter end. This quarterly deferral and variance account reporting would include the balance of the NDVA.

Most parties are silent on this issue, while OEB staff and PWU agree that OPG's proposed reporting is sufficient. OEB staff submit that:

> [N]o additional reporting and record keeping requirements are necessary with respect to the SMR-related costs. OPG will have to provide detailed evidence regarding the actual non-capital costs incurred associated with the planning and preparation for the development of a SMR generating station at the Darlington site at the time that it seeks recovery of the balance in the NDVA. (OEB staff argument, p. 7).

The PWU argues that further reporting on a potential Darlington SMR generating facility would be redundant (PWU argument, para. 20).

Two parties argue that further reporting is required on SMR-related costs. LPMA "generally supports" OPG's submissions on the issue, but submits that the company should be required to track and report on SMR-related balances in any account (LPMA argument, p. 4). AMPCO/CCC argue that OPG should be required to publicly report on all SMR spending, including both actual and forecast amounts, along with a "fully itemized breakdown of all amounts" by cost type (AMPCO/CCC argument, p. 10).

The reporting requirements that AMPCO/CCC propose include measures of budgeted amounts and a level of granularity that exceeds OPG's typical reporting and recording keeping requirements ("RRR"). They would also require an approved basis upon which to break down the progress of the potential SMR project, which has been neither developed nor approved.

In OPG's submission, a central function of the company's RRR is to provide the OEB and ratepayers with a view of OPG's actual performance at its regulated facilities on a range of operational and financial outcomes relative to the plans presented to, and approvals made by, the OEB. This allows the OEB and other parties to assess how the company is performing and the outcomes it is achieving relative to those plans. In this case, no SMR project or costs have been proposed to, or will have been approved by, the OEB in this proceeding. Consequently, there are no proposed outcomes to track against, nor any amounts being collected from customers to reconcile against.

Without any baseline project or plan presented to or approved by the OEB, the reporting requirements that AMPCO/CCC propose serve no clear regulatory purpose. However, the regular disclosure of OPG's budgetary assumptions could potentially harm the company's competitive position with vendors and other third parties. Furthermore, since OPG has not developed an SMR project estimate, there is currently no set of metrics against which the company could report, nor can it say with certainty whether and when such metrics may exist.

Like OEB staff, OPG submits that no additional reporting and record keeping requirements are necessary with respect to SMR-related costs. The quarterly deferral and variance account reporting set out in the approved settlement proposal in this application would provide the OEB

and ratepayers with a view of the company's actual spending on the SMR project that is consistent with the nature and form of other reporting requirements. And, as OEB staff note, OPG will be required to provide detailed evidence on the actual amounts recorded to the NDVA when it seeks recovery of the balance in the account in a subsequent application, providing transparency into OPG's actual costs before any amounts are collected from ratepayers.

2.0 THE D2O STORAGE PROJECT

2.1 Issue 7.6

Are the proposed test period in-service additions for the D2O Project reasonable?

In responding to the submissions of OEB staff and intervenors (the "parties"), OPG focuses on the costs of the project and explains why the full remaining amount that OPG seeks to add to rate base, $494.7M, is appropriate. In OPG's submission, and contrary to the parties' arguments, the sole issue to be decided is what is the reasonable cost of the D2O Storage Project to include in the rate base used to determine just and reasonable payment amounts.

OPG constructed the D2O Storage Project to meet the needs of refurbishment and the ongoing operational needs of the Darlington Nuclear Generating Station and Tritium Removal Facility. The facility OPG built is the facility necessary to meet these purposes – no more and no less. Designing and constructing this first-of-a-kind facility presented many challenges, which OPG successfully overcame to complete the project.

In the submissions that follow, OPG replies to the parties' arguments asking the OEB to disallow hundreds of millions of dollars in legitimate project costs based on claims that OPG built the wrong facility and mismanaged the project. OPG's evidence shows that these claims are incorrect and, as fully explained below, are often based on untested opinion rather than evidence.

In contrast, OPG has offered comprehensive evidence on the project's history, planning and execution to support recovery of the full project investment. OPG also provides an independent

expert report prepared by Bates White Economic Consulting ("Bates White"), which conclusively demonstrates that the cost OPG seeks to recover for the D2O Storage Project is lower than the expected cost to construct a facility with the design, functionality and equipment found in the D2O Storage Project on the project site.

The "Construction Cost Estimate for the Darlington Nuclear Generating Station D2O Storage Project" report filed at Ex. J3.4, Attachment 1 (the "Bates White Report") presents an expert and independent estimate of what OPG would have expected to spend to design, construct and commission the D2O Storage Project based on the facility's final design and the conditions on the project site, absent any extraordinary delays. The mean value of the Bates White estimate is $512.1M, which is somewhat more than OPG's total capital cost to complete the project of $509.3M. OPG submits that Bates White's estimate conclusively demonstrates that the amount OPG seeks to add to rate base for the project is reasonable because it is less than the mean value of Bates White's estimate of the cost to construct the project.

The investment that OPG's seeks to recover in rate base was not the total cost to complete the project. After a dispute over project redesign costs, OPG negotiated a guaranteed maximum price with CanAtom for project completion. The maximum price resulted in CanAtom incurring at least $77M more in cost to complete the project than OPG paid. AMPCO/CCC claim that the OEB should deem this fact irrelevant and SEC agrees (AMPCO/CCC argument, p. 15, SEC argument, p. 38, para. 3.11.2(g)). On the contrary, OPG believes that the CanAtom settlement is uncontroverted evidence that OPG successfully managed costs in the project, as the costs absorbed by CanAtom more than made up for any costs that OPG expended due to the extraordinary challenges the project faced and overcame early in its history.

The OEB is ultimately faced with conflicting narratives in deciding this issue. Parties offer varying combinations of: OPG built the wrong facility, hired the wrong contractor, and managed the project's execution imprudently, and ask the OEB to decide based on these claims that $160M, $200M or $400M in investment should be permanently disallowed. OPG offers a more detailed and factual discussion based on evidence that demonstrates it overcame early challenges to successfully design and build a complex, first-of-a-kind facility that is required for refurbishment

and ongoing operations and will provide benefits for decades, at a cost that has been independently determined to be reasonable. OPG respectfully submits that the evidence supports its position, and, on this basis, the remaining capital cost of the D2O Storage Project should be included in rate base as proposed.

The remainder of OPG's argument responds to the parties' arguments under the following headings:

- Section 2.1.1: Burden of Proof and the Standard of Review
- Section 2.1.2: Facility Design and Alternatives
- Section 2.1.3: Project Management
- Section 2.1.4: Cost to Complete the Project Under CanAtom
- Section 2.1.5: The Bates White Report Establishes the Reasonable Cost of the D2O Storage Project
- Section 2.1.6: SEC's Other Criticisms of the Bates White Report
- Section 2.1.7: Parties' Proposed Disallowances
- Section 2.1.8: Adjustments and Recovery Methodology Proposed by Parties

2.1.1 **Burden of Proof and the Standard of Review**

2.1.1.1 <u>OPG Has the Burden of Proof</u>

OPG has the burden of proof to establish that the costs it seeks to include in rate base for the D2O Storage Project are reasonable pursuant to s. 78.1(6) of the OEB Act. SEC argues that OPG expenditures do not enjoy a presumption of prudence (SEC argument, paras. 3.3.1-3.3.6). It is not apparent why SEC raises this issue. OPG did not include reference to a presumption of prudence in its presentation of the prudent investment test in its AIC. As SEC's argument acknowledges, OPG's AIC clearly states that (i) the prudence standard does not include a presumption of prudence and (ii) OPG has the burden of proving that the amounts it seeks to

include in rate base are prudent.[6] In contrast to SEC, CME acknowledges that "OPG correctly articulated the prudent investment test in its argument-in-chief" (CME argument, para. 21).

2.1.1.2 OPG's Evidence

To discharge this burden of proof, OPG has filed extensive evidence on the D2O Storage Project. This evidence shows that OPG studied the need for additional storage, the options to address this need, and the appropriate site to construct the facility. OPG engaged a technically qualified contractor through a fair process. As was intended, the project began by developing design requirements necessary to elaborate the conceptual design. This process included working with internal stakeholders who possessed the expertise required to integrate the D2O Storage Project into the Heavy Water Management Building/Tritium Removal Facility ("HWMB/TRF").[7] Through this process, the project's scope was defined and, once defined, was largely unadjusted except to meet environmental commitments or construction conditions. Moreover, when the project's cost and schedule began to rise, OPG conducted a scope review exercise that reduced scope.

The project overcame numerous construction challenges primarily related to sub-surface conditions, including significant water ingress even after dewatering and low levels of tritium in the project soil. Installation of the many safety and environmental protection systems required within the constrained space of the project structure also was challenging. Ultimately, the project was able to construct a facility containing the necessary functionality to safely and responsibly store heavy water now and into the future.

The evidence filed in this proceeding includes:

- A comprehensive exhibit that provides a detailed description of D2O Storage Project facility and the project's design and construction from its earliest origins through to its completion (Ex. D2-2-10);

- Explanatory Appendices:
  - Introduction to Heavy Water and Its Use in CANDU Reactors (Ex. D2-2-10, Attachment 1),

[6] As explained in OPG AIC, in this context there is no difference between reasonable costs and prudently incurred costs (OPG AIC, p. 9).

[7] The official title of the project is the "Heavy Water Management Building West Annex." This title emphasizes the interconnection between and common operation of the two facilities. OPG used the "D2O Storage Project" in its evidence for consistency with prior filings and to better distinguish this project from the HWMB (Ex. D2-2-10, p. 1, ft. nt. 2).

- List of Acronyms Associated with the Project (Ex. D2-2-10, Attachment 3),
- Timeline of the Major Project Milestones (Ex. D2-2-10, Attachment 4), and
- Temporary Storage of Unit 2 Heavy Water (Ex. D2-2-10, Attachment 5);

- Key project documents including all business case summaries, project charters, and the contracts with Black & McDonald ("B&M") and CanAtom, the two ESMSA contractors that worked on the project;

- Numerous interrogatories and undertaking responses that provide approximately 10,000 pages of supporting documentation, including 15 external reports related to the project as shown in Chart 1;

Chart 1 – External Reports in Evidence

Report	Reference	Report	Reference
Kinectrics DTRF/HWM 2005 Plant Condition Assessment Report	Ex. L-D2-02-AMPCO-131, Attachment 1	Kinectrics Production of Cost Estimates for the Construction of Heavy Water Storage Facilities	Ex. L-D2-02-AMPCO-131, Attachment 5
Kinectrics DTRF/HWM 2005 Life Cycle Management Strategy and Plan Outline	Ex. L-D2-02-AMPCO-131, Attachment 2	F+G DNGS Heavy Water Management Final Report	Ex. L-D2-02-AMPCO-137, Attachment 128
Kinectrics DTRF/HWM 2005 Obsolescence Report and Obsolescence Matrix	Ex. L-D2-02-AMPCO-131, Attachment 3	ARES Third Party Review Report of Civil Designs	Ex. L-D2-02-SEC-101, Attachment 1
Kinectrics DTRF/HWM 2005 Aging Report	Ex. L-D2-02-AMPCO-131, Attachment 4	Kinectrics Report: Strategic Options Study for OPG Heavy Water Storage and Handling	Ex. L-D2-02-Staff-165, Attachment 1
Kinectrics Report: OPG Heavy Water Storage Management and Drum Handling – Study of Preferred Solution	Ex. L-D2-02-AMPCO-131, Attachment 6	Kinectrics Heavy Water Management Building Project: Campus Plan F1 Background Groundwater Review	Ex. L-D2-02-AMPCO-131, Attachment 7
EXP Geotechnical Report D2O Site	Ex. L-D2-02-AMPCO-137, Attachment 111	Kinectrics Soil Sampling Report	Ex. L-D2-02-AMPCO-137, Attachment 116
Trow Geotechnical Investigation	Ex. L-D2-02-AMPCO-94, Attachment 1	EXP Supplemental Geotechnical Investigation Report	Ex. L-D2-02-AMPCO-99, Attachment 1
Kinectrics Report re: Heavy Water Storage Building Project: Borehole Drilling Investigation	Ex. L-D2-02-AMPCO-137, Attachment 107		

- An OPG Witness Panel consisting of senior project executives including:
  - Mr. Reiner, who was the Senior Vice President with responsibility for the D2O Storage Project during most of the project's existence (2014-2020);
  - Mr. Rose, who was first a Director (2008-2015) and then a Vice President (2015-2018) of project controls during most of the project's existence; and
  - Mr. Simpson, who was the project director from 2017 until its completion.
- A video tour of the facility showing its site within the Darlington protected area and the building layout including details of the tanks, piping and numerous systems required for safe and environmentally responsible operation;
- An independent expert report by Bates White that conclusively establishes the cost of designing and constructing a facility with the functionality of the D2O Storage Project on the site where the project was constructed (Ex. J3.4, Attachment 1); and
- An expert witness panel consisting of Dr. Glenn George and Dr. Steven Krahn, two of the lead authors of the Bates White Report, both of whom have decades of nuclear project experience and who were both qualified as experts in nuclear engineering, construction and cost estimation (Ex. J3.4, Attachment 1, pp. 34-39; Tr. Vol. 3, p. 51).

OPG respectfully submits that this body of evidence is more than sufficient to demonstrate that OPG has met its burden of proof in establishing the prudence of its requested in-service amounts.

2.1.1.3 <u>The Alternative/ Additional Expert Analyses That Parties Suggest OPG Should Have Done Are Unnecessary</u>

Despite OPG's comprehensive body of evidence, and the fact that no party engaged an expert to opine on any aspect of the D2O Storage Project, several parties question why OPG did not ask Bates White to address additional scope in its report. OPG responds to these submissions in this section and responds to the balance of parties' submissions regarding the Bates White Report below in Section 2.1.4.

Prudence

Parties criticize OPG because the Bates White Report is not a prudence review (OEB staff argument, p. 16; Energy Probe argument, pp. 11-12; CME argument, pp. 19-21; SEC argument, pp. 19 and 30; AMPCO/CCC argument, p. 46). In OPG's respectful submission, the prudence of

the project costs that OPG seeks to place in-service is appropriately determined by the OEB, and not by outside experts.

Assessing the prudence of the project's costs is ultimately a matter of weighing the evidence and rendering a judgment based on it. In establishing just and reasonable payment amounts for OPG's prescribed facilities, that responsibility has been assigned by statute to the OEB alone (OEB Act, s. 78.1).

Alternatives

Parties also criticize OPG for not asking Bates White to assess alternatives (CME argument, p. 21, para. 81; SEC argument, p. 30, para. 3.10.2(b); AMPCO/CCC argument, p. 46). OPG has three responses as to why this request was not made.

First, since 2004, OPG has been engaging external experts to assist in assessing the options for storing additional heavy water at Darlington. The record contains the following external assessments of alternatives: "Strategic Options Study for OPG Heavy Water Storage and Handling", Kinectrics, 21-Dec-2004 (Ex. L-D2-02-Staff-165, Attachment 1) and "OPG Heavy Water Storage Management and Drum Handling - Study of Preferred Solution," Kinectrics, 03-Oct-2011 (Ex. L-D2-01-AMPCO-131, Attachment 6). In addition, once OPG determined to proceed with DRP, it conducted a study on the options for storing DRP heavy water "Darlington Refurbishment D2O Storage Facility Evaluation," OPG, 28-May-2009 (Ex. J1.6, Attachment 1). Finally, each of the BCS, except for the final BCS, reviews alternatives. OPG respectfully submits that the record contains sufficient information on OPG's review of alternatives while the project was being planned to make a hindsight external review unnecessary.

Second, the D2O Storage Project is part of the DRP. OPG determined the necessary scope for the DRP through a rigorous process that was thoroughly reviewed in EB-2016-0152. Moreover, as fully discussed below (Section 2.1.2), OPG thoroughly considered the alternatives that AMPCO/CCC now argue would have been superior, and rejected them for sound reasons. Just as the OEB has accepted the need for all other elements of the DRP, based primarily, but not

exclusively, on OPG's assessment, OPG respectfully submits the OEB should do so as well for the D2O Storage Project.

Third, while Bates White are acknowledged experts on the costing and construction of nuclear facilities and have experience with heavy water, the management and storage of heavy water is not their expertise. The primary use of heavy water is in CANDU reactors, and Ontario has the largest fleet of operating CANDU reactors in the world. Since OPG manages the heavy water needs of the entire Ontario fleet, and has done so since the demerger of Ontario Hydro, it has a unique level of experience with the safe and environmentally responsible storage of heavy water that goes back decades. In OPG's respectful submissions, this base of knowledge, supplemented by the expert reports discussed above, makes OPG well qualified to determine how best to store heavy water.

Scope

Finally, SEC suggests that the Bates White Report is deficient because it does not review the scope of the D2O Storage Project (SEC argument, p. 31, para. 3.10.2(d)). As fully explained in Section 2.1.3, while the scope of the project was elaborated through the design process, once it was established, it was not expanded. Simply put, the fact that parties repeatedly allude to "scope creep" does not change the fact that they are unable to point to any evidence that shows that any functionality or equipment included in the project is unnecessary (see discussion in Section 2.1.2.3). To the contrary, as costs increased, OPG conducted a successful scope reduction exercise, which reduced the project's scope including the elimination of the office space and over 900m of piping, among other changes (Ex. D2-2-10, pp. 67-68). In OPG's respectful submission, the evidence overwhelmingly supports the conclusion that the scope of the D2O Storage Project is necessary to safely meet the needs the project is intended to address in an environmentally responsible manner.

2.1.1.4 <u>The Use of The OEB's Historical Prudence Test and Avoidance of Hindsight</u>

OPG's AIC respectfully submits that:

> …the continued application of the OEB's historical approach to prudence review is appropriate in this proceeding. The capital

> costs for the completed D2O Storage Project are unquestionably committed. In determining the reasonableness of its costs, OPG's decisions over the course of completing this complex, first-of-a-kind project should be evaluated based on what was known or reasonably should have been known at the time of the project. This is particularly true in light of O. Reg. 53/05 s. 6.(2)4.ii, which requires that the OEB ensure recovery of the DRP and other costs eligible for Capacity Refurbishment Variance Account ("CRVA") treatment "if the Board is satisfied that the costs were prudently incurred." (OPG AIC, p. 10 (emphasis added)).

While parties emphasize that the OEB is not required to use its historical prudence test, no party takes the position that it would be incorrect to do so. However, two parties, CME and SEC, appear to challenge OPG's position on the use of hindsight in evaluating the prudence of the D2O Storage Project costs.

While CME agrees "that the adjudicator must be cautious not to apply hindsight in making determinations about prudence," it claims that OPG seeks to limit the prudence standard to consider only information that OPG knew at the time decisions were made, rather than information that was known or should have been known (CME argument, paras. 22-23). This claim is baseless and incorrect. CME takes a response by Mr. Reiner out of context in a strained effort to make its argument (Tr. Vol. 2, pp. 94-95). Mr. Reiner was not asked about the prudence standard. His response to a question about whether OPG was blaming its contractors for the challenges faced by the D2O Storage Project cannot reasonably be taken as a statement of OPG's legal position on the use of hindsight in the application of the prudence standard. OPG's position remains as presented in its AIC and quoted above.

SEC attempts to distinguish "hindsight" and "outcomes" in a way that is confusing (SEC argument, pp. 16-17). Hindsight is to be avoided when evaluating the reasonableness of actions taken because hindsight involves information that was unknown and not reasonably knowable at the time the action was taken. Outcomes are the results of actions and establish neither prudence nor the lack of prudence.

2.1.1.5 Prudence Does Not Require Perfection

In a variety of contexts, courts have held that decisions need not be perfect, just reasonable. The Ontario Court of Appeal applied this approach in assessing the actions of business directors.

In *Pente Investment Management Ltd. v. Schneider Corp*. (1998), 42 O.R. (3d) 177 (Ont. C.A.), Weiler J.A. stated, at p. 192:

> The law as it has evolved in Ontario and Delaware has the common requirements that the court must be satisfied that the directors have acted reasonably and fairly. The court looks to see that the directors made a reasonable decision not a perfect decision. Provided the decision taken is within a range of reasonableness, the court ought not to substitute its opinion for that of the board even though subsequent events may have cast doubt on the board's determination. As long as the directors have selected one of several reasonable alternatives, deference is accorded to the board's decision [references omitted].[8]

As OPG has explained, the D2O Storage Project faced challenges, primarily in its early execution (Tr. Vol. 3, pp. 4-5). A number of parties argue that these acknowledged challenges necessarily mean that between $160M and $400M in costs necessary to complete the project should be disallowed (OEB argument, p. 20; AMPCO/CCC argument, pp. 44-45; CME argument, p. 22, para. 83; Energy Probe argument, p. 7; LPMA argument, p. 5; SEC argument, p. 39, para. 3.13.1; and VECC argument, p. 7). OPG respectfully disagrees. In OPG's view, the issue before the OEB requires a determination of the reasonable costs of the D2O Storage Project to be included in rate base and not a decision on whether OPG could have managed the project better at its inception. In OPG's respectful submissions, the requested rate base additions reflect only the reasonable cost to construct the facility necessary to store heavy water for refurbishment and operational improvement needs in a safe and environmentally responsible manner.

To the extent OPG faced challenges early in the process of designing and constructing the D2O Storage Project, those challenges have been addressed. The project has been successfully

[8] *See also, Craig Packaging Ltd. v. Beaumont* (2020 QCCS 367, para. 99) regarding shareholder challenge to a corporate action – "The court should generally look at whether the decision reached is a reasonable one and not necessarily a perfect one."

completed and is storing DRP heavy water (Tr. Vol. 1, p. 138). Moreover, as shown below, these early challenges did not materially impact the project's final cost. Finally, the lessons learned from these challenges paved the way for OPG's current success in executing DRP and other improvements in OPG's project management noted in an independent review conducted by KPMG (Ex. L-D2-02-Staff-157; Ex. D2-2-4, pp. 3-4; Ex. D2-1-1, Attachment 2).

2.1.2 **Facility Design and Alternatives**

2.1.2.1 Argument Is Not Evidence

Before addressing the substance of parties' claims in this section, it is appropriate to note that these claims are not based on evidence.

Specifically, submissions made by AMPCO/CCC and adopted by other parties offer opinion evidence in the guise of argument. This material was not tested through interrogatories or cross examination and represents opinions that were not sponsored by a qualified expert under oath.

As one example, AMPCO/CCC claim that it was both feasible and potentially cheaper to store refurbishment heavy water in an above ground facility outside the Darlington protected area without any evidence that this approach would have been accepted by the CNSC or of the relative cost to seismically qualifying this option (AMPCO/CCC argument, pp. 26 and 28). This untested claim stands in stark contrast to the documents that OPG submitted in evidence to support its determination that this option was not viable and would have been more expensive, as shown in the Sections 2.1.2.2 to 2.1.2.5.

Separately, SEC argues that the OEB should focus on whether OPG has met its burden of proof and not on whether parties have proved imprudence (SEC argument, p. 37 para. 3.11.2 (c)). In OPG's view, the issue is not the transfer of OPG's burden of proof,[9] but rather the legitimate methods for challenging facts in evidence used to meet this burden of proof. In order for parties

[9] OPG has acknowledged that it possesses the burden of proof in Section 2.1.1.1 and 2.1.1.2.

to support proposed adjustments to OPG's request, parties must do so using facts on the record and/or opinion evidence from qualified experts, and not through unsubstantiated opinions.

Parties have known since at least 2014 that the OEB would be conducting a prudence review of this project because the OEB stated in its decision approving the in-service of $14.6M of D2O Storage Project costs: "A prudence review should take place when the D2O project is completed and fully in-service which it is expected will be OPG's next payment case." (EB-2013-0321, Decision with Reasons, November 20, 2014, p. 59). In EB-2016-0152, OPG reiterated that it would be requesting a review of prudence of the completed D2O Storage Project's costs.[10] Every one of the project elements that parties now claim is unnecessary or represents an incorrect design choice was fully described in the 2015 Superseding BCS that OPG first filed in EB-2016-0152.[11] Parties have had ample notice, and time, to obtain expert evidence on these issues.

While OPG deals with the substance of these claims in the sections that follow, it respectfully requests that assertions based on unsubstantiated opinions that appear for the first time in argument about technical design elements such as the proper scope, necessary equipment, appropriate amount of piping, approach to achieving seismic qualification and optimal location of the D2O Storage Project be given no weight.

