

1 SEC Interrogatory #5

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3 **Issue Number: 4.3**

4 **Issue:** Are the proposed nuclear capital expenditures and/or financial commitments for
5 the Darlington Refurbishment Program reasonable?

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8 **Interrogatory:**

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10 **Reference:** Exhibit M1

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12 [p.12] Please explain how Schiff Hardin can determine that the process to identify and
13 evaluate risks for the risk register was consistent with industry standards if it ultimately
14 made no determination on the content and completeness of the risk registry.

15
16 [p.19] Please explain specifically what is meant by "Schiff did not independently verify
17 the appropriateness, sufficiency, or correctness of the DR RQE cost estimate?"

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19
20 **Response:**

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22 The following response was provided by Schiff Hardin :

23
24 Schiff reviewed the steps OPG took as described in the OPG evidence and the risk
25 register documentation provided by OPG. Schiff's determination is based on Schiff's
26 opinion regarding industry standard practice and experience with the actions taken by
27 project participants during the planning phases of the project.

28
29 Schiff did not perform an analysis of the components of RQE cost estimate.

30

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Additionally, I prepared independent oversight reports on behalf of OPG regarding the Pickering Unit A return to service project, including Schiff Hardin's Report on Findings – Root Cause Analysis of Pickering A Unit 4 Return to Service (December 12, 2003) and Schiff Hardin's Pickering A Unit 1 Return to Service Readiness Assessment (March 15, 2004).

II. PURPOSE AND SUMMARY OF TESTIMONY

Q: What is the purpose of your testimony?

A: In late August 2016, Schiff was engaged by the Ontario Energy Board ("OEB") to provide an independent and objective assessment of the Darlington Refurbishment Program ("DRP" or the "Program") including analyzing the following:

- **DRP risks and Ontario Power Generation ("OPG")'s risk assessment with respect to industry best practices for projects the size and complexity of DRP;**
- **Contract strategy, contract terms, and contractual risk allocation between OPG and contractors with respect to industry best practices for projects the size and complexity of the DRP; and**
- **The DRP as compared to other mega-programs including, but not limited to, previous nuclear refurbishments.**

Q: Please summarize how you conducted your review.

A: Schiff performed a high-level review of the written evidence filed by OPG regarding the DRP as Exhibit D2-2 in case number EB-2016-0152 and the OPG interrogatory responses related to the planning and execution of the DRP. Schiff's review is limited to OPG's actions documented in the written material provided.¹ **A high-level review is an appropriate**

¹ Schiff signed the Declaration & Undertaking regarding confidential information.

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scope of review because Schiff is not able to independently verify the appropriateness, sufficiency, or correctness of the scope of the DRP, the DRP cost estimate, or the DRP schedule. Additionally, Schiff did not perform a compliance audit to determine whether OPG has adhered to their internal policies, procedures, guidelines or any applicable legal regulations. Schiff's review is focused on the current status of the DRP – just beginning the Execution Phase – and does not include any predictions or assessments of the DRP's likelihood of success in terms of OPG's ability to manage the Program within the established budget or complete the DRP on schedule.

Q: How is your testimony organized?

A: Section I of my testimony begins with an introduction of my background, qualifications and experience, contains the purpose of my testimony, scope of Schiff's assessment and an executive summary of my findings. **Section II** addresses DRP risks and risk management including a discussion of industry standards for project controls, cost estimating, schedule development, earned value tracking, project management staffing, use of audit and oversight, and management processes and procedures. **Section III** addresses the DRP contract strategy, contract terms, and risk allocation between OPG and the major contractors. **Section IV** discusses other mega-projects and the terms other regulatory agencies have included as a condition of pre-approving large project (including mega-project) costs.

Q: Please provide an executive summary of the findings of your review.

A: Based on the review of written evidence filed by OPG in regarding the DRP in case number EB-2016-0152, I found that OPG has reasonably and prudently completed the Definition Phase of the DRP. An executive summary of my specific findings is provided below:

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- Analysis – What does the information mean; was the information gathered and possibilities considered reasonable; what alternatives were identified or, where possible, what benefits and impacts are projected; how does the decision mesh with project and corporate needs?
- Decision – What decision was made; was the decision reasonable; when was the decision made; how was the decision made; was the decision reviewed as assumptions and circumstances changed?

Effectively implementing the sequence of management actions described in the prudence standard above does mitigate risk, but does not guarantee an optimal end result of the construction (on time and on budget). On large, complex construction projects, not all management decisions, including those that were made prudently, appear to be perfect in hindsight. The standard for demonstrating prudent construction risk management is focused on the reasonableness of the management decision-making process that the owner used during both the definition phase and the execution phase of construction.

Q: Did OPG comply with industry standards in preparing a risk register?

A: Yes. In Schiff's opinion, the process OPG used to develop and evaluate the risk register is consistent with industry standards. This conclusion is limited to the process OPG used and the fact that OPG engaged in a formal process to identify and evaluate risks associated with the Program. Schiff does not have an opinion regarding the content or completeness of the risk registry or whether OPG's assessment of the likelihood or magnitude of all risks or any particular risk will prove to be accurate during the execution phase of the Program.