2.1.2.2 <u>The Design and Construction of This First-of-a-Kind Project Was Inherently Complex</u>

OPG devotes a significant portion of its evidence to a discussion of the D2O Storage Project's design and systems (Ex. D2-2-10, pp. 14-36). This detailed discussion was provided to assist the OEB and the parties in understanding the inherent complexity of safely storing 2,100,000 litres of tritiated heavy water in an environmentally responsible manner and designing and constructing a first-of-a-kind facility to do so. Safety and meeting tritium emissions limits are the key elements of the project. Tritium is a beta emitter that can be absorbed through skin, breathed

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[10] OPG filed Ex. N2-1-1 in EB-2016-0152 on February 22, 2017 to remove the D2O Storage Project from OPG's requested relief in that proceeding. In doing OPG explicitly recognized that the OEB will have the opportunity to review the prudence of the completed project." (EB-2016-0152, Ex. N2-1-1, p. 2). The OEB's Decision in EB-2016-0152 noted that: "The entries in the CRVA are subject to prudence review on disposition." (EB-2016-0152, Decision and Order, December 28, 2017, p. 117).

[11] The 2015 Superseding BCS is Ex. D2-2-10, Attachment 2p in this application and was previously filed in EB-2016-0152 as Exhibit D2-2-10, Attachment 1, Tab 1.

in or ingested and effects all parts of the human body once it enters (Ex. D2-2-10, Attachment 1, p. 2).[12]

The project's design complexity was increased by the need to integrate with the operation of the HWMB/TRF, which also contains the piping that is directly linked to the heavy water system in each of the Darlington generating units. Construction of the facility was complex because of the constrained footprint and challenges associated with water ingress and managing soil containing low levels of tritium. Some parties accept the complexity of the D2O Storage Project, and others do not.

OEB staff accepts that the D2O Storage Project is among the most complex aspects of DRP and quotes from the Burns & McDonnell/Modus Strategic Solutions ("BMcD/Modus") Supplemental Report to Nuclear Oversight Committee - 2nd Quarter 2014, which states that the project "is as technically and logistically complex as virtually any work on the DR Project." (OEB staff argument, p. 9; Ex. L-D2-02-Staff-105, Attachment 2, p. 17).

In contrast, SEC's argument expresses skepticism about the project's complexity stating:

> OPG says that the D2O project was, at least in retrospect, the most difficult and complex project they had to complete during the Darlington Refurbishment Project.
>
> There is reason to be skeptical of that statement, of course. You don't see it in the earlier reports on the D2O. (SEC argument, paras. 3.7.1-3.7.2).

SEC's counsel expressed this view more strongly at the hearing in the following exchange:

> MR. SHEPHERD: It is the most complex thing you did in the DRP?
>
> MR. REINER: It is the most complex modification we are undertaking in the DRP.
> MR. SHEPHERD: Wow. That's the first I've heard of that. None of the reports by anybody else say that. (Tr. Vol. 2, pp. 109-110).

[12] Ex. D2-2-10, Attachment 1, p. 2 describes the protective measures that workers take to limit exposure to tritium where it is present.

SEC is wrong on both counts. As OEB staff note, BMcD/Modus stated in 2014 that the D2O Storage Project was among the most complex elements of the DRP. In July 2014, OPG described the project as the most complex element of the DRP in an exchange between Mr. Reiner and Mr. Shepherd:

> MR. SHEPHERD: I guess I understand that, but it's not as complex as the RFR project, for example.
>
> MR. REINER: I would say it is more complex than the RFR project, yes.
>
> MR. SHEPHERD: More complex?
>
> MR. REINER: Retubing of a reactor has been done ten times by – OPG has re-tubed four reactors at Pickering A. Bruce Power has been re-tubed. Point Lepreau has been re-tubed. Wolsong has been re-tubed. So we are next in line.
>
> So yes, it is a complex job, but it is not complex from an engineering perspective. The materials are like-for-like replacements, there are very rigorous quality standards and very precise ways in which that job needs to get executed.
>
> The D2O storage facility is a brand new facility. It is first of a kind. It doesn't exist anywhere else in the world. The integration with the tritium removal facility is unique. OPG is the only entity that has a tritium removal facility, so from that perspective there is an element of complexity that is beyond what you would see on the re-tube job. (EB-2013-0321, Tr. Tech. Conf., July 8, 2014, p. 69).[13]

SEC goes on to argue that, if the project was as complex as OPG says, then OPG was imprudent in not understanding this earlier and managing the project accordingly (SEC argument, para. 3.7.3). OPG respectfully submits that this is exactly the kind of hindsight that the OEB should avoid. In July 2014, two years after the project commenced, the complexity of designing and constructing this first-of-a-kind facility was readily apparent. Years earlier, when the project was being initiated and put out to bid, this complexity was not apparent to anyone – not to OPG, not

[13] In addition, this exchange illustrates that SEC is also in error when it claims that OPG only started identifying the D2O Storage Project as a first-of-a-kind project as it approached its final cost (SEC argument, para. 3.1.4).

to the external experts OPG retained to estimate its cost and not to either of the experienced ESMSA contractors bidding on it.

OEB staff is the only party that questions whether the D2O Storage Project is first-of-a-kind, saying this is debateable (OEB staff argument, p. 9). Other parties appear to accept this (AMPCO/CCC argument, p. 24; SEC argument, paras. 3.1.4, 3.4.3; Energy Probe argument, p. 8). Importantly, OPG notes that both BMcD/Modus and Bates White accept this characterization. (Ex. J3.4, Attachment 1, p. 5; EB-2013-0321 Tr. Vol. 15, pp. 61-62).

2.1.2.3 The Project Includes Only the Scope Necessary to Meet the Needs It Was Built to Address

Under the rubric of "scope creep," the parties suggest that the project is overbuilt. To support this contention, they offer multiple unsupported arguments, mostly advanced by AMPCO/CCC, that are uniformly wrong. Moreover, these claims do not rest on facts that are in evidence, rather they are built off of untested opinions that appear solely in argument. OPG respectfully requests that the OEB give no weight to conclusions that parties seek to draw from these submissions.

Parties' arguments are replete with the term "scope creep" (SEC argument, para. 3.11.2(e); CME argument, para. 14(e); Energy Probe argument, p. 11; VECC argument, p. 7). Planned scope elaboration is not scope creep. As will be shown below: the project always included elaboration of its scope as an initial step. In addition, early design work required some scope changes. However, once the project's scope was established in the modification design exercise that was completed in December 2012, the only significant addition to scope occurred in 2013 when OPG moved to a two-stage vapour recovery system to meet its commitment in the Environmental Assessment that the DRP would not increase net tritium emissions (Ex. L-D2-02-AMPCO-137, Attachment 46; Ex. D2-2-10, pp. 25 and 51-52).

Contrary to the view that OPG staff added unnecessary scope (see e.g., AMPCO/CCC argument, p. 22; SEC argument, p. 38, para. 3.11.2 (e)), an OPG lessons learned review of the modification planning process conducted in February 2013 states:

> The TRF technology, design and operational details are unique in the OPG fleet and perhaps the world. As a result this project is

> utilizing a strategy of expert stakeholder complete integration into the project team. TRF staff has dedicated 2.5 FTE's to the project and do not simply review submittals, but are proactively engaged, attend most project meetings, and meet with the EPC vendor frequently. As a result there has been excellent involvement from the key stakeholder and many examples of good input and "catches" which prevent errors or omissions from propagating very long into the design cycle, preventing future rework and costs. (Ex. J1.5, Attachment 1, p. 7).

Moreover, OPG conducted a scope review exercise in Spring 2014 that resulted in significant reductions in scope (Ex. D2-2-10, pp. 67-68). The major items eliminated during this review include:

- Office Space – which meant that the completed facility would generally be unoccupied, as it is controlled remotely from the HWMB, and so it would no longer require washrooms or the need for a separate air handling system and radiological zone for the offices. OPG estimated that the office removal would save $2.5M and eight weeks of non-critical path schedule time.
- Piping – in consultation with TRF Operations, the project was able to optimize the piping between the D2O Storage Project facility and the HWMB/TRF. This optimization reduced the amount of piping by approximately 900m and eliminated numerous valves and other components. The project estimated that these changes saved $1.9M and four weeks of critical path schedule time.
- Box drain and its tie-in to the HWMB sump – were eliminated because the construction dewatering system and groundwater monitoring boreholes made them unnecessary, which saved about $0.3M and five weeks of critical path schedule time.

In total, the reductions from the scope review were forecast to reduce project cost by $5.3M and remove nine weeks from the project's critical path schedule (Ex. D2-2-10, p. 68).[14]

[14] OPG also asked RCMT to examine the technical viability of raising the seismic dike from its original design elevation of 87m to a higher elevation of 94.8m to address water ingress issues and, potentially, the need for a pipe chase. (Ex. D2-2-10, p. 68). RCMT's preliminary analysis indicated there would be stability concerns with moving the existing design higher and OPG accepted this conclusion. Contrary to the submissions of AMPCO/CCC, the RCMT review did not evaluate moving the structure up to grade level because on grade construction was not a viable option as explained below in Section 2.1.2.5 regarding "Constructing An Above Ground Storage Facility Was Not a Viable Option" (AMPCO/CCC argument, p. 30-31).

The Project Management Institute's Book of Knowledge (5th edition) defines scope creep as: "The uncontrolled expansion to product or project scope without adjustments to time, cost, and resources."[15] OPG respectfully submits this did not occur on the D2O Storage Project. The project started with a conceptual design document and the first task of the EPC contractor was to verify OPG's preliminary design requirements and develop the design (Ex. D2-2-10, pp. 48 and 50). In the Scope of Work issued as part of the work request for the D2O Storage Project in 2012, the first activity after contract planning was "Scope Definition." (Ex. L-D2-02-AMPCO-103, Attachment 1, p. 13).

Parties cite to the Q2 2014 BMcD/Modus Report as evidence that scope creep occurred. While that report does use the term, incorrectly in OPG's submission, BMcD/Modus view of what it observed is more consistent with the scope elaboration process that was envisioned from the outset of the D2O Storage Project. This is made clear in the Supplemental Q2 Report by BMcD/Modus:

> It is important to note that we believe that the majority of the cost increases with D2O Storage and AHS are due to maturation of these projects' scope definition, scope management, unforeseen subsurface conditions or flawed estimates. In other words, the increased budgets are simply reflective of the true project costs had they been estimated properly at the outset. (Ex. L-D2-02-Staff-105, Attachment 2, p. 17).

Mr. Gould of BMcD/Modus testified in EB-2013-0321 on the substance of their reports and expanded on this point when asked whether BMcD/Modus had looked at the cost of comparable projects to the D2O Storage Project:

> MR. POCH:…But I just wanted to say what -- be clear what you didn't look at with respect to this. Am I correct that Modus did not seek to provide benchmarks for the heavy- water or the other campus project costs? You didn't go out and look at what other heavy-water facilities have cost to build elsewhere and –
>
> MR. GOULD: To my knowledge, there isn't one.
> MR. POCH: All right. And --

[15] What is Scope Creep in Project Management? How to Prevent it? - teamdeck.io

> MR. GOULD: Which might be indicative of why the scope and estimates are migrating to the place that they have, because it is the first of a kind, and first-of-a-kind construction typically involves a lot more understanding of engineering and engineering of scope before you get a realistic estimate. (EB-2013-0321, Tr. Vol. 15, pp. 61-62 (emphasis added)).

2.1.2.4 The D2O Storage Project Was the Best Approach to Meet Both Refurbishment and Operational Improvement Needs

While OEB staff does not dispute the need for the D2O Storage Project (OEB staff argument, p. 9), AMPCO/CCC and the intervenors supporting them argue that OPG built the wrong facility, in the wrong location using the wrong equipment (see e.g., AMPCO/CCC argument, pp. 12, 19-20 and 25-26; SEC argument, para. 3.11.2(b); Energy Probe argument, p. 12; CME argument, paras. 59-63; LPMA argument, p. 5).

As noted above, AMPCO/CCC assert these positions without any evidentiary basis. Instead, the AMPCO/CCC argument reviews numerous internal and external technical reports prepared by or for OPG, reaches different conclusions than the authors of these reports, and then puts forth these conclusions as an appropriate basis for the OEB to reject the need for and design of the D2O Storage Project. OPG respectfully submits that these untested opinions provide no basis to reject OPG's determination, supported by evidence, that the D2O Storage Project as designed was both necessary and appropriate to meet its intended needs.

AMPCO/CCC fault OPG for not issuing a separate project charter for the DRP storage, claiming that OPG merged the operational improvement needs with the refurbishment needs in one project charter and calling this a "critical mistake" (AMPCO/CCC argument, p. 18). As a factual matter, AMPCO/CCC have it backwards – the operational improvement project was an ongoing heavy water storage project (project # 16-31555) that had been deferred pending a decision on refurbishment (Ex. D2-2-10, p. 37). Once the DRP was confirmed, its storage needs were merged into the previously deferred project to form the D2O Storage Project and with the same project number as the predecessor operational improvement project (Ex. D2-2-10, p. 38 and Attachment 2b, p. 5).

AMPCO/CCC only see this as a mistake because of their erroneous view that DRP and operation heavy water storage needs are different, but as shown below, they are not. Once this mistaken

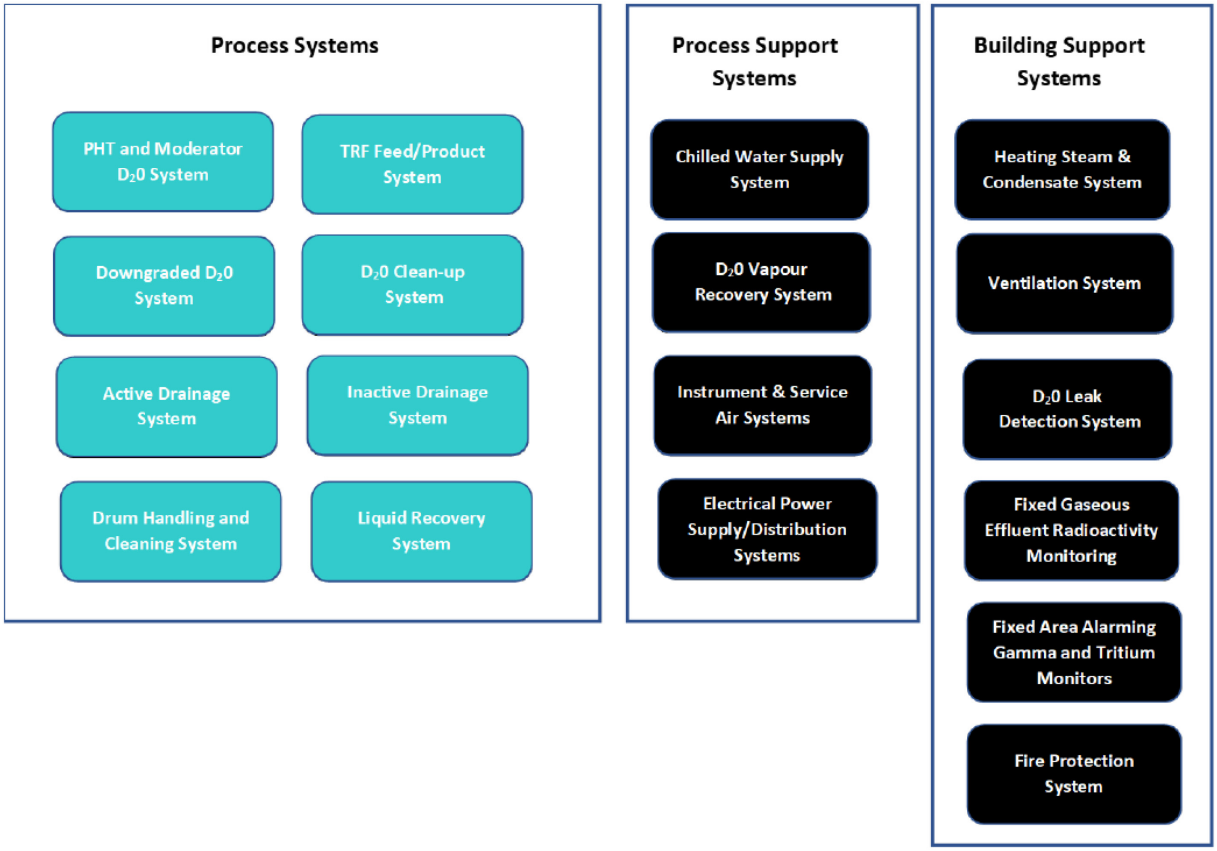
notion is corrected, the logic of combining the two storage needs into a single facility is inescapable and construction of a single integrated facility requires a single integrated project charter. But OPG did not rely on logic alone; it undertook a study that showed savings of more than $19M (12% of the then estimated total project cost) were forecast from combining the two storage needs (Ex. J1.6, Attachment 1, p. 19).

AMPCO/CCC also argue that the storage needs of the DRP are of such a different character that they were better met in a temporary facility located outside the Darlington protected area (AMPCO/CCC argument, pp. 12-14 and 17-19). This position should be rejected – it is wrong in both its general premise and in its specifics as fully explained below.

AMPCO/CCC's general premise is "the two sets of needs, DRP-related Storage and Heavy Water Operations storage, had distinctly different requirements" (AMPCO/CCC argument, p. 18). This conclusion is based on their view that: "The D2O Storage Project consists primarily of tanks, pipes and valves…" (AMPCO/CCC argument, p. 15). Both AMPCO/CCC's general premise and the view underpinning it are incorrect.

This is easily seen by considering Figure 1 in OPG's evidence at Ex. D2-2-10, p. 6, which is reproduced below also as Figure 1. Each one of the Process Support and Building Support Systems shown in black on the right hand side of the figure is essential to safely storing heavy water, whether it is stored for refurbishment or operational support, as explained in detail in OPG's evidence (Ex. D2-2-10, pp. 24-27 and 30-35). All these systems (i.e., electrical, compressed air, heating and cooling, chilled water, vapour recovery, emissions monitoring and control, radiation and tritium monitoring, fire protection and leak detection) must operate in an integrated fashion to safely store heavy water. They include much more than "tanks, pipes and valves." Had OPG constructed two facilities to store heavy water, one for refurbishment and one for operational needs, both buildings would have required every one of these systems.

Figure 1 – D2O Storage Project Systems



The characteristics of heavy water, whether in storage for DRP or operational improvement, that require these systems are:

- Once tritiated,[16] heavy water[17] is radioactive and so its emissions must be limited to the greatest extent possible to protect workers and public health, locations where it is stored must be monitored for tritium and other radioactive compounds, emissions must be controlled, storage must take place within a protected area (as discussed below), storage must be seismically qualified, any leaks must be detected and any spills contained. (Ex. D2-2-10, pp. 17-36; Ex. D2-2-10, Attachment 1).
- Heavy water freezes at 4 degrees C, and so must have a reliable heating supply with redundancy throughout the colder months (Ex. D2-2-10, p. 30).

[16] All heavy water stored in the D2O Storage Project facility has been used in reactors and thus has some degree of radioactivity – none of it is virgin heavy water. For additional explanation, see Ex. D2-2-10, Attachment 1.

[17] Under the *Nuclear Safety and Control Act*, SC 1997, s. 2, both heavy water and all by-products of nuclear energy production are nuclear substances. Storage of a nuclear substance requires a licence under s. 26(b) of the *Nuclear Safety and Control Act*, SC 1997.

- Different streams of heavy water having different levels of radioactivity contamination and isotopic purity must be stored separately (Ex. D2-2-10, p. 15, ft. nt. 13).[18]

- Back-up power must be provided to ensure that the systems necessary to address these characteristics are continuously available (Ex. D2-2-10, pp. 30-31 and 35).

Most of the Process Systems shown in turquoise on the left hand side of Figure 1 are also common to both storage needs. Of the eight systems shown, only the PHT and Moderator D2O System, which is for DRP, and the Drum Handling and Cleaning System and the TRF Feed Product/System, which are dedicated to operational needs, are not shared. The other five systems shown are used to meet both storage needs. The common usage of the two drainage systems and the liquid recovery system is readily apparent as these systems are used to capture any heavy water outside the tanks in either liquid or vapour form (Ex. D2-2-10, p. 19). The downgraded and clean-up systems are used to support upgrading (removing light water) and cleaning (removing impurities) of both heavy water generated during refurbishment drainage and heavy water generated by the operating Ontario CANDU units (Darlington, Pickering and Bruce) (Ex. D2-2-10, p. 15, ft. nt. 13 and Attachment 1; Ex. J1.8).

Under the rubric of "operational flexibility," AMPCO/CCC conflate a number of features together and then assert, again without evidence, that these are not necessary for DRP storage needs and vastly increased the project's cost (AMPCO/CCC argument, pp. 13-14). Here too, AMPCO/CCC are wrong. Some of the features that AMPCO/CCC include as operational flexibility, like proximity to the Darlington units being refurbished and connections to the HWMB/TRF, are absolutely essential to meeting refurbishment needs. In fact, proximity produces cost savings and was one of the benefits that OPG identified as supporting both refurbishment and operational needs (Ex. D2-2-10, p. 39).

[18] This is equally true for operational needs and refurbishment. Heavy water from the PHT and moderator systems have different tritium concentrations and hence different levels of radioactivity. Downgraded heavy water that requires upgrading and clean-up must be stored separately (Ex. D2-2-10, pp. 10, 15 (ft. nt. 13) and 21).

Proximity was essential to take advantage of the fact that each Darlington generating unit has an existing transfer line connected to the HWMB/TRF (Ex. J1.6, p. 14). The use of these pre-existing connections eliminated the need to create new connections to drain each of the units undergoing refurbishment. Creating these connections for each unit would have required work at the generating units either during a pre-refurbishment outage or as part of refurbishment scope. Proximity also meant that the only piping required outside the D2O Storage Project were the pipes that run through the pipe chase to connect the project facility and the HWMB (Ex. D2-2-10, p. 26).[19]

Proximity is also necessary because AMPCO/CCC's claim that "at its most basic level the only requirement is that OPG have a place to store DRP related D2O water for relatively short periods of time, and then return that water to the units as they are put back into service" is incorrect (AMPCO/CCC argument, p. 13). OPG's response to an undertaking requested by AMPCO/CCC shows why this claim is wrong:

> <u>Undertaking J2.1</u>
> TO CONFIRM WHETHER THE PLAN THAT MANAGES MODERATOR CURIE LEVELS CALLS FOR DETRITIATION OF UNIT 3 MODERATOR DRAIN DURING THE REFURBISHMENT WINDOW
>
> <u>Response</u>
> Confirmed. The TRF has overall responsibility to ensure that the requisite quantity of detritiated moderator heavy water is available when the Unit 3 moderator is ready to be refilled.

As this undertaking confirms, depending on the availability of the TRF and the needs of the operating units, heavy water from the units undergoing refurbishment may be sent to the TRF for detritiation during its storage period, as was the case for Unit 3 moderator heavy water. The ability to independently drain and fill the moderator storage tanks and the piping connections established between these tanks and the HWMB (which has pre-existing connections to the TRF) is essential to the ability to detritiate moderator heavy water during refurbishment as the TRF

[19] SEC suggests that the cost of the D2O Storage Project increased because it included the installation of equipment outside the project facility (SEC argument, para. 3.10.9(c)). This is incorrect. As explained in Section 2.1.6,the only piping installed outside of the project facility was the piping necessary to connect the project to the HWMB.

can only accept limited quantities of feed stock (i.e., heavy water requiring detritiation) (Ex. L-D2-02-AMPCO-087, Attachment 1, pp. 16-20).

In reality, true operational flexibility, which OPG describes as the ability to independently drain and fill each tank (Tr. Vol. 2, p. 39), was a small percentage of the project's overall cost. This cost represents good value for ratepayers in terms of OPG's ability to address different streams of heavy water and respond to emergency situations that require draining moderator heavy water.

Operational flexibility is also important in improving the safety of refurbishment, as explained in Ex. J1.8:

> With the D2O Storage Project facility available for Unit 3, OPG was able to flush the Unit 3 moderator with a large volume (approximately 130 m^3) of demineralized water following the moderator drain, which avoided the need to use low curie heavy water to detritiate the moderator system. This approach was employed to lower the amount of radioactivity in the moderator thereby reducing refurbishment staff dose levels and lowering emissions.

The fact that the DRP storage needs will end at the completion of refurbishment does not in any way alter the need to safely store refurbishment heavy water in an environmentally responsible manner. There is no "temporary storage" exception to OPG's obligations as a licenced nuclear operator, which are discussed below. Furthermore, OPG could not accept a temporary plan with no flexibility for potential refurbishment schedule changes. As recent events have shown, reality has a way of impacting the best of plans.[20]

[20] As originally planned, the storage of DRP heavy water in the D2O Storage Project facility would have lasted approximately seven years, starting in January 2017 and ending in September 2023 (Ex. J1.7, Attachment 2). This figure is based on the refurbishment schedule in place at the start of the D2O Storage Project (Ex. J1.7, p. 2). As intervening events have shown however, plans change based on real world developments. The time required to complete the project meant that refurbishment heavy water was not stored in the facility until November 2020 (Tr. Vol. 1, p. 138), but under the current refurbishment schedule heavy water is planned be stored in the facility to the end of 2025 (Ex. K1.6).

VECC's argument states: "Our conclusion, after many of these proceedings with this Utility, is that under the protective umbrella of nuclear science and safety, OPG's nuclear executives have never encountered a problem that could not be made more complex and more costly." (VECC argument, p. 7). VECC can cavalierly make such statements because, unlike OPG, VECC is not responsible for safely storing and processing heavy water that is required for the operation Ontario's nuclear reactors and need not meet the requirements of a CNSC operating licence.

OPG, as the licenced operator of Darlington, bears responsibility for storing and managing heavy water safely to protect the environment and the health and safety of both employees and the population at large. OPG acknowledges that fulfilling this responsibility necessitates complex technical solutions and equipment that is more expensive than similar non-nuclear equipment. OPG's evidence explains the need for these solutions and equipment, examples of which include the use of a seismically qualified dike anchored to bedrock, nuclear grade stainless steel tanks, pipes, headers and valves, a cover gas system for the tanks and a two-stage vapour recovery system to reduce tritium emissions levels (Ex. D2-2-10, pp. 17, 20 and 25). In OPG's respectful submission, the OEB should continue to recognize OPG's responsibilities as a licenced nuclear operator and approve the costs these responsibilities entail.

2.1.2.5 <u>None of the Alternatives AMPCO/CCC Suggest Are Realistic</u>

AMPCO/CCC have parsed OPG documentation that considered and rejected certain alternative storage approaches or design choices and argues that OPG acted imprudently in not implementing them. The basis for this argument is that AMPCO/CCC would have selected different alternatives or made different design choices. No evidence supports these submissions other than the untested opinions in the AMPCO/CCC argument. Moreover, as OPG shows below, AMPCO/CCC's submissions are based on selective reading of the documents, highlighting certain points while ignoring others, and are often incorrect. This latter point is particularly true of the detailed cost analysis that AMPCO/CCC have introduced in the guise of argument (AMPCO/CCC argument, pp. 19-20).

OPG agrees with the PWU's submission that "There is no evidence on the record which demonstrates that the D2O facility, or any facility which serves the same function, could have

been constructed for a cost lower than OPG's proposed D2O Project rate base additions" (PWU argument, para. 21). OPG respectfully submits that the OEB should place no weight on AMPCO/CCC's argument in deciding the reasonable cost of the D2O Storage Project.

AMPCO's Untested and Incorrect Calculations Should be Given No Weight

Near the beginning of the AMPCO/CCC cross examination of the Bates White witnesses, Mr. Buonaguro took the witnesses to tab 50 of the AMPCO/CCC Compendium and represented it to be a table that AMPCO/CCC created from Bates White data (Ex. K1.3, Tab 50). With the table on the screen, the following exchange took place:

> MR. BUONAGURO: Sure. Maybe I can take an example and maybe that will help.
>
> So there are 28 tanks in the facility. There are eight that characterized as PHT tanks, so eight tanks put in the facility to store water drained from a PHT. So there's eight of those tanks; they're a hundred metres cubed. Each one of those tanks has piping and valves that connect it to the various systems in the building.
>
> I'm trying to figure out how much that cost is for all the tanks. But, you know, as this example, one of the tanks would suffice, just to show where these categories capture those costs.
>
> DR. KRAHN: Well, the most frank response I can give is that is not a way that we organize the estimate. So if there was a desire, and if that's important to the Panel to have that information, it would require us to reorganize the analysis that we have done to date, because that's -- that's not a way that we have parsed the data.
>
> So if that's an important piece of information, it would be helpful to us to get a clear definition of what the reanalysis is before we launch off on it.
>
> MR. BUONAGURO: Maybe we can take it in baby steps. If you look at D, process systems, under D-01 it says PHT moderator systems, the cost there is $101 million, and it is described in the evidence as pipe fittings and valves.
>
> That suggests to me that that is the cost of connecting tanks to things, because that's what the pipe fittings and valves are, and

> tanks in particular, because we're talking about the PHT moderators in the D2O system. Am I correct in that?
>
> DR. KRAHN: It's not simply connecting tanks to the system. It is all the piping, sensors, pumps, and other components that are integral to those systems.
>
> …
>
> MR. BUONAGURO: Thank you. And I assume that we start with 28 tanks. If you had 27 tanks, you'd have less piping, valves, and fittings, right?
>
> DR. GEORGE: We don't know that without understanding what the hypothetical alternate functionality is and design of the system. So you're asking us to make all sorts of assumptions in that counterfactual.
>
> MR. BUONAGURO: Right. So you think that if you take a fully connected tank out, you won't necessarily reduce the piping?
>
> DR. KRAHN: There is no reason to believe it would scale in that way. (Tr. Vol. 3, pp. 86-88).

As the above exchange illustrates, every time AMPCO/CCC put a proposition to the witnesses they either demurred because the table did not provide sufficient information to answer or they disagreed because the stated conclusion was wrong. Eventually, Dr. George provided the following response, after which, AMPCO/CCC ended their cross examination on their table (Ex. K1.3, Tab 50):

> DR. GEORGE: Just to back up again, we don't know where this comes from. You've asserted it's extracted from our report, which I'm willing to accept. But without the opportunity to see how you have taken our data and repositioned it into this table, the best we could do in this setting is speculate as to answers to your questions.
>
> So we can proceed, but without a clear idea of where you're going or what you're trying to extract, I don't know how useful this particular path is. (Tr. Vol. 3, p. 89).

Despite being told that the Bates White Report was not organized as AMPCO/CCC suggested, their assumptions about the systems necessary to connect the piping were wrong and that

removing a single tank would not necessarily result in a proportional reduction in piping, AMPCO/CCC offer an updated version of the same table as Table 3 in its Argument (AMPCO/CCC argument, p. 20). Table 3, like the hearing exhibit that preceded it (Ex. K1.3, Tab 50), is just rows and columns of numbers offered without explanation. As Dr. George testified, AMPCO/CCC provide no information about how these numbers were assembled (i.e., where in the Bates White Report each number was taken from and how the numbers were combined).

All that AMPCO/CCC offered at the hearing was that the numbers were “pulled directly out of the report” and “reorganized into the categories.” (Tr. Vol. 3, p. 85). OPG respectfully submits that procedural fairness requires more. If AMPCO/CCC seek to take information from an expert report, reorganize it and ask the OEB to accept the conclusions AMPCO/CCC draw from this reorganization as evidence, the very least that was required here was to show how the data was manipulated and provide the expert with a reasonable opportunity to review and comment. AMPCO/CCC did not do that. On this basis, OPG respectfully requests that no weight be given to AMPCO/CCC Table 3 or conclusions that rely on it.

Moreover, Table 3 purports to organize the Bates White data in precisely the way Bates White said it could not be organized without redoing their report (Tr. Vol. 3, p. 86). AMPCO/CCC use this table in attempt to draw the types of conclusions about piping connections and proportionality that Bates White said would be incorrect, as shown above (see e.g., AMPCO/CCC argument, p. 23).

The categorizations that AMPCO/CCC offer based on Table 3 are incorrect for reasons other than those provided by Bates White. As shown in Figure 1 above, the items in Rows C through E, which AMPCO/CCC call “Process System Piping” includes many items that go beyond the tanks and piping used to store heavy water. For example, Row D, Process Systems includes Active and Inactive Drainage and Vapour Recovery Systems that are used to capture the heavy water in spills and vapours, rather than to store heavy water (Ex. D2-2-10, pp. 6 and 19). Row E, Process Support Systems, includes the Instrument and Service Air System, which are clearly not “Process System Piping.” To be clear, all of these systems are essential for safely storing heavy water, but they are not “Process System Piping”.

In summary, AMPCO/CCC offer an aggregation of Bates White data that has been rejected by Bates White and contains obvious errors to support conclusions that are both unclear and untested. OPG respectfully submits that nothing can be concluded from AMPCO/CCC's array of numbers.

Separate Off-site Storage of DRP Heavy Water Was Appropriately Rejected

AMPCO/CCC claim that OPG was wrong to reject the option of storing heavy water outside the Darlington protected area because it would have been less expensive to construct and OPG could have secured timely regulatory approvals if it had begun planning earlier (AMPCO/CCC argument, pp. 25-26). OPG's 2012 Full Release Definition BCS discusses this option and explains why it was rejected:

> This option is not viable because it requires additional regulatory approvals from the CNSC and Ministry of Environment which would result in a significant delay to the project that would not meet Refurbishment's schedule. D2O is classified as nuclear material due to the tritium concentrations, and as a result, building a new facility outside the protected area would require a new protected area to be zoned and then built. Although technically feasible, the additional costs and time required to secure all regulatory approvals (such as evaluation of impact to the exclusion and protected zones), re-zone land for creation of a new protected area, and connecting interfacing systems at the current Heavy Water Management Building would not meet the Darlington refurbishment program needs and would result in significant risk to delaying the start of refurbishment. (Ex. D2-2-10, Attachment 2m, p. 6)

The sole evidence offered by AMPCO/CCC to counter this conclusion is its unsupported opinion that such an option would have been possible and cheaper to construct. Its conclusion that this would have been a viable option rests solely on the fact that OPG "considered construction of the Retube Waste Storage Building(s) [("RWSB")] that was outside the Protected Area." (AMPCO/CCC argument, p. 25). AMPCO/CCC do not address, let alone refute, OPG's conclusion that a new protected area would have been required given the radioactivity of tritiated heavy water and need to connect with the Darlington generating units via the HWMB. Moreover, AMPCO/CCC simply assume, without analysis or evidence, that both the CNSC and Ministry of Environment would approve a new protected area. Nor does AMPCO/CCC address Mr. Reiner's

testimony that the intermediate waste stored in the RWSB is placed in sealed containers while inside the protected area, that these containers are designed for permanent storage, and that, in contrast to the D2O Storage Project, the RWSB does not have an ongoing connection to the Darlington generating units (Tr. Vol. 2, p. 33).

In terms of the claim that this option would have been cheaper, it rests solely on AMPCO/CCC's consideration that higher productivity could be achieved in constructing a facility outside the protected area (AMPCO/CCC argument, p. 26). AMPCO/CCC do not address the cost of establishing a new protected area, the cost and feasibility of piping heavy water from some unspecified location to the HWMB, or the fact that the new facility would still require nuclear grade materials, seismic qualification and all the equipment that is necessary to store heavy water, as discussed above.

In short, AMPCO/CCC offer no evidence or rationale to support the conclusion that this option would have been either feasible or cheaper. OPG respectfully submits that the AMPCO/CCC submission on this issue should be rejected.

OPG Rejected the Option of Using Large 700 or 800 m^3 Tanks for Appropriate Reasons

In much the same fashion as they argue for a location outside the projected area, AMPCO/CCC claim that constructing a single 700m^3 tank for moderator heavy water and a single 800m^3 tank for PHT heavy water would have been both feasible and cheaper and that OPG was wrong not to evaluate this further (AMPCO/CCC argument, pp. 22-23). Again, AMPCO/CCC ask that its unsupported opinion and untested calculations, which appear for the first time in argument, be accepted over the evidence based conclusions reached by OPG.

AMPCO/CCC's argument fails to mention that the Conceptual Design Report selected smaller tanks in preference to larger tanks and gave reasons for this selection. These reasons include:

- "One large tank would significantly increase the risk of downgrading a large quantity of water. Should a minimal quantity of light water or oil be mixed with high isotopic Moderator D2O, the entire 700 m^3 volume requires upgrading/cleanup. Significant time and resources would be required to accomplish this."

- Periodic inspection and maintenance of larger tanks would be difficult because it would be challenging to find a location to store such a large volume of water in order drain the tanks.

- The savings from larger tanks would be offset by additional costs related to transportation or the need for onsite fabrication

(Ex. L-D2-02-AMPCO-106, Attachment 1, pp. 70-72).

AMPCO/CCC's sole basis for their claim that OPG failed to evaluate the option of using larger tanks further is that the Conceptual Design Report stated: "During detailed design, vendor manufacturing and shipping capability for large tank sizes should be confirmed and the choice of exact tank volumes optimized accordingly." (AMPCO/CCC argument, p. 22). As OPG explained in its Undertaking response (Ex. J2.6), this option was not evaluated because consistency in tank sizes provides operational benefits. As stated in the Project Charter:

> For consistency most of the tanks should be the same size as the ones used in the existing D20 storage (Ref [7] and [8]). Some of them should be divided in two or four (or four smaller tanks should be used) in order to give further operational flexibility in the storage, handling and transferring of different grades of heavy water to and from reactor units, TRF, Upgrader, etc. (Ref [3]). (Ex. D2-2-10, Attachment 2b, p. 10).

In addition, while AMPCO/CCC trivialize the cost and difficulty of transporting a 700 or 800m^3 tank, the OEB should consider the size of these tanks in relation to the 100 m^3 tanks installed in the D2O Storage Project. A 100m^3 tank has a diameter of about 3.8m and a height of approximately 11m, which is taller than a typical three-story building (Ex. D2-2-10, p. 21). In contrast, a 700m^3 tank has a diameter of about 10m, which is almost as wide as a 100m^3 tank is tall (Ex. L-D2-02-AMPCO-106, Attachment 1, p. 71). Moreover, such a large tank, even if it could be transported, would not have fit between the struts used to maintain the spacing of the seismic dike's caisson walls, which were configured to accommodate the installation of 100m^3 tanks (Ex. D2-2-10, p. 61, p. 62 [Figure 13] and p. 84 [Figure 20]).

AMPCO/CCC also make the unsupported claim that OPG could have shipped the larger tanks in pieces and completed the necessary welding and fabrication on site without issue (AMPCO/CCC argument, p. 23). However, as OPG explained in response to undertaking J2.6,

tank assembly would have been required within the seismic dike, which would have necessitated on-site welding thereby significantly increasing construction and quality assurance complexity when compared to using fully assembled prefabricated tanks supplied and certified by a tank manufacturer (J2.6; Tr. Vol. 2, p. 73).

AMPCO/CCC purport to calculate the savings that could have been achieved from the use of larger tanks with an unsupported and untested calculation that appears for the first time in argument (AMPCO/CCC argument, p. 23). Moreover, since this calculation is based entirely on extrapolation from AMPCO/CCC's erroneous calculation of the cost of process piping and equipment (see Section 2.1.2.5 above), OPG respectfully submits that the OEB should reject it for the reasons given.

Constructing an Above Ground Storage Facility Was Not a Viable Option

AMPCO/CCC claim that OPG erred by failing to adequately construct an on-grade option and thereby incurred unnecessary costs (AMPCO/CCC argument, pp. 28-29 and 31). Once again, AMPCO/CCC have misread a technical report that OPG commissioned and substituted its own untested opinions for those of the external experts that OPG retained and OPG's internal decision makers.

The only technical basis offered for arguing that OPG should have considered on grade construction is a 2007 Trow Geotechnical Investigation (AMPCO/CCC argument, p. 28). The Trow Report describes its purpose as follows:

> The purpose of the geotechnical investigation was to determine the subsoil and groundwater conditions at the site by putting down a limited number of sampled boreholes and, based on an assessment of the factual borehole data, provide an engineering report with geotechnical recommendations pertinent to design and construction of the proposed structures. (L-D2-02-AMPCO-137, Attachment 126, p. 3).

Trow (now exp Services Inc.) are soil engineers who were engaged to provide geotechnical recommendations, not to design a facility to hold millions of litres of tritiated heavy water. That is not their expertise. The Trow Report concludes "slab-on-grade construction is feasible at the

site." (Ex. L-D2-02-AMPCO-137, Attachment 126, p. 12). The Trow Report says nothing about whether it would be a good idea to build an above ground facility to hold 2,100,000 litres of heavy water. The report does not analyze, or even mention, the ability to seismically qualify such a structure or the cost of doing so.

OPG's conclusion that construction of underground storage was the preferred method of achieving the necessary seismic qualification and had other benefits is based on studies and analyses dating back to 2004.

In 2004, Kinectrics prepared a study entitled Strategic Options Study for OPG Heavy Water Storage and Handling (Ex. L-D2-02-Staff-165, Attachment 1). This is the study that identified the need and preferred approach for the original operational improvement project (Ex. D2-2-10, pp. 36-38 and Attachments 2a and 2k). This study recommended that an extension of the HWMB be constructed with drum handling facility on the ground floor and a basement containing an additional 750 m^3 of storage (Ex. L-D2-02-Staff-165, Attachment 1, p. 31). The report noted that the existing HWMB basement is seismically qualified and consideration of the seismic qualification requirements for the additional storage would be required.

In a 2007 study entitled "OPG Heavy Water Storage Management and Drum Handling – Study of Preferred Solution", Kinectrics studied a number of options for additional operational improvement storage at Darlington (Ex. L-D2-02-AMPCO-131, Attachment 6). The preferred option was a structure adjacent to the HWMB with a seismic dike described as:

> The bottom section of the proposed HWMB extension would form a seismically qualified, leak tight enclosure, constructed from reinforced concrete of the appropriate thickness. This is intended to contain the entire inventory of the storage tanks in case the tanks were to rupture and release their contents into the building. (Ex. L-D2-02-AMPCO-131, Attachment 6, p. 60)

While this Kinectrics study took place well before the decision to proceed with the DRP and the creation in 2010 of a single project that merged operational improvement and DRP storage needs, it did discuss an option for refurbishment storage to be sited at the preferred location for

the operational improvement storage should a decision on the DRP require expanded storage (Ex. L-D2-02-AMPCO-131, Attachment 6, pp. 62-63).

OPG's Conceptual Design Report also considered the issue of seismic qualification and recommended construction of a seismic dike (Ex. L-D2-02-AMPCO-106, Attachment 1). This report considered three options for seismic qualification: Option A) Seismic Dike on Rock; Option B) Tanks Supported by Micropiles; and Option C) Double-walled Pressure Boundary (Ex. L-D2-02-AMPCO-106, Attachment 1, pp. 36-37). The report concludes:

> Option A is the recommended option, as this method is currently employed in the HWMB and has been proven to best fit the needs of the existing building. It is a more robust option when compared to micropiles and of much better value when compared to double-walled pressure boundary. Finally, Option A allows the storage tank(s) to be stored on the bottom elevation without affecting the configuration of elevation 100.000 m, and the drum handling/storage services that are required. (Ex. L-D2-02-AMPCO-106, Attachment 1, p. 37).

AMPCO/CCC's argument says: "OPG ultimately confirmed 'Option B might make sense for other applications.'" The exchange that AMPCO/CCC offer to support this claim makes clear, however, that Mr. Reiner was not referencing "other applications" that store millions of litres of heavy water.

> MR. BUONAGURO: The way you're describing it, it suggests that no one would ever build a tank storage aboveground. You would always want to use a seismic dike underground, based on what you're saying is the complications involving micropiles or double walled pressure boundary tanks.
>
> MR. REINER: No, that is not what I'm saying. What I'm saying is specifically for this facility, given the components, the equipment, the tanks, and also the ability to contain heavy water in the event of a seismic event, the other advantage of the underground dike is you have the hydrostatic head of the ground water that puts pressure on the outside of the facility and pushes naturally by gravity helps to keep water contained inside the dike.
>
> When all those things are looked at for this specific facility, so I say no to the general statement that you make, Mr. Buonaguro. I'm talking about this specific facility. (Tr. Vol. 2, pp. 65-66).

AMPCO/CCC then state that double walled construction (Option C) would only double the cost of the tanks (AMPCO/CCC argument, p. 28). This statement ignores the statement in the Conceptual Design Report that "Double walled pressure boundary can withstand a DBE[21] and contain the Heavy Water, but would likely either require more strenuous qualification or part of the surrounding structure would have to be qualified to mitigate the effects of a collapsed building." (Ex. L-D2-02-AMPCO-106, Attachment 1, p. 37). AMPCO/CCC also ignore the fact that the pipes and valves transporting the heavy water also would need to be seismically qualified (Tr. Vol. 2, pp. 62-63).[22]

Finally, AMPCO/CCC argue that OPG was short sighted and missed potential cost savings because OPG followed the Project Charter's guidance to use the previous design approach (which included a seismic dike) and not reinvent the design (AMPCO/CCC argument, p. 28). AMPCO/CCC have come to the conclusion that Option B would have been cheaper by failing to consider or calculate its cost. Moreover, the Project Charter gives reasons why it recommends continuing the design approach of employing a seismic dike as used in the HWMB that directly contradict the AMPCO/CCC position:

> It is recommended that the design of the facility should be similar to the existing D20 Supply and Inventory system in order to take advantage of the previous design work (Ref [5]). This includes the use of an underground seismically qualified dike as the preferred option as well as a D2O liquid recovery system to handle equipment leakage. A seismic dike is recommended as it avoids the cost and design complexity of seismic supports, double wall piping and valves that would be required for a double walled tanks concept (Ex. D2-2-10, Attachment 2c, p. 6).

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[21] OPG notes that this report was completed in November 2011, which was before OPG and the CNSC reassessed seismic qualification in response to the events at the Fukushima Daiichi Nuclear Power Plant. The reassessment led to the use of the Margin Design Earthquake ("MDE") in seismic qualification calculations for the D2O Storage Project. The MDE has an acceleration one and a half times stronger than that of the Design Basis Earthquake ("DBE"), which had been used initially (Ex. D2-2-10, p. 17). Because Option C was not preferred, OPG had no need to determine whether it would have met the seismic qualification requirements when measured against the MDE used to seismically qualify the project's seismic dike (*Ibid.*).

[22] As an example, OPG's evidence explains that once the project's design evolved to include a pipe chase to connect the D2O Storage Project and HWMB, that pipe chase needed to be seismically qualified because the piping within it conveys heavy water (Ex. D2-2-10, p. 26). This illustrates the requirement that seismic qualification is not restricted to tanks, it covers any equipment that holds heavy water.

OPG respectfully submits that, while AMPCO/CCC may disagree with the reasons given for preferring a seismic dike, they offer no evidence for their position and no rational basis that suggests, let alone proves, that OPG's rejection of above-ground storage was incorrect.

OPG Could Not Have Replicated the Approach Used to Store Unit 2 Heavy Water for All of DRP

OPG prepared Ex. D2-2-10, Attachment 5 to describe in detail the many steps taken to temporarily store Unit 2 heavy water. These steps were summarized in OPG's main evidence as follows:

> 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. Attachment 5 details the actions OPG took to create safe, temporary storage for Unit 2 heavy water in a manner that minimized the cost and schedule risks to the D2O Storage Project.
>
> While OPG was able to temporarily create sufficient storage in the HWMB for one unit's heavy water, the approach employed occupied all of the available storage at the HWMB. Once the HWMB moderator tanks were full, the station faced greater challenges in the event of an emergency situation that required a moderator drain because there was no ready place to store additional heavy water. (Ex. D2-2-10, p. 88)

Despite OPG's evidence, AMPCO/CCC argue that the fact that OPG was able to craft a solution to temporarily store one unit's worth of heavy water somehow implies that this approach could be used throughout the DRP (AMPCO/CCC argument, pp. 14, 19, 27 and 32).

In particular, AMPCO/CCC suggest that the fact that OPG was able to ship some heavy water to Pickering and Bruce from the HWMB demonstrates that transfers to and from the HWMB could have been used throughout refurbishment to enable the construction of temporary storage for DRP heavy water outside the protected area (AMPCO/CCC argument, p. 32).

OPG has demonstrated above why the option of constructing storage outside the protective area was not feasible and that a stand-alone facility would have required all the same safety systems that are contained in the D2O Storage Project, including seismic qualification.

Given these facts, the question of whether OPG could have in fact obtained regulatory authorization to ship millions of litres of heavy water to and from a stand-alone facility is moot. Moreover, while AMPCO/CCC's submissions may ignore the operational, safety and environmental challenges inherent in managing what would be hundreds of additional shipments, OPG is not in a position to do so. OPG respectfully submits that its evidence fully explains why the approach used to temporarily store one unit's worth of heavy water is not viable for the DRP and nothing in the AMPCO/CCC argument refutes this.