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to identify, manage, and mitigate risk as it occurs during the Execution Phase of the DRP. Based on Schiff's experience in the industry, the duration of the Definition Phase of the DRP, and the tasks completed during that time, OPG's actions are consistent with industry standards used by utilities on large capital construction projects (including mega-programs) of similar size and complexity. Additionally, OPG's evidence filed in this case demonstrates that during the Definition Phase, OPG applied the prudent management decision-making framework described above by: (1) gathering relevant and accurate data; (2) distributing the data to the appropriate audience; (3) evaluating all appropriate options and conducting robust analysis of the data; and (4) making timely and reasonable decisions.

Q: During the Execution Phase of the DRP, what are the construction industry standards that OPG should utilize to mitigate risks?

A: OPG is just beginning the Execution Phase which, if all four units are completed, is scheduled to last for 112 months (February 2026). While OPG's detailed planning during the Definition Phase of the DRP does prepare OPG to mitigate the risks that occur during the Execution Phase of the DRP, the true test will be whether OPG actually executes those plans and whether OPG continually and reliably follows the prudent management decision-making framework described above to make reasonable management decisions. Based on Schiff's experience in the industry, an owner's compliance with industry standard risk mitigation planning does not guarantee the successful *execution* of the program or project.

As noted in the Pegasus-Global Report prepared by Dr. Patricia Galloway, an expert hired by OPG, the Facilities and Infrastructure Projects and Safety Improvement Opportunities

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estimating process. Such inputs include project scope definition, requirements documents, specifications, project plans, drawings, calculations, lessons learned from past projects, reconnaissance data, and other information that must be developed to (fully) define the project.”³³ AACE’s Classification System comprises five different “classes” of estimates (Class 1 through Class 5).³⁴ A Class 1 estimate is based upon a fully-developed project definition, while at the other end of the spectrum, a Class 5 estimate is often developed quickly and based on very preliminary and limited information. As a result, an estimate that fits the definition of a Class 5 estimate is not generally regarded within the industry as being very accurate.

Although AACE’s Classification System defined above describes the development cycle of a cost estimate for a project from a conceptual stage to a very detailed stage, it is commonplace and acceptable for an estimate to mature based on available information and other project particulars. For an owner, the two most important milestones to consider in the development cycle of a project occur at the conceptual phase and then at the budgetary phase. A cost estimate during the conceptual phase allows corporate management to evaluate the overall feasibility of the project and to begin to evaluate how to strategically allocate resources. Under the AACE’s Classification System, this estimate could typically either be a Class 5 or a Class 4 estimate. Conceptual phase estimates are not expected to be highly accurate; rather, they are regarded as merely providing a cost order of magnitude for a project.

³³ AACE International Recommended Practice No. 17R-97, Cost Estimate Classification System by Peter Christensen and Larry R. Dysert et al (August 12, 1997), at p. 3 and AACE International Recommended Practice No. 10S-90, Cost Engineering Terminology (April 13, 2004), at p. 17.

³⁴ AACE Recommended Practice 10S-90, at pp. 16-18 and generally AACE Recommended Practice No. 17R-97.

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A: Yes. OPG's explanation of the schedule development process for the DRP is within industry standards.³⁸ However, OPG's evidence did not include details regarding the training, experience, and qualification of the people directly involved in developing the schedule. Additionally, Schiff did not independently verify the appropriateness, sufficiency, or correctness of the scope of the DRP or the Unit 2 schedule. Further, Schiff did not perform a compliance audit to determine whether the Unit 2 schedule adheres to industry standard scheduling practices.

Currently, OPG has only completed the detailed schedule for Unit 2.³⁹ The detailed schedules for Units 1, 3, and 4 do not yet exist and OPG's evidence does not specify when these schedules are going to be created. Depending on the size of the project controls team for both OPG and the major contractors, it may be a challenge during the Execution Phase to monitor, update and track the Unit 2 schedule while simultaneously developing the subsequent units' detailed schedules. Additionally, OPG plans to incorporate lessons learned from the execution of the refurbishment of Unit 2 into the schedule planning for the subsequent units on an ongoing basis.⁴⁰ To successfully execute this plan, OPG will need to apply the prudent management steps described above including: (1) diligently capturing the Unit 2 lessons learned information; (2) distributing the data to the appropriate audience; (3) evaluating the options for corrective/preventative action and analyzing the relevant underlying data; and (4) making timely and reasonable decisions and incorporating the information into the schedule, processes and procedures, or other applicable project management documents.

³⁸ See Exhibit D2-2-6.

³⁹ See Exhibit L-Tab 4.3, Schedule 2, AMPCO-65.

⁴⁰ See Exhibit L-Tab 4.3, Schedule 1 Staff-60.