OPG Considered Alternatives Appropriately

AMPCO/CCC claim that OPG failed to adequately consider alternatives (AMPCO/CCC argument, pp. 25-26). Read closely, however, AMPCO/CCC's actual complaint is that OPG rejected alternatives that AMPCO/CCC suggest would have been better. AMPCO/CCC also criticize OPG's value engineering process as inadequate. The reasons why OPG rejected specific alternatives that AMPCO/CCC prefer are discussed in the sections above. This section addresses OPG's consideration of alternatives and value engineering. In OPG's respectful submission, it considered alternatives and undertook value engineering appropriately and chose the best option for the safe storage of tritiated heavy water.

As noted above, OPG has been studying the need to expand heavy water storage at Darlington since 2004 (Ex. D2-2-10 pp. 36-38; Ex. L-D2-02-Staff-165, Attachment 1). Both the external studies and internal analyses discussed above looked at alternatives (Ex. L-D2-02-Staff-165, Attachment 1; Ex. L-D2-02-AMPCO-131, Attachment 6; Ex. J1.6, Attachment 1; Ex. L-D2-02-AMPCO-106, Attachment 1). These studies and analyses consistently recommend a seismically qualified dike for heavy water containment and the current project location, for the reasons discussed above.

AMPCO/CCC argue that OPG should have reconsidered the project's location and the use of a seismic dike once it was known that the soil on the project site contained low levels of tritium. AMPCO/CCC claim that "the soil remediation work was worse than anticipated and resulted in incremental costs of $14M" (AMPCO/CCC argument, p. 27). Both elements of this claim are wrong. As explained below in Section 2.1.3.2, tritium was present at low enough levels that OPG

could construct a lay-down area for the tritium to dissipate and ultimately use the soil on the Darlington site. The $14M figure represents the total cost of soil management, not the incremental cost. In the absence of tritium, OPG would still have incurred costs to transport and dispose of the approximately 17,500m^3 of wet soil generated during excavation.

More fundamentally, in OPG's assessment, the cost of managing the tritiated soil did not outweigh the locational advantages of the preferred project site, which have been fully described above. OPG selected the site with full knowledge that it might incur additional costs to manage low levels of tritium in the soil. The value engineering workshop participants preferred the current location, but initially gave a higher score to a split option that had the storage needs divided between the current location (600m^3) and a location within the protected area to the east of the generating units called Site C (1500m^3) based on the potential for tritiated soil, constructability and site size (Ex. L-D2-02-AMPCO-097, Attachment 2, p. 29). As AMPCO/CCC acknowledge (AMPCO/CCC argument, p. 27) however, in the final value engineering analysis, participants' preferred option was to build a single facility to meet all storage needs at the current project location despite the potential cost of addressing tritium in the soil (Ex. L-D2-02-AMPCO-097, Attachment 3, p. 27). Site C was not preferred due to distance from HWMB transfer lines and cost (Ex. L-D2-02-AMPCO-103, Attachment 1, p. 8).

That the workshop participants ultimately did not prefer the split solution is understandable as explained below:

> This option to construct operational improvement capacity west of HWMB at Site 'A' and refurbishment capacity at Site 'C', east of the power house is not recommended because of the additional space requirements utilized by this option, additional effort and costs for tie-ins, and <u>the additional costs to construct two buildings instead of one</u>. Space within the protected area is limited, and is required to be utilized by several projects in support of refurbishment. Site 'C' is also the contingency location for many Campus Plan projects, and likely will not be available for the D20 facility.[23] (Ex. D2-2-10, Attachment 2l, p. 6 (emphasis added)).

[23] This proved to be the case as Site C was used to construct the Retube Waste Processing Building ("RWPB") (see, Ex. K1.3, PDF p. 668, which shows the RWPB as number 11; Tr. Vol. 2, p. 31).

OPG agrees that the current location has long been seen as the preferred project site (AMPCO/CCC argument, p. 27). As noted above, this site has been consistently recommended since the 2004 Kinectrics Study (Ex. L-D2-02-Staff-165, Attachment 1, p. 31). OPG and AMPCO/CCC disagree over how this preference should be viewed. In OPG's respectful submission, the decision to build at this location is evidence of the overwhelming benefits it offers in terms of proximity and connection to both the HWMB/TRF and the generating units undergoing refurbishment, not evidence that OPG's consideration of alternatives was deficient.

Mr. Reiner was asked about benefits of selecting the current site directly:

> MR. STEVENSON: … Do the benefits of the siting outweigh the costs that were associated with that decision?
>
> MR. REINER: The answer is yes, the benefits outweigh the costs. Even with hindsight and what we now know as we experienced about the complexities of constructing the facility where it is located, those costs are far outweighed by the benefits of having this facility adjacent to the tritium removal facility and heavy water management building at the site. So the location is quite critical. And in order to satisfy all the requirements that this project needed to deliver, selection of one of those other sites would have added significant costs. (Tr. Vol. 1, p. 109).

OPG respectfully submits that the evidence overwhelmingly shows the advantages of the current site that led OPG to select it initially and continues to support the decision to construct the project in its current location.

2.1.3 **Project Management**

2.1.3.1 <u>Black & McDonald Was Prudently Retained</u>

OPG retained B&M through a fair competitive process that followed the requirements of the Broader Public Sector Procurement Directive (Ex. K1.9, p. 155). In support of their position that OPG undertook a flawed selection process, parties offer the sole criticism that OPG equally weighted price and technical criteria in evaluating the work request responses from B&M and ES Fox (OEB staff argument, p. 12; Energy Probe argument, p. 8; CME argument, pp. 8-10, paras. 28-34 and p. 12, paras. 43-45; SEC argument, p. 28, paras. 3.8.1-3.8.3; AMPCO/CCC argument,

p. 24). In OPG's respectful submission, these arguments ignore the fundamental fact that both proponents were viewed as technically qualified to undertake this project and both proposals met the technical criteria in the work request (Ex. D2-2-10, pp. 46-47).

OPG weighted price and technical factors equally in pursuit of value in the execution of the DRP. OPG accepts that with the benefit of hindsight, if it had known the project's full scope and complexity, it may have weighted technical criteria more heavily. That is what occurred in the work request that retained CanAtom to complete the project where technical criteria (all non-price factors) comprised 75% of the score (Tr. Vol. 1, p. 117; Ex. D2-2-10, p. 79).

OPG diverges from the parties' views on the retention of B&M in three areas:

1) That equally weighting price and technical merit of the proposals in the original solicitation led to the selection of an unqualified contractor;

2) That changing the weighting would have necessarily led to the selection of a different contractor; and

3) That the selection of a different contractor would have changed the complexity of the project, its necessary scope or the cost to complete it.

OPG determined to undertake the D2O Storage Project as an Engineer, Procure and Construct ("EPC") project under the Extended Services Master Service Agreement ("ESMSA") and issued a competitive solicitation, in the form of a work request, to the two qualified ESMSA contractors, B&M and ES Fox (Ex. D2-2-10, p. 46). Both these contractors had been competitively selected through the ESMSA RFP and both were viewed as technically qualified nuclear vendors by OPG, having successfully completed OPG's qualification process (Tr. Vol. 1, p. 107).[24] Both contractors continue to perform work on the DRP under their ESMSA (Ex. D2-2-4, p. 23, Ex. L-D2-02-AMPCO-120). SEC characterizes B&M as a "respected contractor" and OPG does not disagree (SEC argument, p. 20, para. 3.4.9(c)).

[24] SEC argument states "What that misses is that, if qualification is only a threshold, then any comparison of technical ability isn't relevant at all." (SEC argument, p. 29 para. 3.8.4). SEC misses the distinction between the technical qualification of a contractor and the technical merit of its proposal. B&M was technically qualified to undertake the D2O Storage Project, even if its proposal scored lower on the technical criteria.

As indicated in OPG's AIC, both proposals were made on behalf of consortia whose members had different strengths and weaknesses (OPG AIC, p. 18). While the Auditor General's Report highlights that the ES Fox consortium had "had some experience with parts of a different nuclear generating station's Heavy Water Facility (Ex. K1.9, p. 155)," it fails to note that the lead engineer for the B&M consortium was an RCMT employee who had decades of experience working on Darlington projects (Ex. L-D2-02-AMPCO-104, Attachment 1, p. 1).

Parties suggest that had the weighting been different, a different contractor would have been selected, but offer no reason why this would have been true (AMPCO/CCC argument, p. 24; CME argument, p. 12, para. 45). CME suggests that if OPG had used a higher weighting of technical factors, "it would have led either to the more technically proficient contractor being selected, or it would have caused Black & McDonald to spend more time and effort understanding the technical requirements" (CME argument, p. 10, para. 36). OPG fails to see how B&M spending more time understanding the work request would have altered the challenges inherent in designing and constructing this first-of-a-kind project or the reasons that ultimately led to B&M's termination. Ultimately, these arguments are speculative. There is no way to know how proponents would have changed their proposals in response to a different weighting of price and technical merit. As Mr. Reiner testified, contractors submit bids to win projects. If the selection criteria change, the bids change (Tr. Vol. 3, p. 13).

CME also argues that OPG was wrong to ascribe any weight at all in the solicitation to price (CME argument, p. 11). The core of this argument is the claim that: "There is no value to according the price any weight in a solicitation without a firm understanding of what the project entails." (CME argument, p. 11, para. 40). This is incorrect on three fronts. First, to have given zero weight to price would have been at odds with prudent procurement. Second, while the project's full scope was not known, portions of the scope such as the need to construct a seismic dike and anchor it to bedrock were known, and OPG was correct in considering the price to execute the scope as it was known at the time of the work request. Third, under the ESMSA contract, while contractors are able to earn profit on the additional costs of any approved scope changes, they earn no profit on legitimate cost increases unrelated to expanded scope (Ex. L-D2-02-AMPCO-127(b)).

In order to determine if there was a legitimate cost increase, OPG needed a baseline and a lower baseline meant that more of any claimed cost increase required justification. Simply put, this was a target price contract (Tr. Vol. 3, p. 26).[25] The lower the target price, the sooner the contractor is required to justify and seek approval of requested contract price changes. There is no basis that this target price model changed the necessary scope or the cost to complete the project.

The third part of the parties' argument is that, had OPG selected a different contractor, the cost of the project would have been lower. There is no basis to believe this is true. Having a different contractor would not have changed the complexity of the design, altered the subsurface conditions (the amount of dewatering required and the need to address low levels of tritium), moved the project outside the protected area of Darlington while it was undergoing refurbishment, or eliminated the congestion challenge inherent in installing multiple systems in a confined space. In short, a different contractor would not have changed the project and it was the project, as it was fully elaborated, that drove cost.[26]

Two qualified ESMSA contractors, B&M and ES Fox, bid on the D2O Storage Project. While the parties' comments on the weighting of the technical criteria indicate that they believe ES Fox should have been selected over B&M, no party voices this conclusion directly. This silence is unsurprising because there is no basis to believe that ES Fox, the contractor on the Auxiliary Heating System ("AHS") project, would have performed any better than B&M on the D2O Storage Project. As Mr. Reiner explained:

> Both contractors, Black & McDonald and ES Fox were qualified to do the work. Both were doing work for OPG. Both had projects that they executed very successfully. Both had projects where they struggled. So there isn't -- there isn't one or the other that rises to the top that you count. (Tr. Vol. 2, p. 129).

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[25] Energy Probe's argument claims there was no target price and cites to Mr. Reiner's testimony (Energy Probe's argument, p. 9), but Mr. Reiner said just the opposite: "There was a target price." (Tr. Vol. 3, p. 26).

[26] SEC claims that there is a common element that drove up costs and it was not the contractors (SEC argument, p. 26, para. 3.6.14 and 3.6.15) The evidence shows that the common element was the project's complexity and challenging construction conditions, not OPG, as SEC suggests (See Ex. L-D2-02-Staff-105, Attachment 2, p. 17).

In OPG's respectful submission, the cost increases experienced were caused by the elaboration of the project's scope and the construction conditions encountered, not contractor performance.[27]

Ultimately, OPG respectfully submits that the arguments over contractor selection are a red-herring. The cost of the D2O Storage Project increased as its scope was defined and construction challenges occurred and were overcome and not because of the contractor that OPG selected. This was a challenging project, and the selection of a different contractor initially would not have changed the issues that drove increased project cost.

2.1.3.2 The Reports by BMcD/Modus Do Not Establish That Any of The D2O Storage Project's Costs Were Imprudent

During the early years of the D2O Storage Project, BMcD/Modus was integrated into the DRP for the purpose of providing observations and recommendations to management and regular reports to the Nuclear Oversight Committee ("NOC") of OPG's Board of Directors (Ex. L-D2-02-Staff-105, Attachment 2, p. 2).[28] While BMcD/Modus' primary function was to comment on the planning and preparation for refurbishment and the development of the Release Quality Estimate for DRP,[29] at the request of DRP senior management, they reviewed the performance of the

[27] OPG holds the view despite having terminated B&M. OPG's evidence describes the reasons for B&M's termination in October 2014 after the project's scope was largely known. These reasons were primarily related to B&M's inability to produce quality cost and schedule estimates and its unwillingness to assume any significant responsibility for the project's ultimate cost (Ex. D2-2-10, pp. 65-67 and 69; Ex. L-D2-02-SEC-96, Attachment 1). Mr. Reiner confirmed his opinion remains that terminating B&M was a prudent decision and that these were the principal reasons for the decision (Tr. Vol. 1, pp. 107-108).

[28] Contrary to the repeated use of the term by AMPCO/CCC, BMcD/Modus are not auditors and were not hired to audit the D2O Storage Project (see e.g., AMPCO/CCC argument, pp. 21, 27, 35 and 46).

[29] Energy Probe argues that OPG's decision to replace BMcD/Modus with the Refurbishment Construction Review Board ("RCRB") for the DRP was improper and that the OEB should direct OPG to rehire BMcD/Modus or a similar independent incorporated entity to provide regularly quarterly oversight reports to the OEB (Energy Probe argument, p. 7). First, the DRP's oversight structure has never included an entity reporting to the OEB. BMcD/Modus provided independent oversight to the Darlington Refurbishment Committee ("DRC") of OPG's Board of Directors and the RCRB will continue to do so. Second, Energy Probe is incorrect in its assertion that the RCRB is an oversight board managed by OPG itself – it reports directly to the DRC as Mr. Reiner confirmed in response to Energy Probe's questions (Tr. Tech. Conf., May 3, 2021, p. 29, lines 17-22). Third, OPG explained the reasons why the DRC elected to change oversight entities in evidence (Ex. D2-2-8, pp. 19-20; Ex. L-D2-02-Staff-132). In short, following the completion of Unit 2, the nature of DRP work changed from largely planning/execution to execution of replicating scopes across the remaining units. Therefore, the DRC placed greater emphasis in the entities ability to conduct oversight of execution and identify future risks and opportunities. Finally, the approved settlement proposal between OPG and the parties in this application fully settled all issues related to the DRP (save the D2O Storage Project), including reporting requirements for the DRP.

prerequisite projects including the D2O Storage Project (Ex. L-D2-02-Staff-105, Attachment 2, p. 16).

The suggestion that OPG was unaware of the issues in the BMcD/Modus reports until informed of them by BMcD/Modus is wrong (SEC argument, p. 24, para. 3.6.7). BMcD/Modus has confirmed this, stating it was DRP senior management that asked them to review the root causes of the issues that management was experiencing on the project (Ex. L-D2-02-Staff-105, Attachment 2, p. 16).

OPG has testified to the same conclusion. From 2014 until the end of 2020, Mr. Reiner was the senior executive responsible for the D2O Storage Project. The OEB first heard testimony from him on the project in 2014 during EB-2013-0321. In that proceeding he was specifically asked about whether OPG senior management was aware of issues on the D2O Storage Project and he testified that they were, that they asked BMcD/Modus to examine the root causes of these issues and they did (EB-2013-0321, Tr. Tech. Conf., July 9, 2014, pp. 60-61).

The BMcD/Modus comments on the project were discussed extensively in EB-2013-0321. Mr. Reiner and Mr. Eric Gould both testified at both the Technical Conference and the Oral Hearing about the fourth BMcD/Modus report (2nd Quarter 2014), which parties quote extensively, and the fifth BMcD/Modus report (Supplemental 2nd Quarter 2014), which parties largely ignore. The comments also were reviewed in the EB-2016-0152 proceeding in connection with the AHS project. Despite this history, in OPG's respectful submission, some parties have mischaracterized the meaning of comments in the BMcD/Modus reports or drawn wrong conclusions from them as the sections that follow demonstrate.

Finally, although the parties reiterate virtually all of the findings related to the D2O Storage Project contained in the Q2 2014 BMcD/Modus Report, they omit any mention of the BMcD/Modus conclusion with respect the cost implications of their findings. In a chart that appears at the end of the Q2 2014 BMcD/Modus Report (Ex. L-D2-02-AMPCO-137, Attachment 134, p. 27) (reproduced below as Figure 2) entitled, "Project Matrix, Campus Plan, Findings and

Observations," BMcD/Modus check every critical finding in the D2O Storage column except for two:

- Line 20 – "Contractor performance has increased cost"
- Line 21 – "OPG performance has increased cost or has the potential to increase cost"

Figure 2 – BMcD/Modus Observations and Findings (Q2 2014)

5/1/2014 Project Matrix Campus Plan Observations/Findings Page 1 of 1

REF.	OBSERVATIONS	PROJECTS				
		Water & Sewer	D20 Storage	Aux Htg Sys	RFR Annex	* RFR Waste Storage
1	Lack of scope definition.	√	√	√	√	
2	Insufficient effort and time in creating engineering requirements.	√	√	√	√	
3	Initial Project was deferred and then reactivated over a period of years (> 5yrs).	√	√	√		
4	3rd Party Estimates - Mixed results w/F+G being significantly over or under vendor quote.	√	√	√		
5	Change in contracting strategy with Vendor from a E-PC to EPC.	√	√	√		
6	Basis of Estimates do not conform to AACE Recommended Practices.	√	√	√	√	√
7	Project Team has failed to characterize the changes/progression to the estimates from gate to gate.	√	√	√	√	
8	Mischaracterized Estimate Classification - OPG is accepting vendor quote as a "Class 2" or "Class 3 estimate when such quote does not meet the threshold for a Class 2 or 3.	√	√	√	√	√
9	Contingency calculated at ~21% - not clear how contingency and risk assessment are linked, if at all.	√	√	√	√	
10	Risk shifting - Project Team does not fully understand the nature of target price work.	√	√	√	√	√
11	The process of bid evaluation scoring and metrics used varies among Project Teams.	√	√	√	√	√
12	The process of comparing bids and 3rd party estimates varies among Project Teams.	√	√	√	√	
13	Significant differences between Vendor Quotations (from 50% to > 100%).	√	√	√	√	
14	Vendor quotes and 3rd Party Estimates (Faithful + Gould) are not aligned for ease of comparison to facilitate a comprehensive review of differences.	√	√	√	√	
15	The contractor selection process compelled the contract to be awarded to the lowest bidder over other qualifying considerations.	√	√	√	√	
16	Risks materialized greater than expected during execution, i.e. underground utilities.	√	√	√	√	
17	Senior Management is reluctant to increase contingency on the front end despite selecting the lowest bidder.		√	√		
18	Project Manager is young and appears inexperienced to manage size of project.		√	√	√	
19	Project Team has difficulty in obtaining reliable cost and schedule data from contractor resulting in OPG's inability to effectively forecast costs to complete.	√	√	√	√	√
20	Contractor performance issues have increased costs	√		√	√	
21	OPG performance issue has increased costs, or has the potential to increase costs					√
22	Scope growth beyond what was anticipated for the project.		√	√	√	
*	*Project is in its early stages.*					

This chart demonstrates that despite their many criticisms of both B&M and OPG performance early on in the life of the project, BMcD/Modus concluded that the challenges they identified did not result in increased costs or even the potential to increase costs on the D2O Storage Project.

Statements that OPG Tried to Hide or Minimize D2O Storage Project Costs Are Incorrect

While the BMcD/Modus Q2 2014 Report contains statements that parties present as saying the Project & Modifications ("P&M") group deliberately understated costs or hid them from OPG senior management to mislead them (Energy Probe argument, p. 8; SEC argument, p. 25, para. 3.6.9); AMPCO/CCC argument, pp. 35-38 and 40), that is not their intended meaning. Mr. Gould clarified this in the following exchange from EB-2013-0321:

> MR. SHEPHERD: …
>
> "It appears these initial BSC estimates..."
>
> That's the estimates from the business case summary.
>
> "...were poorly characterized as part of a deliberate management strategy directed by the former VP of P&M."
>
> And then you go on to say that it looks like they -- I am characterizing it -- like they told the contractors, Don't put in all the costs; assume everything is going to be perfect, because we don't want to have a high cost. Is that fair? Is that a fair characterization?
>
> MR. GOULD: What we saw from the evidence was that the former VP from projects and modifications believed that the costs of these projects could be constrained by sort of a top-down management style.
>
> MR. SHEPHERD: You can't spend more than X and find a way.
>
> MR. GOULD: That was what the evidence showed, and that's from talking to people within the organization. That's essentially what they reflected.
>
> MR. SHEPHERD: So this -- and I have obviously misunderstood this -- this wasn't intended to be duplicitous in any way. It was actually intended to be sort of tough management.
>
> MR. GOULD: I don't know what's in anybody's hearts and minds that I haven't talked to, but I would agree that that is a better characterization. (EB-2013-0321, Tr. Tech. Conf., July 9, 2014, pp. 121-122).

Parties criticize OPG's instruction to the two ESMSA contractors bidding on the project to omit any cost for addressing tritiated soil from their proposals and use this to show that OPG was

trying to artificially minimize project costs. That is not the case. This instruction was given because the tritium levels in the soil at the project site were being investigated at the time that the work request for the project was issued (Ex. D2-2-10, p. 53). Rather than have the contractors speculate about the levels of tritium, if any, OPG employed this approach to ensure that differing assumptions about the then unknown levels of tritium contamination did not affect the comparability of the bids it received.

Energy Probe suggests that this was done to pressure bidders to artificially drive down the project cost (Energy Probe argument, p. 8). To the contrary, OPG was completely transparent about this request and the reasons for it.[30] The Scope of Work ("SOW") issued as part of the work request to B&M and ES Fox explains:

> The OPG Project team, with OPG Environmental Compliance Department, has developed a strategy to investigate and characterize the extent of tritium contamination at Site "A", with the aim to develop a remediation plan, if necessary. The full investigation (Environmental Site Assessment Phase II) is expected to conclude in April 2013, however by April 2012, initial groundwater samples and Geotechnical Evaluation for Site "A" will be complete. An interim groundwater report will also be made available.
>
> The Proponents should assume, for the purposes of this RFP, that there are no tritium concerns with Site "A". (Ex. L-D2-02-AMPCO-103, Attachment 1, p. 9)

While parties criticize this approach (See e.g., AMPCO/CCC argument, pp. 35-36, Energy Probe argument, p. 8; SEC argument, pp. 29-30, paras 3.9.5 and 3.9.6), none of them offer a reason, let alone any evidence, that this prudent approach resulted in higher costs. In fact, because the tritium levels were found to be relatively low, OPG was able to construct a soil lay-down area on Darlington lands that allowed the tritium to dissipate and the soil to be used and planted on the Darlington site (Ex. D2-2-10, pp. 53-54). This was a more economical solution when compared to alternatives for transporting and disposing of the soil (Ex. L-D2-02-CME-019, Attachment 5, p. 17).

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[30] Energy Probe incorrectly conflates tritium removal and dewatering (Energy Probe argument, p. 8). This instruction had nothing to do with dewatering, which was required independent of any tritium issues. Moreover, the cost of dewatering was not increased by presence of tritium (Ex. L-D2-02-Staff-156).

BMcD/Modus Did Not Question the Prudence of OPG's Management

In the EB-2013-0321 proceeding, Mr. Gould was asked about the statements in the Q2 2014 BMcD/Modus Report that performance on the D2O Storage Project and AHS "may cause external stakeholders to question OPG's management prudence." (Ex. L-D2-02-AMPCO-137, Attachment 134, p. 11).

> Mr. SHEPHERD: …What I want to understand is: Is that your opinion, that it's legitimate to question their prudence, or are you simply identifying a risk that something might happen?
>
> MR. GOULD: It's the latter. We are identifying it as a risk. (EB-2013-0321, Tr. Tech. Conf., July 8, 2014, pp. 72-73).

Based on this response, BMcD/Modus did not view the issues it identified as a legitimate basis on which to question the prudence of OPG's execution of the D2O Storage Project, notwithstanding the parties' use of this quote in their arguments (OEB staff argument, p. 14; AMPCO/CCC argument, p. 37, CME argument, p. 18; SEC argument, p. 24).

OPG's Project Management

Parties' arguments offer a number quotes from the 2nd Quarter 2014 BMcD/Modus Report to conclude that OPG was imprudent in assigning the D2O Storage Project to the P&M group, and that P&M's management led to increased scope and had a lasting impact on project costs (OEB staff argument, pp. 10-14; Energy Probe argument, pp. 9-10; CME argument, p. 12, paras. 46-47; SEC argument, pp. 22-23 and 27, paras. 3.6.2-3.6.4 and 3.7.3(a); AMPCO/CCC argument, pp. 23-24). In OPG's respectful submission, none of these conclusions are correct.

P&M Experience and Skills

Parties claims that the P&M group lacked project management skills because they primarily engaged in small maintenance projects (Energy Probe argument, p. 9; CME argument, p. 12, para. 47). This is a substantial overstatement. P&M managed a portfolio of nuclear projects that totaled hundreds of millions of dollars.

The 2nd Quarter 2014 BMcD/Modus Report explains the background on P&M and how they came to manage the campus plan projects as follows:

> The Campus Plan Projects consist of 26 separate scopes of "pre-requisite" work that are needed to support the DR Project or the station's operations during construction. These projects are being managed by OPG's P&M organization. Prior to this Campus Plan work, P&M executed capital projects for the stations, with annual budgets of approximately $300M. With the advent of the DGNS Refurbishment Project, senior management sought to use P&M to develop and oversee all of the Campus Plan Projects, allowing the DR Team to focus on planning for the DR Execution Phase. (Ex. L-D2-02-Staff-105, Attachment 2, p. 178).

This is expanded on in the Supplemental 2nd Quarter 2014 BMcD/Modus Report:

> P&M is a projects organization set up to manage a large portfolio of capital projects for both Pickering and Darlington. As such, the needs of the P&M organization are different to Refurbishment and it does not utilize the same procedures and controls developed for the Refurbishment Project. The P&M processes are geared towards multiple (hundreds) of small projects authorized within the OPG AIS-C funding stream. Due to the fact that the Campus Plan Projects had to start significantly ahead of the Refurbishment Project, and the fact that the DR Team did not have its construction execution organization in place, the Campus Plan Projects were handed over to the P&M organization to manage. (Ex. L-D2-02-Staff-105, Attachment 2, p. 20).

As demonstrated above, the D2O Storage Project was an extremely complex construction project whose scope ultimately involved construction challenges and integration with the HWMB/TRF, both complex undertakings. That the P&M organization faced challenges in managing such a complex undertaking is neither surprising nor evidence of imprudence. The fact that early in the project, the organization was building the skills necessary to manage a project that was among the most complex elements of the DRP is also not evidence of imprudence. More importantly, as shown in Section 2.1.3.2 and Figure 2, BMcD/Modus found that the issues that it identified in its Q2 2014 Report did not result in either the contractors or OPG incurring extra costs (Ex. L-D2-02-AMPCO-137, Attachment 134, p. 27).

CME argues that the OPG should have awarded the project to the Darlington Refurbishment Group which included five senior managers with experience with the Point Lepreau Nuclear Generating Station refurbishment (CME argument, pp. 12-13, paras. 47-48). This argument evidences a lack of understanding of both the D2O Storage Project and refurbishment. As is well

explained in the evidence, the D2O Storage Project is a first-of-a-kind construction project built on a challenging site. Thus, it is fundamentally different from refurbishment, which as noted above, consists largely of like-for-like equipment replacement, albeit of precise equipment in a complex arrangement (EB-2013-0321, Tr. Tech. Conf., July 8, 2014, p. 69). Point Lepreau experience, while helpful for refurbishment, was not directly applicable to the D2O Storage Project because Point Lepreau did not involve the construction of a new heavy water storage facility.[31]

CME, SEC and AMPCO/CCC also fault OPG's project management for failing to consider operational experience ("opex") from Bruce Power (CME argument, p. 12, para. 44; SEC argument, p. 38, para. 3.11.2 (f); AMPCO/CCC argument, p. 30). This claim is refuted by OPG's evidence, which discusses OPG's review of Bruce Power's much smaller project to add additional heavy water storage tanks in an existing building, discussions with Bruce Power and the site visit OPG staff conducted to Bruce Power (Ex. D2-2-10, p. 42). OPG also prepared a report that reviewed its internal operating experience with the Heavy Water Management Building (Ex. L-D2-02-AMPCO-096, Attachment 1).

AMPCO/CCC's claim that OPG's internal review showed that lessons learned from Bruce Power were not "fully" utilized (AMPCO/CCC argument, p. 30). This claim fails to note that the review documents the many lessons learned that OPG collected from Bruce Power, which demonstrates the efforts that OPG made to assess and apply them to the extent possible given the differences between the two projects (Ex. L-D2-02-AMPCO-115, Attachment 1, pp. 48 and 73).

While P&M initially lacked experience with large construction projects, when this gap was recognized, OPG took appropriate action to add such expertise. Mr. Reiner explained that new management with experience managing large construction projects was brought into P&M and

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[31] A brief description of the scope of the Point Lepreau life extension project can be found in: IAEA-CN-164-4S02, Life Extension at the Point Lepreau Generating Station - Powering the Future, K. P. Stratton, pp. 8-9 and accessed here: https://www.google.ca/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjR2_vArojzAhXImeAKHYfEDFgQFnoECAIQAQ&url=https%3A%2F%2Fwww-pub.iaea.org%2FMTCD%2FPublications%2FPDF%2FP1500_CD_Web%2Fhtm%2Fpdf%2Ftopic4%2F4S02_K.%2520Stratton.pdf&usg=AOvVaw3JAGVH2iwjvvY2btBx2FvU

P&M resources were augmented through hiring and training (EB-2013-0321, Tr. Tech. Conf., July 9, 2014, pp. 44-46). Mr. Gould confirmed that many of these changes were made before the 2nd Quarter 2014 Report was issued (EB-2013-0321, Tr. Tech. Conf., July 9, 2014, p. 46).

On this basis, OPG respectfully submits that the initial assignment of the D2O Storage Project was prudent and when challenges arose with P&M's management of the project, OPG prudently addressed them. While SEC says these actions were "good firefighting," not good management, OPG respectfully submits that good firefighting is an essential part of good management (SEC argument, p. 19, para. 3.4.3 (c)). Moreover, these challenges occurred early in the project, and as shown below, did not have a lasting impact on project cost.

Scope Growth Was Not Due to P&M's Management

The issue of the project's scope is fully discussed above in Section 2.1.2.3. Contrary to the parties' submissions (Energy Probe argument, p. 10; CME argument, pp. 17-18, para. 64; SEC argument, pp. 23-24, para. 3.6.5), P&M did not allow for uncontrolled scope growth. The scope of the project was elaborated as the design evolved to deliver the project's intended functionality and address operational and environmental requirements. Moreover, as fully described above, when the costs of the project increased, OPG conducted a scope review, which resulted in scope reductions including removal of all office space and associated facilities and approximately 900 m of piping (Ex. D2-2-10, pp. 67-68).

AMPCO/CCC rely on allegations of uncontrolled scope growth that are sourced from B&M's letter responding to its termination (AMPCO/CCC argument, p. 21; Ex. L-D2-02-SEC-096, Attachment 2). These allegations include the fact that the office space grew in complexity. Given that these allegations were made during an ongoing commercial dispute,[32] and that the referenced office space was entirely removed from the project, these allegations should be given no weight.

[32] As Mr. Reiner explained about the B&M letter: "This is laying out a defensive posture in response to a termination." (Tr. Vol. 2, p. 139).

P&M's Early Project Management Challenges Did Not Have a Lasting Impact on Project Cost

As Mr. Reiner testified, the issues identified by BMcD/Modus related to the first 18 months of the project's operation (Tr. Vol. 3, pp. 4-5). As early as mid 2013, OPG was taking steps to address these issues as Mr. Reiner and Mr. Gould testified in July 2014:

> MS. BLANCHARD: So it sounds like there has been some fairly significant new hires, and has all of that happened since May of 2014?
>
> MR. REINER: No, some of that happened much earlier on and would have started around -- the changes were starting to be made around mid-2013. The new person that came on to take on that senior role arrived in early 2014. I think it was around January -- it was in early 2014.
>
> MR. GOULD: And I think we document not only the new VP's arrival, but also that as of the time of this report many of these changes had already been -- had been jump-started, and some of the -- some of the new things that Mr. Reiner is talking about had already begun. (EB-2013-0321, Tr. Tech. Conf., July 9, 2014, p. 46).

OEB staff claims that the challenges faced by P&M had a lasting effect on the project's costs (OEB staff argument, pp. 15-16).[33] OEB staff and SEC specifically state, quoting BMcD/Modus, that P&M actions deprived OPG senior management of the opportunity to make changes in the project or consider alternatives (OEB staff argument, p. 16; SEC argument, p. 24, para. 3.6.6). That is not the case. At the end of 2014, when the 2015 Superseding Release Execution BCS was being prepared, OPG had spent $122M on the project (Ex. L-D2-02-AMPCO-080). The BCS requested authority to spend up to $381.1M (Ex. D2-2-10, Attachment 2p, p. 3). The BCS presented the proposal to complete the project and alternatives, all of which were considered inferior to completing the project at an additional cost of approximately $259M (Ex. D2-2-10, Attachment 2p). The BCS was signed by OPG's CEO and the OPG Board of Directors was fully apprised of the issues experienced on the project and the magnitude of the anticipated cost

[33] SEC acknowledges that there is no evidence that the issues raised regarding P&M's performance continued, but claims that, nevertheless, costs continued to increase (SEC argument, pp. 22-23, para. 3.6.2). As OPG explains below (Section 2.1.4), costs continued to increase due to ongoing construction issues.

increase prior to management's approval of this BCS (Ex. L-D2-02-SEC-90, Attachment 2, p. 3). Thus, the claim that OPG did not review whether to proceed with the project after its costs increased is incorrect (SEC argument, p. 25, para. 3.6.10).

OEB staff's submission offers a partial quote from the BMcD/Modus 2nd Quarter 2014 Report to support the view that early project management challenges can have a lasting cost impact (OEB staff argument, p. 15). The balance of the quote supports a different conclusion – that the increase in project costs were primarily due to unrealistically low initial budgets and evolving scope, not project management issues.

> …this is in large part due to the unrealistic nature of P&M's initial project budgets and the way in which scope crept into these projects after these initial budgets were approved. (Ex. L-D2-02-Staff-105, Attachment 2, p. 177).

In OPG's respectful submission, the challenges the project faced in its first 18 months did not increase its costs.

The Inability to Isolate the Incremental Costs of Specific Events Does Not Show Imprudence

AMPCO/CCC suggest that because OPG cannot isolate the incremental cost and delay attributable to particular performance issues while B&M was the contractor, OPG is not able to demonstrate that the costs and schedule impacts were prudently incurred (AMPCO/CCC argument, pp. 34-35). OPG does not agree. OPG is able to demonstrate that all the work performed on the project was required, and the cost to execute that work was not significantly different than it would have been had it been added earlier or not been delayed.

To be clear, OPG has fully documented the costs of all the project elements, OPG simply cannot specifically quantify the incremental cost and schedule impacts of the fact that some elements were added and some were delayed. This is the case for two reasons: (1) these elements occurred in the context of the changes to the project's scope and challenging construction conditions, and (2) these costs were relatively small and difficult to isolate.

AMPCO/CCC use the Low Pressure Service Water relocation as an example of OPG's inability to assign costs to delay (AMPCO/CCC argument, pp. 34-35). As OPG's evidence explains, the LPSW was a very large drainage pipe that required relocation, but was not included in B&M's bid (Ex. D2-2-10, pp. 55-59). When this was determined, OPG and B&M looked at alternative approaches to relocate the pipe, selected one and executed it (*Ibid.*). When AMPCO/CCC asked how much this work cost, OPG provided the figure of approximately $10M, which included any cost of delay, but could not separately provide the cost of delay (Ex. L-D2-02-AMPCO-115(c)).

As Mr. Reiner explained, intuitively, OPG agrees there was some additional cost because additional time on the schedule always comes at some cost (Tr. Tech. Conf., May 3, 2021, pp. 75-76). Fundamentally, however, the delay did not change the work that was required. The labour, materials and equipment required for shoring, dewatering, excavation, removing the old pipe and installing the new pipe would have been substantially the same had B&M included the task in its initial bid. These items comprise the overwhelming bulk of the LPSW project cost.

Simply put, it is not possible to construct an alternative universe where B&M included these costs in its bid and the LPSW relocation occurred sooner, and compare these costs to the amount actually spent. But it is possible to conclude that the amounts spent executing the work would not have been substantially different because the work would not have been substantially different, whether it was included in the original scope or added subsequently (Tr. Vol. 2, pp. 129-131).

For similar reasons, OPG could not put a specific cost to the delay in completing design documents (Tr. Tech. Conf., May 3, 2021, pp. 75-77). The design document delay took place in the context of elaboration of the design and addition of new tasks like the LPSW relocation. While OPG can determine the total cost paid to the engineering firm that undertook the initial design, RCMT, OPG has no way of isolating an increase attributable to delay from those attributable to scope elaboration or the addition of new tasks. OPG respectfully submits that the cost of the project is in its design and construction, and while delays did occur, they did not significantly change the final cost.

2.1.3.3 OPG's Use of Contingency Was Appropriate

Energy Probe argues that OPG inappropriately used contingency claiming that OPG knew about the costs of dewatering and contaminated soil removal and therefore should not have expected to pay these costs out of contingency (Energy Probe argument, p. 8). It then states: "Contingency should only be used for unknown events." (Energy Probe argument, p. 8). SEC takes the same position. (SEC argument, pp. 29-30, paras. 3.9.5-3.9.6).

OPG has discussed its decision to instruct the initial bidders on the D2O Storage Project not to include any costs for addressing tritiated soil in their bids above in Section 2.1.3.2. The consequence of that reasonable decision was that the costs of addressing the low levels of tritium present on the project site were paid out of contingency. While OPG was aware of the potential for tritium in the soil at the time of the project's initial work request, it did not know the levels of tritium present on the project site and thus could not accurately estimate the costs to address tritiated soil (Ex. D-2-2-10, pp. 44 and 53). In this circumstance, the use of contingency was entirely appropriate.

Dewatering costs were always included in the project budget.[34] As OPG's evidence make clear, it was aware of the level of the water table well before the project commenced based on the two geotechnical studies it had commissioned (Ex. D2-2-10, pp. 37 and 43). What OPG did not know, and what could not have been known in advance, was the extent and force of the water, which is determined by both environmental factors (precipitation) and localized hydrology and geology that varies throughout the site. As OPG's evidence describes, even after an extensive dewatering effort over many months and the installation of a caisson wall, water continued to enter the site through the tie-backs in the caisson walls, through the rock anchors and ultimately through bedrock itself with enough force to fracture a 0.25m thick concrete slab (Ex. D2-2-10, pp. 55, 60-61 and 72-73).[35] As Mr. Reiner put it, "What was not known, and could not have been known

[34] Energy Probe states: "The contractor, Black & McDonald, was not informed of the high water table according to their letter to OPG." (Energy Probe argument, p. 9). This is both untrue and a misrepresents the B&M letter. The original Scope of Work provided to B&M in the work request package mentions both excavation down to bedrock and dewatering at the preferred site (Ex. L-D2-02-AMPCO-103, Attachment 1, p. 9). What B&M's letter actually says is the project's scope increased because the full extent of soil and water issues were unknown, which OPG agrees is correct, as shown above.

[35] OPG's evidence demonstrates the localized nature of

until excavation was undertaken, is the amount of water that came into the excavation, the volume of water that needed to be dealt with." (Tr. Vol. 2, p. 137).

Contrary to the submissions of Energy Probe and SEC, while OPG was aware of potential need to address tritiated soil and the requirement to dewater the site, the costs of these activities were unknown, and could not reasonably have been known, at the time of the initial project budget and therefore were appropriately addressed through contingency.

2.1.4 **Cost To Complete the Project Under CanAtom**

2.1.4.1 <u>The Increase in Project Costs Between the 2015 BCS and 2018 BCS Were Due Primarily to Construction Costs</u>

AMPCO/CCC argue that the $117M increase in cost between the 2015 Superseding Release Execution BCS (Ex. D2-2-10, Attachment 2p) and the 2018 Superseding Release Execution BCS (Ex. D2-2-10, Attachment 2q) is driven by OPG's approval of CanAtom's proposed redesign and that this decision was imprudent (AMPCO/CCC argument, pp. 40-41). In OPG's respectful submission, as demonstrated below, AMPCO/CCC are wrong on both counts. The cost increase between the two BCS, as well as the $77M in costs that CanAtom incurred but could not charge to OPG because it was working under a maximum price contract, were primarily driven by increased construction costs to complete the project and, to a lesser degree, by its extended duration.

Chart 2 below shows the variance between the 2018 Superseding Release Execution BCS and 2015 Superseding Release Execution BCS using figures extracted from Ex. JT1.14. As can be seen, the bulk of the $117.4M difference between these two BCSs is the contract with CanAtom to complete construction and commissioning.[36] The work CanAtom completed in this period is described in OPG's evidence (Ex. D2-2-10, pp. 97-102). As can be seen from contemporaneous project reports, the work primarily involved installation of systems and equipment (see, e.g., Ex.

[36] As shown in Ex. JT1.14, the $10.8M of Management Reserve from the 2018 Superseding BCS, which is included in OPG's requested in-service amount, was expended primarily on commissioning, and supervision and interest costs incurred due to the time required to complete the project.

L-D2-02-CME-019, Attachments 25 and 26). Other significant cost drivers were interest costs and other OPG costs driven primarily by increased project duration and materials procurement costs (Ex. D2-2-10, p. 111).

Chart 2 – Variance Between 2018 and 2015 BCS by Category

Cost Category	2015 Superseding Release Execution BCS	2018 Superseding Release Execution BCS	Variance (2018 minus 2015)
		$M	
OPG Project Management	$6.70	$12.40	$5.70
OPG Engineering	$7.40	$16.30	$8.90
OPG Procured Materials	$1.40	$10.30	$8.90
Interest	$20.00	$43.30	$23.30
OPG TRF	$0	$3.00	$3.00
OPG Other	$18.70	$22.60	$3.90
Design Contract(s)	$7.10	$14.30	$7.20
Construction Contract(s)	$40.80	$44.40	$3.60
EPC Contract(s)	$244.90	$331.60	$86.70
Consultants	$0.10	$0.20	$0.10
Other Contracts/Costs	$0.10	$0.10	$0.00
Contingency	$33.90	$0	($33.90)
Total	**$381.10**	**$498.50**	**$117.40**

Source: Ex. JT1.14

AMPCO/CCC argument also spends considerable time to establish that the increase between the two superseding BCS is not attributable to scope changes (AMPCO/CCC argument, pp. 40-41). Although some minor increases to scope did occur, consistent with prior testimony and as shown in Chart 2, OPG does not attribute the increased cost in this period to the elaboration or significant addition of scope.

AMPCO/CCC provide a quote from the 2018 Superseding Release Execution BCS and present it as confirmation that OPG agrees that the bulk of the cost incurred above the $381.1M in the 2015 Superseding Release Execution BCS were due to the redesign (AMPCO/CCC argument, p. 41). This submission misinterprets the BCS.

The relevant full quote is as follows:

> Following the approval of that business case, OPG engaged a new vendor. The new vendor recommended changes to the existing design based on what it said were code deficiencies in the original design. It assured OPG that the changes would have no cost or schedule impact. OPG approved the changes on that basis.
>
> In fact, the changes resulted in significant cost and schedule impacts. After OPG refused to pay for the cost increases, it negotiated revisions to the agreement with the vendor lo convert it to a guaranteed maximum price agreement.
>
> At this point, 85% of the civil work, 20% of the electrical work, and 50% of the mechanical work have been completed. A limited Notice to Proceed has been issued in order to safe state the building. The current estimate of $498.5 Million is based on the cost to complete the project under the guaranteed maximum price agreement. (Ex. D2-2-10, Attachment 2q, p. 2).

The key to understanding AMPCO/CCC's misinterpretation is the sentence, "After OPG refused to pay for the cost increases, it negotiated revisions to the agreement with the vendor to convert it to a guaranteed maximum price agreement." This sentence makes clear that the "significant cost and schedule impacts" being referred to in the previous sentence are the approximately $37.5M in redesign costs that CanAtom sought under Project Change Notice ("PCN") 67 and <u>OPG refused to pay</u> (Ex. D2-2-10, pp. 90-95). The resulting "schedule impacts" are those from the construction slowdown during the dispute over PCN 67. Thus, contrary to the AMPCO/CCC submission, this quote is in no way an acknowledgement that the costs to complete the project contained in the final BCS are due to the redesign.

As the BCS suggests, OPG did not pay the redesign costs. While the settlement did include payment of CanAtom's audited costs incurred through April 21, 2017, it also included offsetting concessions that more than covered the $37.5M in redesign costs (Ex. D2-2-10, pp. 95-97).

These concessions include setting the contract maximum price at $90M, some $10M less than the independently estimated cost of completion, a $20M discount on the final cost so that OPG's actual maximum cost was $70M, and CanAtom's agreement to forego approximately $10M in performance fees (Ex. D2-2-10, pp. 95-97). These concessions alone total $40M and as such more than offset the cost of the redesign. Moreover, converting the contract to a maximum guaranteed price provided substantial additional value as CanAtom's cost to complete the project were at least $77M more than OPG paid (Ex. D2-2-10, p. 102; Ex. L-D2-02-SEC-108, Attachment 1).

AMPCO/CCC also cite the Auditor General's Report and claim that it says the entire cost to complete the project above the $381.1M in the 2015 was due to OPG having accepted the redesign (AMPCO/CCC argument, pp. 41-42). In OPG's respectful submission, that is not what the report says. Moreover, given the timing of the Auditor General's Report relative to the completion of the project and the fact that the Auditor General did not audit any aspect of the project other than the retention of B&M, the conclusion that AMPCO/CCC ascribe to the report is incorrect.

The Auditor General's Report indicates that the project was forecast to experience cost increases of "about $130 million, primarily related to design changes suggested by the new contractor in addition to changes to the project's scope and other factors) and delays to the Heavy Water Facility" (Ex. K1.9, pp. 155-156). As the Report indicates, these statements are not supported by any audit review that apportions the $130M among design changes, scope change, other factors and delays to project completion. Moreover, the Report subsequently states this amount includes the $14M in the transition costs related to the termination of B&M in October 2014 (Ex. K1.9, p. 156), but some of these costs were incurred for work in late 2014 and early 2015 that were known prior to the issuance of the 2015 Superseding Release Execution BCS in March 2015.

AMPCO/CCC also claim the project incurred "close to $10M in incremental overtime costs in 2016 for accelerated work" (AMPCO/CCC argument, p. 17).[37] While the figure is close to the actual amount of CanAtom overtime cost in 2016 (Ex. JT1.6), the remainder of the claim is incorrect. The figure is not incremental because the project operated on 10 hour shifts to increase productivity by increasing "wrench time" on each shift so overtime was built into the base costs (Ex. L-D2-02-Staff-171(b)). CanAtom overtime was relatively higher in 2016 because a large portion of the project structural work and piping and tank work in the seismic dike occurred in that year rather than because of acceleration. Structural work undertaken in 2016 included pouring the seismic dike top slab, erecting the building's super structure, and completing almost all of the work on the pipe chase (Ex. D2-2-10, pp. 85-87). In addition, tank installation, pipe spool installation and placing equipment in the seismic dike largely occurred in 2016 (Ex. D2-2-10, pp. 83-85).

OPG Acted Prudently Prior to Accepting CanAtom's Proposed Redesign

AMPCO/CCC make two additional claims of imprudence regarding OPG's acceptance of CanAtom's redesign (AMPCO/CCC argument, pp. 42-43). AMPCO/CCC first says OPG was imprudent for not having secured strong contractual commitments that the proposed redesign would not cause additional costs or schedule delay prior to accepting it. AMPCO/CCC next claim that OPG was imprudent for not having obtained an independent review of the need for the redesign when it was proposed rather than obtaining this review only after entering into a dispute with CanAtom over PCN 67. Both these claims are incorrect. The first reflects a misunderstanding of the terms of the ESMSA contract. The second ignores the evidence that before accepting CanAtom's redesign, OPG did obtain an independent review of the RCMT design. In addition, AMPCO/CCC misrepresent both the purpose and the findings of the engineering report OPG obtained during the dispute over PCN 67 (Ex. D2-2-10, p. 82; Ex. L-D2-02-SEC-101, Attachment 1).

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[37] Elsewhere in their argument AMPCO/CCC claim "OPG spent significantly more in contractor overtime on the D2O project in 2016, $10.47M compared to an average of $626,000 for other years…" (AMPCO/CCC argument, p. 42). While this figure accurately states the amount of overtime for CanAtom in 2016, the source cited by AMPCO/CCC (JT1.6) does not provide an annual average figure for contractor overtime and AMPCO/CCC do not provide its calculation. AMPCO/CCC's failure to put this basis for this average in evidence leaves significant uncertainty about its derivation and accuracy (e.g., is this the average for CanAtom or for all contractors and in calculating the average of other years, did AMPCO/CCC exclude 2016 for all contractors or just CanAtom?).

When OPG accepted CanAtom's proposed redesign, CanAtom represented that there would be no additional costs or schedule delays. OPG confirmed this commitment in its acceptance memo (Ex. L-D2-02-SEC-099, Attachment 1). While AMPCO/CCC suggest more was required, nothing else was necessary.

Under the ESMSA and the Purchase Order for the D2O Storage Project, changes to the target price can only occur through OPG's issuance of a Project Change Authorization ("PCA") for agreed changes to scope or other OPG-initiated changes or a Consent to Proceed ("CTP") for agreed cost changes due to underestimation of effort by the contractor (Ex. L-D2-02-AMPCO-127 (b)). Once OPG informed CanAtom that it was agreeing to the design change on the condition that it would not increase cost or extend schedule, in effect it was informing CanAtom that it would not issue a PCA or a CTP for additional costs related to the change. The ESMSA does not allow OPG to unilaterally convert a target price contract to a fixed price contract as AMPCO/CCC suggest, but it does contain provisions that allow OPG to reject additional costs that it does not agree are appropriate, and OPG did so.

AMPCO/CCC also allege that OPG was imprudent not to have obtained an engineering review of the need for the redesign prior to agreeing to it and that the engineering review OPG obtained through its legal counsel during the dispute with CanAtom over PCN 67 shows that the redesign was unnecessary. Here too, AMPCO/CCC is wrong.

As OPG's evidence explains:

> OPG asked one of its external design review engineers to examine the RCMT design in light of the issues raised by CanAtom. This engineer undertook a high-level review and concluded that the RCMT design was unusual in that it lacked lateral bracing for the steel superstructure and, as such, would require significant effort to erect temporary support structures in order to construct the building. The reviewing engineer also indicated that there was no documentation to show that the precast panels relied on for structural integrity had been adequately reviewed against wind and seismic loads. The reviewing engineer concluded that adopting a design where the steel superstructure was used to meet all loads and the precast panels were solely used for architectural, rather

> than structural, purposes would minimize construction delays and engineering effort (Ex. D2-2-10, p. 82).

In short, the external review concluded that the CanAtom design would be easier to complete. OPG determined that since CanAtom would be the entity doing the construction, it made sense to have them employ a design that both they and an external engineer, retained by OPG, agreed would be easier to build. This view proved correct, as the erection of the building's superstructure proceeded smoothly (Ex. D2-2-10, pp. 85-86).

Once OPG entered into a dispute with CanAtom over PCN 67, it obtained, through counsel, a more detailed review of the RCMT design from Ares Corporation (Ex. L-D2-02-SEC-101, Attachment 1). The Ares review confirmed that the RCMT design, once constructed, would be expected to meet code and that the design was constructible (Ex. L-D2-02-SEC-101, Attachment 1, pp. 12-14). Discussing the base plates for the beam pockets that hold the steel superstructure, however, the report concluded: "From a finished product point of view, the design is acceptable… however, the dyke wall concrete immediately below the base plates may have insufficient strength to resist breakout forces imposed by the anchor bolts during construction." (Ex. L-D2-02-SEC-101, Attachment 1, p. 13) This point actually supports one of CanAtom's criticisms regarding the constructability of the RCMT design. More fundamentally, the Ares review said nothing about which design would be cheaper or quicker to construct, which were the main factors that led OPG to accept CanAtom's redesign.

It is impossible to determine how an adjudicator would have decided on the need for the redesign if the PCN 67 dispute had gone to arbitration or court, but in OPG's respectful submission, this information is unnecessary for the OEB to conclude that OPG acted prudently in accepting the redesign. Contrary to the AMPCO/CCC submissions, OPG did obtain an external review prior to accepting the design change and the Ares design review does not address the issue of which design was better from a constructability perspective.

2.1.5 The Bates White Report Establishes the Reasonable Cost of the D2O Storage Project

OPG retained the expert firm Bates White to estimate the cost to construct a facility with the equipment and functionality of the D2O Storage Project on the project site. After reviewing the OEB's discussion of the AHS and Operational Support Building ("OSB") projects in EB-2016-0152, OPG concluded that this information would assist the OEB in determining the reasonable cost of the D2O Storage Project to be included in rate base. In OPG's respectful submission, the Bates White Report supports the view that the amount OPG seeks to place in rate base for the project is reasonable.

In developing its estimate, Bates White applied a detailed five step methodological approach which is the standard structure used by the U.S. Energy Information Agency to decompose and display construction cost estimates (J3.4, Attachment 1, p. 12). Bates White's expert conclusions are a product of the teams' detailed line by line analysis and "more than 100 person-years of experience acquired analyzing major construction projects of similar size and scope at nuclear sites across North America and indeed around the world" (J3.4, Attachment 1, p. 12).

The submissions of the parties contain relatively little commentary on the information and analysis in the Bates White Report. To the extent criticisms are made on the report itself, they are based on misunderstanding or misrepresentation as shown below. Given the approach of the SEC argument, with a great number and variety of misstatements, OPG has included a table that briefly refutes each of the numerous points unique to SEC.

Largely, parties criticize the report for what it is not – a prudence review, a study of alternatives or an analysis of the project's scope. OPG explains above (see Section 2.1.1) that provision of the information that parties claim is missing would have been either inappropriate (a prudence review) or duplicative of the information already on the record (evaluation of alternatives and scope).

Parties also claim that the Bates White cost analysis is or might be biased because Bates White had access to the OPG's estimated cost in the final D2O Storage Project BCS. Below OPG addresses this suggestion by 1) explaining how Bates White's methodology avoids bias, 2) presenting Bates White's testimony that the BCS figures had no impact on their estimates and that these estimates were not influenced in any way by OPG, and 3) demonstrating why the suggestion that OPG could have tried to keep the publicly available amount of the project's final cost from Bates White is wrong.

After addressing and dismissing the parties' criticisms, OPG respectfully submits that what remains is a detailed and comprehensive analysis performed by acknowledged experts in nuclear construction and cost estimation that presents the OEB with an accurate and fully supported estimate of the cost for designing, constructing and commissioning the D2O Storage Project.

2.1.5.1 Criticisms of the Information and Analysis in the Bates White Report Rest on Misunderstanding or Misrepresentation

As noted, parties spend relatively little time on the actual contents of the Bates White Report. The few criticisms they do offer are based either on misunderstanding the Bates White methodology or misrepresenting it. Before addressing the specifics of these criticisms, OPG first summarizes the analysis that Bates White performed to put these criticisms in context.

Bates White was asked to estimate the cost to construct the D2O Storage Project facility on its current location. Bates White presents a high level summary of their work in the following paragraphs from their report:

> This report presents our cost estimate for the engineering design, procurement, construction, and commissioning of the D2O Storage Project, as it would have been calculated before construction began. The cost estimate assumes what might be called "perfect knowledge" with respect to project scope, design requirements, and actual site conditions encountered. The estimate comprises the cost to pay a construction contractor to engineer, procure, and construct ("EPC") the D2O Storage Project, and OPG's in-house cost ("owner's cost") for contract administration, procurement support, and engineering oversight

> and approval through project turnover, commissioning, and contract close-out, but does not include any costs associated with post-commissioning operations and maintenance ("O&M").
>
> The construction timeline is consistent with the assumed perfect knowledge. The construction timeline includes an allowance for typical delays but no unusually long gaps. Thus, our estimate does not represent an ideal or least-cost perfect build; our probabilistic analysis explicitly reflects typical variability in labour productivity, weather, the need for modest rework, and other factors. The estimated construction cost captures the reality of a build that is located within the exclusion zone of an operating nuclear facility, on a constricted and previously contaminated building site, subject to water ingress and dewatering requirements resulting from the location on the north shore of Lake Ontario, and in a region subject to weather extremes, particularly in winter, and is appropriately regarded as a "first-of-a-kind" ("FOAK") project. (Ex. J3.4, Attachment 1, p. 5, footnote omitted).

The Nature of the Bates White Review and Its Inclusion of Contingency

A few points from these paragraphs bear emphasis as they are relevant to the parties' criticisms. First, this report is not an "after the fact" review of construction cost (SEC argument, p. 10, para. 3.1.6), rather it is the development of a cost estimate from ground up as would have been done before construction began, but assuming perfect knowledge of what was ultimately built and site-specific conditions.[38] As Bates White explained:

> We used the term "perfect knowledge" to describe the fact that we had access to the fully defined project scope, a final design, and an understanding of actual site conditions encountered during the execution of the project. Such information provided details that estimates early in the execution of a project would not have access to; however, knowledge of this type does not eliminate all potential sources of uncertainty in a cost estimate. For example, as noted on p. 9 of the Bates White report, variability in such factors as labour productivity, weather, and the need for modest rework is an unavoidable part of any construction project. (Ex. L-D2-02-CME-022 (b)).

The quote above is a complete response to SEC's claim that the Bates White estimate is too high because it includes contingency (SEC argument, para 3.10.9 (a)). Bates White assumed

[38] As discussed in detail below, the site specific conditions that Bates White assumed perfect knowledge are "previously contaminated soil, a constrained work area, cold weather, and water ingress." (Ex. D2-2-11, Attachment 3, p. 8) The most material of these, dewatering and soil management, are discussed below.

perfect knowledge of what would be built and site specific conditions; they did not assume perfect knowledge of ordinary construction risks such as day to day weather,[39] variations in labour productivity or the need for modest rework that are part of every construction project. As SEC acknowledges, "it is normal industry practice to include a contingency when estimating project costs, and expect it to be spent", and that is exactly what Bates White has done here – estimate project costs that would be expected to be spent (SEC argument, para 3.10.9 (a)).

Second, this is a probabilistic estimate. The mean cost estimate is $512.1M and the P90 cost estimate is $559.4M (Ex. J3.4, Attachment 1, p. 6). The accuracy of the estimate is within 15% above and 10% below the mean (expected) cost, which is equivalent to a Class 2 estimate in the AACE International's Cost Estimate Classification System (Ex. J3.4, Attachment 1, pp. 10-11). This range and the uncertainty around the mean confirm that the Bates White estimate was developed as a preconstruction estimate rather than deterministic estimate of what OPG built using OPG's cost as suggested by SEC ('If we knew in 2013 exactly what ended up being built, and how much it actually cost, what would we have estimated the final cost to be?'") (SEC argument, p. 31, paras. 3.10.3-3.10.4).

For the same reason, SEC's claim that the Bates White Report is based on hindsight is also wrong (SEC argument, p. 30, para. 3.10.1). In order to estimate the cost of building the D2O Storage Project, Bates White had to start with the D2O Storage Project – what the facility contains and where it was constructed. That is not hindsight; that is estimating the cost of constructing what was actually built, which is exactly what Bates White was asked to do.

Productivity Rate Assumption

SEC and CME criticize Bates White's use of a 0.39 productivity factor and claim, incorrectly, that it is inconsistent with OPG's actual productivity at Darlington (SEC argument, pp. 31 and 32-33, paras. 3.10.2(g) and 3.10.9(b); CME argument, pp. 19-20, para. 72(a)). These criticisms rest on the erroneous proposition that OPG's internal productivity rate for construction projects at

[39] In an undertaking response, Bates White explained that perfect knowledge did include knowledge of the exceptionally cold winters the project experienced (Ex. D2-2-10, p. 75, ft. nt. 29) as it affected concrete work in the seismic dike (Ex. JT3.21, p. 4, Question 3(a)).

Darlington is between 0.53 and 0.55. In fact, as demonstrated below, that is the productivity range assumed for regular work in the Darlington station, not for construction projects within the Darlington protected area (Tr. Vol. 3, p 21). Moreover, as the Bates White sensitivity analysis has shown, the productivity factor used has little impact on the total cost of the estimate (Ex. J3.7).

To develop the 0.39 productivity rate used in their report, Bates White analyzed two wrench-time studies prepared for OPG and relied on their own extensive experience with nuclear construction projects (Ex. J3.4, Attachment 1, p. 17). The first study covered a number of activities being performed as part of the DRP and was undertaken by the University of Ontario Institute of Technology (Ex. L-D2-02-CME-021, Attachment 1). The second was specific to the D2O Storage Project and was conducted by Faithful & Gould (Ex. L-D2-02-CME-021, Attachment 3).

In contrast, the 0.53 to 0.55 productivity rates that Mr. Simpson referenced in testimony relate to the productivity of ongoing work at Darlington. This is clear in the transcript exchange that follows:

> MR. SHEPHERD: Sure, of course. There's lunch and training, and there's getting your protective gear on, all that sort of stuff. I get that.
>
> My question is a simple one. In a ten-hour shift, does your typical unionized employee do 3.9 percent of productive work -- or 39 percent, 3.9 hours?
>
> MR. SIMPSON: To answer your question, in two areas the average currently at Darlington nuclear industry in our area is between .53 and .55. That's the starting point.
>
> So if you're comparing the D2O project .93 -- .39, <u>that's the difference between what it is working in the plant and what it was working on this particular project in this location</u>. And there was multiple reasons why that is at .39. (Tr. Vol. 3, p. 21 (emphasis added)).

It is easy to see why the productivity on a construction project within the protected area of a nuclear power plant and the productivity of people regularly working within that plant will be different. A construction project, like the D2O Storage Project, employs a temporary workforce

consisting of a variety of trades at a construction site without a central stores facility for tools, breakroom, or locker room onsite. As shown in OPG's evidence, trailers and a wash-car were located to the south of the project location (Ex. D2-2-10, pp. 63-64, Figure 14). Trailers for supervisors with internet and communications were located outside the protected area (*Ibid.*). Materials were located in the laydown area away from the project. Finally, the D2O Storage Project site was a physically constrained space with multiple trades, scaffolding and large pieces of equipment limiting movement (Ex. D2-2-10, p. 100).

In contrast, the employees working at Darlington are virtually all permanent OPG employees who are familiar with the plant, have access to onsite facilities such as breakrooms and locker-room and tools and equipment storage located at or near the workface. The plant provides ample space and work is sequenced to avoid crowding.

Moreover, as Bates White has demonstrated, the choice of productivity factor has relatively little impact on their estimate of total project cost. For example, Bates White has shown that using the 0.53 productivity factor cited by parties changes their estimate of total project cost from $512.1M to $496.7M (J3.7, p. 3). This is a difference of $15.4M or 3% of the estimated total.

While SEC claims that the Bates White productivity factor sensitivity analysis appears inaccurate, it offers nothing to support this claim, except for its own untested calculations that appear for the first time in its submission and were not put to Bates White (SEC argument, pp. 32-33, para. 3.10.9(b)). Having attempted to add evidence to the record in its own argument, SEC then cautions OPG against doing the same, stating: "We note that adding further explanation in Reply Argument would be even less helpful, as it would then be both untested and unanswered evidence. We assume OPG will not attempt to do that." (SEC argument, pp. 32-33, para. 3.10.9(b), ft. nt. 104). OPG sees no need to add to the extensive information already in evidence on this subject.

Bates White has fully explained its productivity factor sensitivity analysis on the record. To respond to the OEB staff interrogatory that initially requested the sensitivity analysis, Bates White undertook the analysis, explained it, and provided charts and figures to show how both its total

cost and labour costs estimates changed based on differing productivity factors (Ex. L-D2-02-Staff-172, a-d). In Technical Conference Undertaking JT1.11, OEB staff asked Bates White follow-up questions and requested additional clarification of this interrogatory response, which Bates White provided (Ex. JT1.11 (c)).

At the hearing, SEC asked for an undertaking to redo the productivity factor sensitivity analysis in light of the small correction to the Bates White cost estimate. It also requested that Bates White explain the analysis. In responding to the undertaking, Bates White provided the revised sensitivity analyses, which showed little change, and included a discussion of how the analysis was performed, which referenced the formula in Excel that was used to generate it (Ex. J3.7). If SEC genuinely believed that OPG's response to Undertaking J3.7 was inadequate, its remedy was to request additional clarification, rather than attempting to add untested evidence through argument.

Crew Size

As with the productivity assumption, parties incorrectly claim that Bates White has used a higher assumption for average crew size than OPG typically uses (CME argument, pp. 19-20, para. 72(b); SEC argument, p. 25, para. 3.10.10). Bates White's estimate does not use an average crew size. Instead, the estimate is based on the crew sizes required to execute each of the specific tasks used to build up their estimate (Ex. J3.4, Attachment 1, pp. 17 and C3-C4). Having used the crew size necessary for each task, Bates White had no need to use or calculate an average crew size and did not do so. Thus, any claim based on a purported difference between Bates White's average crew size and OPG's average crew must be rejected as clearly wrong.

To be clear, what SEC did in cross examination is take an illustrative example crew size from the Bates White Report and represent it to OPG's witnesses as if it were the typical crew size used in the Report:

> MR. SHEPHERD: All right, thank you. On the next page, page 85, they talk about -- what they've done is they've said we have to change the crew size. This is in addition, by the way, to increasing the hourly wage and reducing the productivity.
>
> They said we have to increase the crew size because in a project like this, you can't have a typical three-person crew, you have to have a four-person crew.
>
> Is that your experience? Is that what happened actually here with you and your contractors?
>
> MR. SIMPSON: Yes, so there is an average, right. Some crews will be as high as five. Some crews will be in the order of magnitude of two or three, depending. Once again, that's a question for Bates White as to exactly why they decided to do an average of three. But that's consistent, plus or minus, with what we saw in the field.
>
> MR. SHEPHERD: Sorry, three is a reasonable average?
>
> MR. SIMPSON: Correct.
>
> MR. SHEPHERD: Thank you. Because they said four…(Tr. Vol. 3, pp. 21-22 (emphasis added)).

Then SEC asked the Bates White witnesses about this purported difference and Bates White explained that their report did not use average crew size as follows:

> DR. GEORGE: So to be clear, we used actual labour rates, and we calculated crew sizes for individual tasks. What you're referring to in both instances is our opinion on merely purely illustrative examples of how the calculation would be done. We do not, for example, make the claim that all the crews would have four people rather than three, for example, or that a welder would be 75 dollars specifically. (Tr. Vol. 3, p. 114).

Furthermore, the Bates White Report clearly explains the limited circumstances where crew size adjustment applied. Crew size was adjusted for tasks that involved installing nuclear-class designated materials or parts. Bates White provided an example to illustrate how this was done. (Ex. J3.4, Attachment 1, pp. 17 and C3-C4).

As CME and SEC argue that Bates White incorrectly calculated an average crew size figure that appears nowhere in their report, OPG respectfully requests that their submission be given no weight.

Soil Management and Dewatering Costs

AMPCO/CCC and SEC point to an apparent discrepancy between the costs Bates White used for dewatering and soil management and those quoted by OPG (AMPCO/CCC argument, p. 29; SEC argument, p. 33, para. 3.10.9(d)). There is no discrepancy. The costs on page D-47 of the Bates White Report include both dewatering and soil management and are comparable to the estimates that OPG provided (Ex. L-D2-02-AMPCO-107 (soil management); Ex. J2.5 (dewatering).[40] Bates White revised the table heading to make clear both activities were included (Ex. J3.4, p. 1).

2.1.6 SEC's Other Criticisms of the Bates White Report

SEC's argument takes a scatter shot approach to criticizing the Bates White Report in an attempt to show that it is a "black box" or a "'Fun with Numbers' exercise" that cannot be relied upon (SEC argument, pp. 31-34). OPG respectfully requests that the OEB not rely on SEC's recitation of the evidence, but instead look to the report and the transcript to determine what Bates White wrote and they said in testimony.

To clearly respond to each SEC's numerous claims, OPG has prepared the Chart 3 below. In it, OPG addresses claimed deficiencies in Bates White's report or testimony that have not been covered previously and shows why each of these claims should be disregarded.

[40] Soil management and dewatering costs were included in both the original version of the table on page D-47 and the corrected version of this table. In other words, the correction did not change the types of cost included in this table.

1 **Chart 3 – Responses to Specific SEC Claims Regarding the Bates White Report**

2

SEC: The Bates White Report "is the **only** expert evidence offered by OPG with respect to D2O" (SEC argument, p. 30, para. 3.10.1, emphasis in the original).
Response: OPG has filed in evidence 15 external expert reports covering the D2O Storage Project's design solution and alternatives, project cost, geotechnical site conditions, groundwater analysis, and the management of heavy water at Darlington.[41]
SEC: The Bates White report "provides no information on the appropriate quantities of equipment, including piping, tanks, etc., because it assumes that what was purchased was exactly what was needed in the circumstances." (SEC argument, p. 31, para. 3.10.2(e)). SEC also claims that the report is based on undocumented analysis (SEC argument, p. 34, para. 3.10.9(f))
Response: The Bates White Report builds its cost estimate from the drawings of the as-built facility and the Bill of Quantities ("BOQ") (Tr. Vol. 3, pp. 56-57; Ex. J3.6). On a spot basis, Bates White verified that what was on the drawings was accurately reflected in the BOQ (Tr. Vol. 3, pp. 120-121). Contrary to SEC's claim, Bates White did not consider what was purchased, only what was actually installed. As Dr. George explained: > the BOQ is based on takeoffs, as Dr. Krahn described earlier in today's testimony, from the as-built drawings, and we validated the BOQ to ensure there was no obvious duplication, nothing was obviously missing, that the overall set of elements in the BOQ seemed reasonable, and so, yes, it was provided by OPG, the BOQ was, but we validated it through cross-check, not exhaustively, but on a case basis with the drawings themselves. What SEC calls "undocumented analysis" was actually one of the cross-checks to confirm the accuracy of the BOQ. (Tr. Vol. 3, p. 103, lines 15-20). This was done by measuring the drawings to see if they showed the same amount of pipe as the BOQ (Tr. Vol. 3, p. 104) There was no need to document this check in a spreadsheet because it was used only to confirm the accuracy of a figure that was already documented in the BOQ.
SEC: The Bates White report "provides no information on about $58 million of costs for which there was no readily available benchmark, because it assumes that the amount spent was the appropriate amount." (SEC argument, p. 31, para. 3.10.2(f)).

[41] See Chart 1 – External Reports in Evidence found above in Section 2.1.1.2.

Response: Contrary to SEC's claim, Bates White has provided significant information about two types of costs for which actual cost information was used.

For approximately $24.7M in soil management and dewatering costs, Bates White used OPG actual costs because there were no available external comparators (Ex. J3.4, Attachment 1, p. D-47). As Dr. Krahn explained for dewatering: "We looked for other available guides and they just did not address the nature, complexity, and duration of a dewatering evolution as it was experienced in the D2O project." (Tr. Vol. 3, p. 66). The Bates White Report provides additional detail as follows:

> With respect to the drainage costs associated with the subgrade excavated site, we determined that the dewatering and soil management efforts were so distinctive (with associated environmental controls) and occurred over such a long period, that their costs could not be readily estimated using RSMeans or other available data. However, after we reviewed the procedures and system design in use, these actual costs are in our opinion representative of the costs that a planner or estimator with perfect knowledge with respect to project scope, design requirements, duration, and site conditions would have included. (Ex. J3.4, Attachment 1, p. 18).

For approximately $28M in costs for equipment custom fabricated for the D2O Storage Project (Ex. J3.4, Attachment 1, pp. C9-C10), Bates White reviewed the competitive procurement process used to purchase this equipment and assessed their reasonableness based on four considerations, as their report explains:

> We reviewed these vendor invoices, evaluated the quoted cost for its reasonableness, incorporated information from the invoices into our schedule analysis, and determined appropriate materials costs to incorporate into the estimate. Our opinion regarding their reasonableness rests on four considerations:
>
> - Such major purchases would normally be the subject of a competitive procurement process, with various forms of pre- and post-contract reviews, which we could not readily replicate but the results of which would be unlikely to differ from the actual purchases.
> - We reviewed evidence that the EPC contractor in this instance had indeed implemented a formal procurement process typical for projects of this type, complexity, and size.
> - Based on our experience, none of the costs appears to be unreasonable.

- For certain items (*e.g.*, large tanks), the procured cost appears to be at the low end of the range we might consider reasonable.
- For some other items (*e.g.*, certain valves) where we could make a comparison with costs reported by RSMeans, the procured cost clearly falls in the reasonable range. (Ex. J3.4, Attachment 1, p. 18).

Contrary to SEC's claim, the evidence shows that Bates White did not assume that the actual costs for custom fabricated equipment were appropriate. Instead, they satisfied themselves that these costs were reasonable based on the fact that these items were subject to competitive procurement and the costs were in line with their experience of costs for similar items.

SEC: "The Bates White Report is a blizzard of numerical data, and it was disconcerting that the authors of the Report did not appear to have a sufficiently firm grasp of the Report's details and underlying logic to answer fairly simple questions." (SEC argument, p. 32, para. 3.10.8)

Response: The Bates White Report is a line-by-line, bottom-up estimate of an extremely large and complex project. As a result, it contains a lot of data. The question to which SEC refers is not accurately characterized as "fairly simple":

> MR. SHEPHERD: That's going to increase the difference. It's not going to decrease the difference, because you're de-escalating at a lower rate than your financing cost, so therefore -- if you said it was 4.4 and now it turns out the math says 5.7. In fact, if you de-escalate for inflation and re-escalate -- or, sorry, for currency, and re-escalate for financing costs, that 5.7 is going to be larger, not smaller. It's not going to be 4.4, is it? (Tr. Vol. 3, pp. 92-93)

In OPG's respectful submission, an undertaking was appropriately provided to respond to the question accurately and, as SEC acknowledges, the change in the calculation was fully explained in Undertaking J3.4 (SEC argument, p. 32, ft. nt. 95). There is no basis to the claim that Bates White did not sufficiently grasp the Report's details and underlying logic.

SEC: Under the heading "Inclusion of Extraneous Costs." SEC suggests, again without evidence, that OPG has included items unrelated to the D2O Storage Project in its request. Having created this baseless allegation, SEC then criticizes Bates White for not investigating whether it is true. (SEC argument, p. 33, para. 3.10.9(c)).

Response: This is another instance where OPG respectfully urges the OEB to ignore SEC's characterizations of the evidence and rely on the record. The evidence clearly describes the equipment that was installed outside the D2O Storage Project facility to integrate the project

with the HWMB and provide it with electrical power (both grid connected and back-up). This equipment includes:

- Piping to connect the tanks in the project facility to the tanks in the HWMB and to the pre-existing connections between the HWMB and the Darlington generating units and piping to connect the D2O Storage Project's drainage (active and inactive) to the HWMB drainages (Ex. D2-2-10, pp. 22 and 26);
- A seismically qualified pipe chase running between the project facility and the HWMB, which holds the piping described in the previous bullet (Ex. D2-2-10, pp. 26-27);
- A causeway between the project facility and the HWMB that is used to transport drums to and from the loading dock at the HWMB (Ex. D2-2-10, p. 28);
- Instrumentation and control cables that run in the causeway and are used to link the project facility to the control panel in the HWMB (Ex. D2-2-10, p. 90)
- A new control panel that allows the D2O Storage Project facility to be operated from the existing control room in the HWMB (Ex. D2-2-10, p. 24);
- Grounding cable that is interconnected with the existing grounding system for the HWMB to achieve electrical continuity (Ex. D2-2-10, p. 32);
- Electrical cables to connect the project to the distribution grid and to a back-up generator (Ex. D2-2-10, p. 31);
- A back-up diesel generator with associated fuel storage, exhaust and fire detection and suppression systems that is housed in a stand alone building (Ex. D2-2-10, p. 31).

All of this equipment is necessary for the operation of the D2O Storage Project facility and none of it would have been installed but for the project. It is all properly included in the Bates White estimate.

SEC claims "While the witnesses admit that some of the costs included in the Bill of Quantities were likely not actually installed in the D2O facility, they advise that making that distinction was not within their scope. (SEC argument, p. 33, para. 3.10.9(c)). This claim is wrong in several respects. The Bates White witnesses did not need to "admit" that equipment was installed outside of the project facility as that fact is undisputed, and, as shown above, fully addressed in OPG's evidence. In addition, the Bill of Quantities does not contain costs, just materials. Moreover, as noted above, Bates White reviewed the actual drawings in preparing their estimate; it did not simply rely on the Bill of Quantities.

When SEC asked Bates White about equipment installed outside the project facility, the witnesses accurately confirmed the nature of this equipment and indicated, correctly, that the location of the equipment was irrelevant to estimating the cost of the D2O Storage Project (Tr. Vol. 3, p. 106). SEC never asked the witnesses whether any of the piping or equipment on the drawings they reviewed appeared to be unnecessary for the project.

SEC: Bates White presented inconsistent evidence regarding their statement that the "six year project schedule was based on the need date for the DRP." (SEC argument, p. 34, para. 3.10.9(g))

Response: As the Bates White's report states, "Based on our professional experience, we established a project construction timeline of six years, including typical delays due to weather and other factors, but no unusually long gaps." (Ex. J3.4, Attachment 1, p. 9) The six-year construction period started in 2013 and concluded at the end of 2018, following which there was an additional four months of commissioning. (*Ibid.*).

Contrary to SEC's cross examination question (Tr. Vol. 3, p. 100), the report does not indicate that this starting date was selected to meet the need for Unit 2, rather it says this starting date was selected "to reflect the need to support the larger DRP." The phrase "the larger DRP" is a reference to heavy water storage needs of Unit 3 and the subsequent units.

SEC: "There is uncertainty around the estimate of tank costs, since the tanks were of different types but appear to have been estimated as if they were all the same type." (SEC argument, pp. 33-34, para. 3.10.9(e))

Response:

SEC refers to the following exchange:

> MR. BUONAGURO: Perhaps as a matter of clarification, when you use a description of the tanks you say PHT moderator feed and product, which I think accurately describes, I believe it's 19 of the tanks, of the 28. Is that just a general description? You didn't mean to limit the description to those four types?
>
> DR. KRAHN: Yes, we chose in this estimate to provide an estimate for landing all of the major tanks. (Tr. Vol. 3, p. 84)

Mr. Buonaguro refers to 19 tanks and Dr. Krahn indicates that these are the major tanks. Dr. Krahn is correct and there is no uncertainty. Ex. D2-2-10, pp. 18-19 fully describes the tanks included in the project and shows a diagram of them. There are 25 tanks used for storage. Of these, 19 tanks, each with a capacity of 100 m^3, are the major tanks. There are also 3 tanks for draining and vapour recovery, which not routinely used for storage. The 25 storage tanks and the 3 non-storage tanks comprise the 28 tank total.[42]

2.1.6.1 Bates Whites Mean Estimate Is a Reasonable Comparator for the Cost of the D2O Storage Project

CME argues that the Bates White mean estimate does not necessarily include only prudent costs. CME's thesis appears to be that the project could have been completed at close to the

[42] Earlier in his cross-examination, Mr. Buonaguro refers to "28 tanks worth of storage." (Tr. Vol. 2, p. 40). As described above, there are only 25 storage tanks.

Bates White estimate because some elements went very well and were completed below budget while other elements were done imprudently at unreasonable cost. The logical implication of this argument is that in order for the OEB to find the project's cost reasonable, it must not only find its overall cost reasonable, but also must find that every element of the project was perfectly executed. As discussed above, prudence does not demand perfection.

Moreover, the OEB rejected a similar request to deconstruct a project's costs into components for Darlington Unit 2 costs in EB-2016-0152 and OPG respectfully submits that it should do so again here. In EB-2016-0152, a number of parties argued that even if Unit 2 Refurbishment was completed at or below OPG's estimate cost, the OEB should conduct a prudence review because some elements may have been executed very well and offset the cost of poorly executed elements. The OEB rejected this position stating:

> Parties raised the argument that due to the way the CRVA was set up, OPG could undertake some spending that was not prudent, however so long as the total Unit 2 cost was less than $4.8 billion, the OEB would have no way to track and disallow that imprudent spending. The OEB recognizes that this risk exists, as it does with spending on any large project. The OEB finds that this risk is mitigated by the fact that in that event, underspending will have to occur in some other areas of the project to achieve the overall budget. (EB-2016-0152, Decision and Order, December 28, 2017, p. 40).

CME also appears to be arguing against the use of the mean estimate in the Bates White Report as the basis of comparison against D2O Storage Project's cost (CME argument, pp. 20-21). CME notes that Bates White produced a distribution of costs (CME argument, pp. 20-21). OPG respectfully submits that while Bates White presented a distribution of cost estimates, the mean estimate is the most likely estimate and hence most representative outcome to be used a basis of comparison with the completed project. Moreover, if the OEB were to adopt the approach used for Unit 2 and accept the P90 estimate, the Bates White estimate to construct the D2O Storage Project would increase to $559.4M (EB-2016-0152, Decision and Order, December 28, 2017, p. 38; Ex. J3.4, Attachment 1, p. 6). This would serve only to increase the amount by which the Bates White estimate exceeds OPG's requested in-service amounts.

2.1.6.2 Access to the Final OPG BCS Did Not Bias the Bates White Estimate

A number of parties suggest that the Bates White estimate is biased (Energy Probe argument, p. 11; SEC argument, pp. 31 and 34-36, paras. 3.10.2(h) and 3.10.9(h)-3.10.12; AMPCO/CCC argument, p. 47), or that it might be (OEB staff argument, p. 17) because OPG provided Bates White with all BCS, including the final one. In response to direct questions about this, Bates White explained why they asked for the BCS, how they used them and why possessing them did not bias their bottom-up estimate. In OPG's respectful submission, the OEB should ignore the parties' speculative claims of bias and rely instead on the forthright responses from Dr. George and Dr. Krahn on this issue.

Bates White's Estimate Is Based Solely on the Project's Design and Construction

Asked why Bates White requested the BCS, Dr. George indicated that Bates White asked for project documents they thought might be helpful and were provided with everything they requested (Tr. Vol. 3, pp. 117-118).[43] As Dr. George testified, Bates White reviewed the BCS for the descriptions of the project, and not for the cost figures they contained because they were tasked to develop their own independent estimate starting from the ground up (Tr. Vol. 3, pp. 118-119).

As Bates White has testified and as its report demonstrates, the estimate they produced is the line by line build up of the costs to design, construct and commission the D2O Storage Project using their best professional judgment and over 100 years of combined experience in costing and construction nuclear projects (Tr. Vol. 3, p. 118). They did not start with a number. Rather, they started with a blank piece of paper, project drawings and all the information on the project that they thought might be useful in understanding the project's design and construction, not what it actually cost.

While OEB staff do not state that the Bates White Report is biased, they suggest it might be. OEB staff's argument states: "OEB staff submits that the possibility that the knowledge of OPG's actual costs at least subconsciously coloured the analysis cannot be ruled out. Knowing the $510

[43] Ex. J3.4, Attachment 1, Appendix B lists the 507 documents OPG provided to Bates White.

million figure may at least have created an “anchor bias”.” (OEB staff argument, p. 17). The implication of this argument is that by knowing the number in the final BCS, Bates White might have been influenced to try to match it.

OEB staff counsel asked Bates White why they did not ask OPG to shield them from the project’s final cost:

> DR. GEORGE: It's hard to think through the hypothetical situation that we would have known about the process by which OPG would periodically produce business case estimates and would update them, so we would have known in advance to request that we not see them.
>
> So we just did not know enough going in to know what to ask to be shielded from -- to which I would add we were very sensitive to the opposite.
>
> But I'm thinking an even more important kind of problem, or potential problem, which is that we would somehow be shielded from useful though potentially, I don't know, embarrassing information, that we would somehow be directed down a path of our analytical approach or our inputs, or how we viewed the world, what assumptions we made.
>
> And to OPG's credit, there was nothing -- to my recollection, there was nothing we asked for that was denied. At no point were we told to make certain assumptions, or not make others. We were not directed to approach the problem in a particular way.
>
> That was our focus. We wanted access to information. We wanted transparency and complete information from OPG. And it's true in retrospect, in response to your specific question, potentially had we enough knowledge in advance, we could have made that request.
>
> But as I say, our focus was really completely in the opposite direction. We wanted to make sure we had everything and could, with a clear conscience and a clean sheet of paper, approach the problem in the most appropriate and rigorous way we could with over a hundred years of accumulated nuclear construction experience on the team.

> And we did that, and we really did that in spades. And not having asked to be shielded from some things, perhaps with 20/20 hindsight we could have proceeded differently on that front.
>
> But our important criteria for doing a good job here, which was gaining access to anything we could have want or need, and to be freed up to do the analysis we thought was appropriate and come up with whatever the answer was. There was no expectation or pressure that I ever felt to come up with an answer from OPG.
>
> Those are the elements which to me and my colleagues on this team, this is what convinced us that the cost estimate you're seeing really does reflect our expert opinion as to what this would have been estimated at in advance, making the assumptions that we made. (Tr. Vol. 3, pp. 117-119).

When asked directly about whether having the final BCS biased the Bates White estimate, Dr. George disagreed: "We were in possession of that. We honestly did not let that colour our expectations as to where the number would come out." (Tr. Vol. 3, p. 119). In response to a subsequent question on this topic from the Chair, Dr. Krahn stated:

> What did we spend our time doing? We did not spend our time reviewing and parsing the business-case summaries from OPG. I mean, we used that information to give us some project context, but we spent our time building this cost estimate from the bottom up…. (Tr. Vol. 3, p. 122).

SEC takes a slightly different tack on the question of bias. Under the heading "client bias" SEC claims: "it would appear clear that at least Dr. George has a history of giving his utility customers the numbers they want." (SEC argument, pp. 34-35, para. 3.10.9(h)). SEC claims it was somehow able to reach this conclusion from Dr. George's CV, but never explains how. When asked about this directly here is what Dr. George said:

> And to OPG's credit, there was nothing -- to my recollection, there was nothing we asked for that was denied. At no point were we told to make certain assumptions, or not make others. We were not directed to approach the problem in a particular way.
> …
> There was no expectation or pressure that I ever felt to come up with an answer from OPG. (Tr. Vol. 3, p. 118).

SEC also claims the OEB should view the Bates White estimate as biased because Bates White coordinated with OPG (SEC argument, p. 31, para. 3.10.2(h)). SEC's sole evidentiary support for this is Dr. Krahn's statement that "when we hit unresolvable issues like cost information that we couldn't easily get a handle on, we discussed it with OPG." (Tr. Vol. 3, p. 122). In OPG's respectful submission, this is not an example of coordination, but instead an example of OPG providing Bates White with all the information they needed to produce an accurate cost estimate. As referenced above, Bates White's evidence is that OPG did not influence how they performed their analysis and did not suggest any particular result.

Public Information Cannot Be Kept Confidential

Once information is publicly known, it can no longer be considered confidential. This is long established in case law[44] and is found in the OEB's *Practice Direction on Confidential Filings*, which states: "Information that is in the public domain will not be considered confidential." (*OEB Practice Direction on Confidential Filings*, Appendix A, p. I).

In October 2017, almost two years before Bates White was retained, Global News released a story that stated the project "could cost Ontarians as much as $500 million, roughly four-times the initial estimate, when finally, complete."[45] In December 2019, a few months after Bates White was retained and a year before their Report was filed, the Auditor General released her report on Darlington Refurbishment. This report states: "At the time of our audit, the Heavy Water Facility was expected to cost about $510 million…" (Ex. K1.9, p. 156).

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[44] *Sabre Inc v. International Air Transport Association* (2011 ONSC 206):

Information is not confidential unless it is not public property and public knowledge. On this point, Justice Sopinka in LAC Minerals held as follows: "In this regard the statement of Lord Greene in Saltman Engineering Co. v. Campbell Engineering Co. (1948), 65 R.P.C. 203 (C.A.) (leave to appeal to House of Lords refused), at p. 215, which was quoted by the trial judge, is apposite:"

I think that I shall not be stating the principle wrongly if I say this with regard to the use of confidential information. The information, to be confidential, must, I apprehend, apart from contract, have the necessary quality of confidence about it, namely, it must not be something which is public property and public knowledge…

[45] Key project at Darlington nuclear facility hundreds of millions over budget, delayed | Globalnews.ca

This was the third result shown in response to a Google search for "D2O Storage Project." The 2018 Auditor General Report on Darlington Refurbishment was also among the top results.

In OPG's respectful submission, given that the final cost of the D2O Storage Project was readily available on the internet, it would have been fruitless to withhold pertinent information for understanding the project contained in the final BCS in order to shield Bates White from a then forecast cost that was publicly available. Moreover, had OPG done so, and Bates White claimed to be unaware of a number that anyone with an internet connection could easily see, OPG respectfully submits that this claim would have been viewed skeptically, at best.

OEB staff's attempt to contrast the circumstances of the Bates White estimate with those of the High Bridge Associates, Inc. ("High Bridge") estimate is inapposite. During the Spring of 2017, OPG and CanAtom were in a dispute over the cost of the D2O Storage Project (Ex. D2-2-10, pp. 92-93). As part of an attempt to move forward, OPG instructed CanAtom to retain High Bridge to estimate the cost to complete the project. High Bridge was also instructed not to review CanAtom's internal forecast of the remaining project cost to preserve its independence (Ex. D2-2-10, p. 93). The crucial distinction is that CanAtom's information was private. It was information that High Bridge could not have known unless CanAtom gave them access to it. In contrast, OPG's estimate of the final cost to complete the D2O Storage Project was public information that was readily available to Bates White.

2.1.7 **Parties' Proposed Disallowances**

In the preceding sections of this Reply Argument, OPG has demonstrated why it has acted prudently throughout the life of the project and how OPG's requested in-service amount is lower than the Bates White independent estimate of the cost to construct the project. In the following sections, OPG demonstrates why the specific disallowance amounts sought by parties are not appropriate.

2.1.7.1 The OEB Should Reject Invitations to Adopt a Formula as a Substitute for Reviewing the Prudently Incurred Costs of the D2O Storage Project

All parties, with the exception of PWU and Society, invite the OEB to adopt the formulaic approach used in EB-2016-0152 for the AHS and OSB to disallow hundreds of millions of dollars in costs of the D2O Storage Project (OEB staff argument, pp. 19-20; AMPCO/CCC argument, p.

23; CME argument, para. 87; Energy Probe argument, p. 7; LPMA argument, p. 5; SEC argument, paras. 3.1.12-3.2.5, 3.3.14 and 3.13.1; and VECC argument, p. 7). OPG respectfully requests that the OEB decline these invitations, and instead, determine the reasonable costs of the project based on a review of the evidence.

Adopting a Formulaic Approach is Unnecessary

Applying the formula used for the AHS and OSB project in EB-2016-0152 to the D2O Storage Project is unnecessary because of the detailed body of evidence OPG has provided on the D2O Storage Project. In determining the disallowance for AHS,[46] the EB-2016-0152 decision states:

> The OEB cannot determine on an exact basis how much of the increased cost is due to additional scope and how much is due to project management issues. Therefore the OEB has considered both factors and has determined it will allow 50% of the increased cost on account of increased scope and disallow 50% of the increased cost to account for poor management. (EB-2016-0152, Decision and Order, December 28, 2017, p. 21).

In EB-2016-0152, AHS and OSB were among a number of capital projects that OPG sought to include in rate base in that proceeding. While AHS and OSB received greater scrutiny than other capital projects due to their increased cost, OPG respectfully submits that the evidence available to the OEB on these two projects in the last application was of a different order than the D2O Storage Project evidence OPG has provided in this application. Here the OEB has an extensive discussion of the progress of the D2O Storage Project from inception to completion, numerous expert reports on the project's planning and technical elements, oral testimony from executives directly involved in the project and a detailed independent expert report of the cost to build the project.

OPG submits that the evidence here is sufficient to show that despite the criticism of OPG's project management performance in 2012 and 2013, the increased costs of the project are due entirely to the fact that the initial execution BCS cost estimate did not reflect the full scope of the

[46] The disallowance for OSB is based on the same approach (EB-2016-0152, Decision and Order, December 28, 2017, p. 22).

necessary work to construct the project or the equipment necessary to provide its requisite functionality as is further explained below.

Applying a Formula Produces Subjective Results

SEC's argument illustrates why relying on a formulaic disallowance would not be appropriate for the D2O Storage Project. After acknowledging that the OEB has evidence on which to conduct a prudence review (SEC argument, para. 3.3.12), SEC states:

> Of course, the Board may determine that such a line-by-line, step-by-step review is not warranted, given the evidence and the EB-2016-0152 precedent. In that case, a determination of a 50/50 allocation between justified and unjustified cost overruns would also be equally justifiable, and is in fact what SEC will propose. (SEC argument, para. 3.3.14)

In other words, to support a proposed $200M disallowance, SEC would have the OEB eschew a review of the evidence and instead apply a formula. OPG respectfully submits more is required here. The OEB should conduct a prudence review and base its decision on the evidentiary record in this proceeding rather than simply applying a formula reflecting the judgement of a different OEB panel about different projects based on different evidence.

Except for OEB staff and CME, all parties propose the same 50% disallowance of the difference between the first execution BCS and final cost that was applied to AHS and OSB (AMPCO/CCC argument, pp. 44-45; Energy Probe argument, p. 7; LPMA argument, p. 5; SEC argument, p. 39; and VECC argument, p. 7). The reason they offer to support using 50% is their shared subjective view that OPG's performance on the D2O Storage Project was at least as bad as AHS and OSB (see e.g., SEC argument, para. 1.2.6)

That this subjective assessment is not a substitute for an evidence-based review is best illustrated by the contrast between the CME and OEB staff's positions. CME largely cites the same evidence and makes similar arguments to other parties, but uses them to propose a 100% disallowance without any justification as to why the reasonable in-service addition for this $510M project is $110M, other than this was the amount in the first full execution BCS. In contrast, OEB staff, who largely cite the same facts as the parties advocating for a formulaic 50% disallowance,

proposes a disallowance of 40% (OEB staff argument, pp. 19-20). While OEB staff's argument explains why it views a 50% disallowance as too high, it provides no explanation as to why the resulting disallowance should be 40% ($160M) rather than 20% ($80M) or some lower number.

While acknowledging that adjudication requires judgment, OPG respectfully submits that the OEB's judgment is better applied to assessing the evidence in this application to determine a reasonable in-service addition amount for the D2O Storage Project rather than adapting a formula developed in a different case on a different record.

The First Full Execution BCS Is Not an Accurate Baseline for D2O Storage Project Costs

Parties advocating for a formulaic disallowance simply assume that the first full execution BCS provides a proper initial baseline for project costs. As the evidence clearly shows, this assumption is incorrect. Due to the circumstances and timing of the D2O Storage Project, the first full execution BCS was issued before the full scope of the project was determined and before the full costs of the construction challenges were known (see Section 2.1.2.3 for a discussion of the scope elaboration that was part of the project from the outset). For the reasons that follow, OPG submits that starting from the $110M project cost in the first full execution BCS to determine any disallowance would be inappropriate.

The evidence in this case shows that the $110M execution BCS was issued in May 2013 (Ex. D2-2-10, Attachment 2o, p. 2). This was early in the design process, some ten months into the seven and a half year project timeline and some two years before engineering was complete (Ex. D2-2-10, pp. 51 and 81). At the time of the full execution BCS, engineering on the project was in its early stages, with RCMT, the first-tier engineering subcontractor to B&M, just beginning to produce engineering design packages (Ex. L-D2-02-CME-019, Attachment 5, p. 12).

OPG moved to a full execution BCS so early in the process before engineering design was complete for two principal reasons: 1) to provide funding to allow Phase III construction activities to begin in parallel with design and site preparation activities, and 2) to enable procurement of long lead materials (Ex. D2-2-10, Attachment 2o, p. 1). Both these needs were driven by a

schedule designed to complete the project in advance of the start of the Unit 2 refurbishment in October 2016.

As OPG has acknowledged, its early BCS were incorrectly categorized:

> While cited, incorrectly, as a Class 2 (+20% to -15%) cost estimate, in fact the estimate was Class 5 (+100% to -50%) as it was based on the cost estimate in B&M's proposal, which relied on the preliminary design work from the RFP documents.
>
> To validate a bid and arrive at a Class 3 cost estimate, let alone the Class 2 indicated, between 10% and 40% of the design and engineering work needs to be completed and used as a basis of estimate. (Ex. D2-2-10, p. 107).

That Class 2 was an erroneous classification is easily seen in the Scope of Work issued as part of the work request for the D2O Storage Project issued to the two ESMSA contractors (B&M and ES Fox) in 2012. Under Contract Planning, one of the first tasks required of the successful proponent was to finalize "AACE Class 5 overall cost estimate." (Ex. L-D2-02-AMPCO-103, Attachment 1, p. 13).

Moreover, as OPG has explained:

> First-of-a-kind projects like the D2O Storage Project are particularly challenging to estimate because they are unique. No direct benchmark cost information exists for such projects as would be available for frequently replicated projects like, for example, building a hospital or a distribution sub-station. (Ex. D2-2-10, p. 107).

In contrast to the first full execution BCS, the superseding BCS for $381.1M signed in March 2015 was issued when engineering was nearing completion (Ex. D2-2-10, Attachment 2p). On this basis, OPG included $381.1M for the D2O Storage Project cost in the overall $12.8B Release Quality Estimate for the DRP (Tr. Vol. 2, p. 90). As OPG has stated in all of its applications starting with EB-2013-0321, the Release Quality Estimate represents the definitive

baseline cost and schedule for the entire DRP.[47] While construction challenges justifiably caused the project's final capital cost to be $509.3M (as fully explained in Section 2.1.4 above), the March 2015 superseding BCS was the first document that reflected the project's full scope and thus represents a more appropriate starting point for assessing the project's final cost.

This is not a newly adopted opinion. This was OPG's position before the March 2015 superseding BCS was even issued and well before the OEB's decision on AHS and OSB in EB-2016-0152, as the following exchange from the EB-2013-0321 Technical Conference confirms:

> MS. BLANCHARD: And given that those costs might be attributed to sort of the learning aspect or the pilot project aspect of these additional -- that these costs might be attributed to those -- whatever you want to call them -- hick-ups or speed bumps, has there been any thought given to removing those from the amount that's going to be included in the rate base?
>
> MR. REINER: I wouldn't characterize them as costs associated with learning. I think one of the points that I was attempting to make yesterday is <u>the issue that we have on the D2O storage project is an estimate was produced before the scope of work was understood. It would be false to use that as the starting point. That estimate is not reflective of the work.</u> <u>The estimate that will be reflective of the work and schedule is the one that will be produced here, that we will update.</u>
>
> So the time period that we are working towards hasn't changed. This isn't a learning thing; this is get the job executed, given the scope that we are dealing with in the period of time that we have available to us.
>
> So I would not characterize these as learning costs. These are part of the facilities that are needed to execute refurbishment. It's part of the cost for the overall refurbishment. So I don't believe that's a correct characterization of the costs. (EB-2013-0321, Tr. Tech. Conf., July 9, 2014, pp. 41-42 (emphasis added)).

[47] EB-2013-0321, Tr. Tech. Conf., July 9, 2014, p. 37 and Tr. Vol. 15, pp, 147-148; EB-2016-0152, Reply Argument, p. 73.

OPG respectfully submits that the $110M first full execution BCS, which OPG has consistently evidenced across three applications as wrong in its estimate classification, cannot be considered a reasonable or accurate baseline against which to measure project cost.

Low Initial Estimates Did Not Cause the Project to Incur Unnecessary Costs

The fact that OPG's initial estimate was significantly lower than the final cost to complete the project did not cause the project's final cost to be higher than it otherwise would have been. OEB staff acknowledge this, stating: "OEB staff believes that costs exceeding a low initial estimate should not be, in the absence of other issues, considered imprudent (i.e., if the final cost of a project is higher than a poorly developed estimate, it does not mean that all incremental spending is imprudent)." (OEB staff argument, p. 19).

Other parties take the opposite view. AMPCO/CCC claim: "poor management of the project from the outset by OPG is the root cause of the poor baseline estimate for the project" (AMPCO/CCC argument, p. 38). SEC also claims that OPG's inability to produce an accurate initial estimate was illustrative of poor project management (SEC argument, para. 3.5.5). In support of this conclusion, SEC states: "As they freely admit, poor baselines tend to cause increased costs and delays" and cites to Mr. Reiner's testimony (SEC argument, para. 3.5.4). Rather than supporting SEC's position, however, Mr. Reiner's testimony actually supports the opposite view:

> MR. SHEPHERD: Can you go to the bottom of that paragraph there? It says:
>
> "In response to cross-examination by SEC, OPG agreed that poor baseline information can lead to cost increases and schedule delays."
>
> And you would agree that's true, right? Poor baseline information can lead to cost increases and schedule delays. Isn't that right?
>
> MR. REINER: <u>Poor baseline information leads you to erroneous conclusions about cost or schedule. It would result in cost increases only to the extent that that cost wasn't known.</u>
>
> It was always there, the cost. The cost of execution is the cost of execution, and that doesn't increase. That's dictated by what you are constructing. Without having a properly developed baseline

> that's informed by exactly what it is that you're building, you really don't have an ability to accurately measure performance. (Tr. Vol. 2, p. 129 (emphasis added)).

While parties assert that poor baselines increase cost, they have not provided a single argument in support of any cost actually having increased as a result of the low initial estimate. Instead, the examples they offer show only that costs increased as the scope of the project became better understood and specific engineering solutions were required to meet project needs or because of conditions encountered during construction. In approving OPG's proposed in-service additions in EB-2016-0152 for the Third Emergency Power Generator, another prerequisite project for the DRP, the OEB accepted OPG's requested in service addition amount and found that "the proposed disallowance suggested by parties is based only on the notion that there has been a variance from the initial budget and the parties presented insufficient evidence to support the disallowance." (EB-2016-0152, Decision and Order, December 28, 2017, p. 39). OPG respectfully submits that the same result is appropriate in this proceeding.

The Recommended Disallowances Are Inconsistent with the Evidence

In OPG's submission, the OEB is being asked to choose between two narratives. The first maintains that OPG, the professional cost estimating firms it retained, and the two experienced contractors it hired, B&M and CanAtom, all failed to accurately estimate the project's cost and that these failures led to increased project cost. The second view is that the project's costs increased because of necessary changes to scope and construction challenges, and the failure to anticipate these in project cost estimates did not cause these costs to be higher than they otherwise would have been. OPG respectfully submits that this latter view is supported by the evidence and should be accepted.

2.1.8 Adjustments and Recovery Methodology Proposed by Parties

Parties proposed three different arguments relating to the recovery of in-service amounts for the D2O Storage Project that are not tied to the prudence of the project costs:

- Recovery from the Decommissioning Fund for portions of the D2O Storage Project
- The Appropriate In-Service Dates for the 2016 and 2019 Amounts

- Application of Any Disallowance to Partial In-Service Amounts

OPG addresses each of these arguments in the following sections.

2.1.8.1 Recovery from the Decommissioning Fund for portions of the D2O Storage Project

The submission of AMPCO/CCC are based on the premise that the funding of OPG's nuclear liabilities includes, among other things, the storage of heavy water associated with decommissioned facilities. On this basis, AMPCO/CCC argue that if a portion of the D2O Storage Project is used to store heavy water from Pickering, it would be inappropriate to allow OPG to continue to collect the revenue requirement associated with this portion of the facility through its payment amounts. Instead, AMPCO/CCC argue that the revenue requirement attributable to the storage of Pickering heavy water should be recovered from the Ontario Nuclear Funds Agreement ("ONFA") segregated funds, specifically, the Decommissioning Fund (AMPCO/CCC argument, p. 12).

To accomplish this result, AMPCO/CCC argue that, at the time that any portion of the storage in the D2O Storage Project is used to store heavy water from decommissioning, the cost of that storage should either be recovered directly from the Decommissioning Fund as "other revenue", or the costs of that storage should be removed from rate base and separately tracked as a cost that OPG can recover directly from the Decommissioning Fund (AMPCO/CCC argument, p. 50). AMPCO/CCC also state that it is necessary to carefully account for the use of D2O Storage Project assets for decommissioning because the terms of the ONFA are such that on termination, the Province is entitled to any fund surplus (AMPCO/CCC argument, p. 50). LPMA supports AMPCO/CCC's position (LPMA argument, pp. 5-6). SEC also supports it, claiming that ratepayers will pay twice for the D2O Storage Project – "once in rates, and ones in decommissioning costs" – and further submitting that the OEB should direct OPG, in its next cost of service proceeding, to file a study or studies showing the extent to which the costs of the project should be allocated to the Decommissioning Fund (SEC argument, pp. 37 and 40).

OPG submits that the parties' positions are incorrect and no change to OPG's proposal is appropriate or required. As discussed above, the D2O Storage Project was built for two purposes

only: refurbishment and the ongoing operational needs of Darlington, including those of the TRF, which serves all of Ontario's operating CANDU reactors. These are the sole bases on which OPG approved the capital investment.[48] As such, the cost of the investment is properly recorded as an operational asset in OPG's audited financial statements and appropriately forms part of the non-nuclear liabilities rate base sought for recovery through the payment amounts.

In response to the parties' submissions, OPG confirms that no portion of the project's cost is reflected in the ONFA Reference Plan cost estimates underpinning the current revenue requirement for nuclear liabilities. Therefore, there is no duplication of costs as between the proposed rate base value for the project and the recovery of nuclear liabilities through payment amounts.

While no decisions have been made on the approach to Pickering decommissioning and thus on the timing of the resulting heavy water storage needs, OPG is investigating these issues. Should the D2O Storage Project be used to store heavy water from Pickering decommissioning activities, and nuclear liabilities costs decrease as a result, this will be reflected in a future ONFA Reference Plan cost estimate, with a corresponding adjustment to revenue requirement impacts. Sections 5.2(1), 6(2)8, 6(2)9 and 6(2)10 of O. Reg. 53/05 require that the OEB ensure that any changes to cost estimates arising from an approved ONFA Reference Plan are reflected in the revenue requirement and as necessary trued up through the existing Nuclear Liability Deferral Account and Bruce Lease Net Revenues Variance Account. [49]

Conversely, the provisions of O. Reg. 53/05 also mean that the OEB should decline the parties' arguments to effectively challenge the assumptions of the current approved ONFA Reference Plan and opine on how to treat certain monies in the Decommissioning Fund. OPG respectfully submits that deciding on these matters is not within the OEB's jurisdiction.[50] The OEB has

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[48] While various BCS mention other potential benefits of the facility, the two needs it was constructed to address are those stated, which are further described in the project's final BCS (Ex. D2-2-10, Attachment 2p, p. 1).
[49] As further discussed in Ex. C2-1-1 and Ex. H1-1-1.
[50] As OPG explained at Ex. C2-1-1, p. 10:

> Cost estimates and underlying operational, economic and other planning assumptions reflected in the ONFA funding liabilities are determined through a

previously acknowledged this, stating in EB-2013-0321: "The Board has no authority over the segregated funds or the reference plan for nuclear liabilities established by the Ontario Nuclear Funds Agreement" (EB-2013-0321, Decision with Reasons, p. 110).

Furthermore, the parties' proposals to attribute a portion of the project costs to the Decommissioning Fund are based on a misunderstanding of OPG's approved nuclear liabilities cost recovery methodology. The methodology was first approved in EB-2007-0905 and continued in all subsequent OEB applications, including through the settlement agreement reached in the current proceeding.[51] The parties' submissions confuse the ONFA funding mechanism and the OEB-approved cost recovery methodology. As discussed below, the fact of funds being set aside pursuant to the ONFA does not mean that they have been incurred as costs by OPG or recovered from ratepayers.

Specifically, as outlined in Ex. C2-1-1, Section 4.0, the approved nuclear liabilities recovery methodology is primarily based on OPG's accounting values as determined in accordance with generally accepted accounting principles and reflected in OPG's financial statements. Accordingly, the cost of these obligations is generally recognized over the periods they are incurred, by matching those costs to the benefits (i.e., electricity generation) derived from the nuclear facilities over time (e.g., by depreciating capitalized asset retirement costs over the remaining life of the stations).

On the other hand, the ONFA is a contractual funding mechanism, between OPG and the Province of Ontario, pursuant to which OPG sets monies aside toward future expenditures on

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> comprehensive process that draws from a variety of sources, including the use of independent third party experts in different fields. Cost estimates and underlying assumptions are reviewed by the Province and their technical consultants prior to approval of an ONFA Reference Plan.
>
> …
>
> OPG cannot withdraw monies from the funds unless the withdrawal reimburses OPG for an eligible incurred expenditure related to nuclear waste management and decommissioning activities as specifically defined by the ONFA. These disbursements are subject to a detailed review and approval process by the Province.

[51] Issue 12 relating to the revenue requirement methodology for recovering the costs of OPG's nuclear liabilities is a fully settled issue under the settlement agreement that was approved verbally by the OEB (Tr. Vol. 3, pp. 123-124).

nuclear waste management and decommissioning based on stipulated formulae and rules. While the baseline cost estimates underpinning the nuclear liabilities recorded in OPG's financial statements and included in payment amounts are developed through the same process as for the ONFA funding obligations, amounts OPG sets aside, or subsequently draws from the ONFA funds, do not form the basis of recovery of the nuclear liabilities' costs from ratepayers.[52]

In the context of the positions of AMPCO/CCC, as supported by LPMA and SEC, the application of the approved revenue requirement methodology means that, to the extent it were somehow appropriate to attribute a portion of the D2O Storage Project costs to the nuclear liabilities (which OPG maintains it is not for the reasons stated above), such costs would be simply reallocated from the non-nuclear liabilities portion of the revenue requirement to the nuclear liabilities' portion. Therefore, the idea advanced by the parties that funding a portion of the project costs from the Decommissioning Fund would result in their removal from the revenue requirement is incorrect and their proposals should be rejected.

OPG submits that SEC's proposal for a further study of the "integration" of the D2O Storage Project and monies set aside in the Decommissioning Fund for heavy water decommissioning also should be rejected. For the above reasons, the proposal is unnecessary – there will be no double recovery and ratepayers will be made whole for any future efficiency gains related to nuclear liabilities through existing true up mechanisms, without the need to complete any study on potential benefits.

Finally, the entitlement to any surplus in the Decommissioning Fund should not be a consideration in the OEB's decision on the matter of the D2O Storage Project. As noted, AMPCO/CCC are (i) incorrectly equating the balance of the Decommissioning Fund to costs that have been recovered from ratepayers, and (ii) ignoring the fact that changes in decommissioning liabilities arising from an approved ONFA reference Plan will be reflected in the existing deferral and variance accounts.

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[52] Substantial discussion on the differences between ONFA funding and the OEB-approved cost recovery methodology is further contained in OPG's prior applications, including in OPG's EB-2016-0152 Reply Argument, which is referenced and summarized in this application in Ex. L-C2-01-Staff-085.

For all the reasons above, OPG respectfully submits that AMPCO/CCC, LPMA and SEC's proposals with respect to recovering D2O Storage Project costs from, or otherwise attributing to, the Decommissioning Fund should be rejected.

2.1.8.2 The Appropriate In-Service Dates for the 2016 and 2019 Amounts

Elements of the D2O Storage Project were placed in-service at various times (Ex. D2-2-10, p. 12, Chart 2):

Chart 4 – Total D2O Storage Project Capital Additions by Year and Supporting Documentation

Date	Capital Addition ($M)	Report of Equipment In-Service (REIS)
2014	14.6	REIS dated October 15, 2014 (Ex. L-D2-02-AMPCO-080, Attachment 1) (confidential)
2016	160.0	REIS dated December 20, 2016 (Ex. L-D2-02-AMPCO-080, Attachment 2) (confidential)
2019	320.9	REIS dated November 26, 2019 (Ex. L-D2-02-AMPCO-080, Attachment 3) (confidential)
2020	13.8*	REISs dated March 26, 2020 and November 30, 2020 (Ex. L-D2-02-AMPCO-080, Attachments 4 & 5) (confidential)
Total	**509.3**	

*The 2020 figure is the amount included in the 2020-2026 Business Plan, which forms the basis of OPG's application. A small portion of this amount (less than $0.1M) is expected to come into service in 2021. The actual in-service additions for 2020 and 2021 will be reconciled via entries in the CRVA.

Parties argue that the OEB should reject the timing of OPG's proposed in-service additions of $160M in December 2016 and $320.9M in November 2019, as reflected in OPG's financial accounting records and audited financial statements in accordance with US generally accepted accounting principles, and instead apply a March 2020 in-service date to these amounts. The sole reason parties have provided in support of this position is that March 2020 is the date the entire facility was formally declared capable of receiving heavy water (OEB Staff argument, pp. 20-21; LPMA argument, pp. 5 and 6; SEC argument, p. 38, para. 3.11.2(h); AMPCO/CCC

argument, pp. 48-49). As set out below, OPG respectfully submits that the OEB should accept its 2016 and 2019 in-service additions because the relevant elements of the D2O Storage Project became useful at these times.

OEB staff expressly acknowledge that the OEB has approved partial in-service amounts associated with large capital projects closing to rate base in the past, and that doing so is appropriate where the assets that underpin the partial in-service amounts are used or useful (OEB staff argument, p. 21).[53] In this proceeding, OPG has filed evidence supporting the usefulness of the assets comprising the partial in-service amounts of $160M in December 2016 and $320.9M in November 2019, including the underlying documentation. However, rather than advancing evidence challenging the basis and rationale for the in-service declarations, parties rely on the fact that the facility was declared capable of receiving heavy water in March 2020 to support their claim that the 2016 and 2019 in-service timing is not appropriate. They also point to the fact that the facility was not used at the time of these in-service amounts.

OPG follows a comprehensive process to deem assets used or useful prior to declaring them in-service. Approval for placing assets in service is captured in REIS documents prepared by a cross-functional team of subject matter experts across OPG's project and station teams, Finance department and project contractors. The complete set of REIS for the D2O Storage Project is provided in Ex. L-D2-02-AMPCO-080.

The December 2016 in-service addition represented the costs of the seismic dike (including necessary excavation, dewatering, supply and construction of caissons, structural steel and columns) with embedded active drainage, grounding, beetles conduits and flat bars, five PHT storage tanks and the pipe hangers, valves, pumps and piping necessary to allow them to receive heavy water if required (Ex. L-D2-02-AMPCO-093). All inspection and test plans and quality documents related to this work were signed-off by both civil contractors, and completion assurance was completed by OPG Field Engineering and Quality Oversight (Ex. L-D2-02-AMPCO-080, Attachment 2, p. 2). These assets were declared useful (Ex. L-D2-02-AMPCO-

[53] In EB-2013-0321, the OEB approved a partial in-service addition of $14.6M for the D2O Storage Project.

080, Attachment 2, p. 2) once the seismic dike was complete, piping was installed to create a flow path to fill the PHT tanks with Unit 2 PHT heavy water, and the tanks were capable of storing heavy water (Ex. D2-2-10, p. 13, L4-8). These assets were useful at the time of the REIS as they provided OPG with the option of using the unfinished building as temporary storage during the Unit 2 refurbishment. As OEB staff notes, had OPG selected this option, it would have further installed the temporary support systems required to safely store heavy water and altered its construction plan in order to maintain radiological safety with heavy water in the facility. However, while OPG ultimately rejected this option in order to avoid incurring increased costs and a longer schedule when another viable storage alternative was developed (Ex. D2-2-10, p. 88), and the assets were not ultimately used for this purpose, they are appropriately considered useful in providing an alternative option for the project to store Unit 2 heavy water.

The November 2019 in-service addition of $320.9M represented the costs of the process systems, process support systems and building support systems necessary to enable the functionality of the facility (see, Figure 1 above for the list of systems) (Ex. L-D2-02-AMPCO-093). All inspection and test plans and Quality Oversight was completed to ensure the systems were clean, quality verified and leak-tight. Completing these systems rendered the facility construction complete and provided the building functionality needed to progress the remaining work (Ex. D2-2-10, p. 102, L1-4). For example, the electrical system provided continuous power to the lighting, heating and ventilation systems that were used to complete commissioning, and the completed monitoring and alarm systems provided additional safety.

Almost all of the systems, equipment, seismic dike and the above ground portions of the building itself had then been placed into service and the project was substantially complete for its intended use by November 2019 (Ex. L-D2-02-AMPCO-080, Attachment 3, p. 3). At this time, the building was available to take and store Unit 3 PHT and moderator water, if needed (Ex. L-D2-02-AMPCO-080, Attachment 3, p. 3). However, the DRP schedule in place at the time forecasted that the facility would not be needed to store Unit 3 heavy water until April 2020 (Ex. D2-2-10, p. 101, L15-16). Therefore, additional life safety systems required to enable human occupation of the building were completed between November 2019 and March 2020 when they were placed in service.

OPG respectfully submits that the $320.9M of assets were useful and some were actually used in November 2019 because the building was construction complete, available to store Unit 3 heavy water and ready for OPG to commence the work needed to finalize the remaining human safety systems per the timeline that accorded with the DRP schedule.

Both the 2016 and 2019 in-service amounts comprise assets that were useful prior to the completion of the entire D2O Storage Project, and both created options for OPG to store heavy water as required. The fact that OPG did not actually use some of the assets until the entire building was completed does not mean that such assets were not useful.

Separately, had OPG placed the 2016 and 2019 amounts in-service in March 2020 following the completion of final commissioning activities as proposed by OEB staff, LPMA and AMPCO/CCC, the project would have incurred approximately $30M in additional financing (interest) costs that would have been capitalized on the construction work in progress balance. Together with a recalculated depreciation amounts based on a later in service date, this would increase the 2022-2026 revenue requirements by a total of approximately $17M, decrease the forecasted regulatory tax loss carried forward beyond 2026 by approximately $13M, and similarly increase the revenue requirements from 2027 until the end of asset life. Over time, due to a higher total project cost, these impacts would more than offset the elimination of the proposed CRVA debit balance that would result from applying a March 2020 in-service date.

Finally, as noted by OEB staff in the past and supported by OPG, adoption of in-service dates for rate making purposes that are different from OPG's financial accounting basis could introduce complexities in the regulatory process, including a lack of comparability with reported audited financial information and benchmarking issues (EB-2010-0008, OEB staff submission, p. 80; EB-2010-0008, OPG Reply Argument, p. 123). It would also increase OPG's administrative costs by requiring two sets of fixed asset and depreciation records for the life of the asset. In EB-2010-0008, the OEB found that for relatively small revenue requirement impacts, such adjustments would not warrant the difficulties inherent in having separate financial and regulatory accounts (EB-2010-0008, Decision with Reasons, p. 110).

For the above reasons, OPG respectfully submits that declaring project assets in-service in 2016 and 2019 as they became used or useful was appropriate, and benefits ratepayers as a result of reduced total project costs.

2.1.8.3 Application of Any Disallowance to Partial In-Service Amounts

OPG provided an illustrative calculation of the revenue requirement impact of a $200M rate base disallowance in Ex. J3.2. Only OEB staff raised concerns regarding the calculation, arguing that if the OEB does not accept OEB staff's argument with respect to timing of in-service additions discussed above, any disallowance ordered by the OEB should be applied on an in-service addition weighted basis across the various years (i.e., 2016, 2019 and 2020) proposed for the requested in-service additions (OEB staff argument, pp. 21-22).

OPG does not agree with this proposal. Consistent with OPG's position above that the March 2015 superseding BCS of $381.1M was the first document that reflected the project's full scope and thus represents a more appropriate starting point for assessing the project's final cost, OPG believes that any disallowance should first apply to amounts over $381.1M, being the March 2020 and, if necessary, the November 2019 in-service additions.

2.2 Issue 13.2

Are the balances for recovery and the proposed disposition amounts in each of the deferral and variance accounts related to OPG's nuclear and regulated hydroelectric assets appropriate?

Please refer to Issue 7.6 (Section 2.1). This issue is denoted as "Partial Settlement" solely because of the CRVA balances associated with the D2O Storage Project. Issue 13.2 is otherwise settled. The resolution of Issue 7.6 will effectively resolve the remaining unsettled issue regarding

1 the CRVA balances associated with the D2O Storage Project that are recoverable in this
2 application because the entries to this account flow directly from the approved capital amounts.[54]

[54] As explained at Ex. H1-1-1, p. 20, the revenue requirement impacts of D2O Storage Project investments have been recorded in the CRVA as they have been placed in service. These revenue requirement impacts will continue to be recorded in the CRVA until the effective date of nuclear payment amounts that reflect this project's inclusion in the rate base. OPG's application has sought to clear the December 31, 2019 CRVA balance related to the D2O Storage Project. Based on OPG's investments in the D2O Storage Project, this CRVA balance is a debit of $58.1M at year-end 2019. The derivation of the CRVA additions for 2016-2019 is shown in Ex. H1-1-1, Table 16 and further discussed in Ex. J3.2.