1 **Energy Probe Interrogatory #10**
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3 **Issue Number: 4.3**

4 **Issue:** Are the proposed nuclear capital expenditures and/or financial commitments for
5 the Darlington Refurbishment Program reasonable?
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8 **Interrogatory:**
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10 **Reference:** Exhibit M1 page 24
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12 On page 24, you state: "Currently, OPG has only completed the detailed schedule for
13 Unit 2. The detailed schedules for Units 1, 3, and 4 do not yet exist and OPG's evidence
14 does not specify when these schedules are going to be created. Depending on the size
15 of the project controls team for both OPG and the major contractors, it may be a
16 challenge during the Execution Phase to monitor, update and track the Unit 2 schedule
17 while simultaneously developing the subsequent units' detailed schedules."
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19 Is Schiff Hardin aware of other megaprojects that attempted to create detailed
20 schedules for future parts of a project while attempting to complete one part of the
21 project?
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24 **Response:**
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26 The following response was provided by Schiff Hardin:
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28 Schiff is not in possession of the requested information.
29

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Q: Are the OPG Project Management staffing plans within industry standards?

A: Yes. The staffing plan⁴¹ appears to be within industry standards; however, in Schiff's experience, for an owner-led multi-prime contracting strategy to be successful, the owner must employ a strong, capable, and experienced project management team that is able to coordinate and track the work of such a complex project/program. Otherwise, the multi-prime approach is at risk to miss schedule and cost objectives, thereby preventing the owner from securing the benefits of a multi-prime contracting strategy as discussed later in this testimony. Not only having a full and complete management staff in place, but the experience of the management level staff is important. Compared to typical large construction, mega-projects (including mega-programs) are a different type of project to manage. One expert's view is that "if managers of conventional projects need the equivalent of a driver's license, then managers of megaprojects need a pilot's jumbo jet license."⁴² OPG provided information about the corporate executives involved in the DRP, but the evidence does not include any details regarding the DRP management team's prior experience and credentials including whether or not they possess: nuclear refurbishment experience; prior mega-project (or mega-program) project management experience; or prior experience managing a multi-prime project.⁴³

⁴¹ See Exhibit D2-2-2, Attachment 2.

⁴² Bent Flyvbjerg, 2014, "What You Should Know about Megaprojects and Why: An Overview," *Project Management Journal*, vol. 45, no. 2, April-May, pp. 3.

⁴³ During the November 14, 2016 Technical Conference, the panel verbally stated that there are some members of the management team who have prior nuclear refurbishment experience.

Energy Probe Interrogatory #7

Issue Number: 4.3

Issue: Are the proposed nuclear capital expenditures and/or financial commitments for the Darlington Refurbishment Program reasonable?

Interrogatory:

Reference: Exhibit M1 Page 28

On page 28 of the report, Schiff Hardin states:

"If OPG fails to create and maintain staffing levels in accordance with the staffing plan, it could adversely impact OPG's ability to effectively manage the DRP."

Should the Board be concerned that OPG has struggled to ramp up its hiring in the run-up – and eventual transition – to the Execution Phase? In your opinion, if the Board were to initiate a prudency review of the project, would the company's struggle to hit its hiring targets work against it?

Response:

The following response was provided by Schiff Hardin:

Yes. During any prudency review of the DRP, OPG's early struggle to hit its hiring targets may or may not be an issue. The issue would be when, if ever, OPG met the staffing levels in the plan and then, from that point to the end of the DRP, whether OPG maintained the planned staffing levels throughout the project. For any staffing deficiencies, the issue would be whether that deficiency adversely impacted OPG's management of the DRP in a measurable adverse way and whether OPG's actions regarding such adverse impact were imprudent.

1 **OPG Interrogatory #4**
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3 **Issue Number: 4.3**

4 **Issue:** Are the proposed nuclear capital expenditures and/or financial commitments for
5 the Darlington Refurbishment Program reasonable?
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8 **Interrogatory:**
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10 **Reference:** Exhibit M1, Page 25
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12 On page 25 of Exhibit M1, Mr. Roberts comments on the importance of a strong,
13 capable and experienced project management team that is able to coordinate and track
14 the work of such a complex project/program. He then states that: "*OPG provided*
15 *information about the corporate executives involved in the DRP, but the evidence does*
16 *not include any details regarding the DRP management team's prior experience and*
17 *credentials including whether or not they possess: nuclear refurbishment experience;*
18 *prior mega-project (or mega-program) project management experience; or prior*
19 *experience managing a multi-prime project.*"
20

21 Did Mr. Roberts review Ex. L-4.3-1 Staff-046 where OPG provided the CVs of the
22 Darlington Refurbishment Program management team and also a written summary of
23 their relevant experience?
24

25
26 **Response:**
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28 The following response was provided by Schiff Hardin:
29

30 Yes. Ex. L-4.3-1 Staff-046 only addresses the executive management. In Schiff's
31 experience, the managers multiple levels (depending on the structure of the
32 organizational chart) below the executives are also critical to the overall project
33 management.
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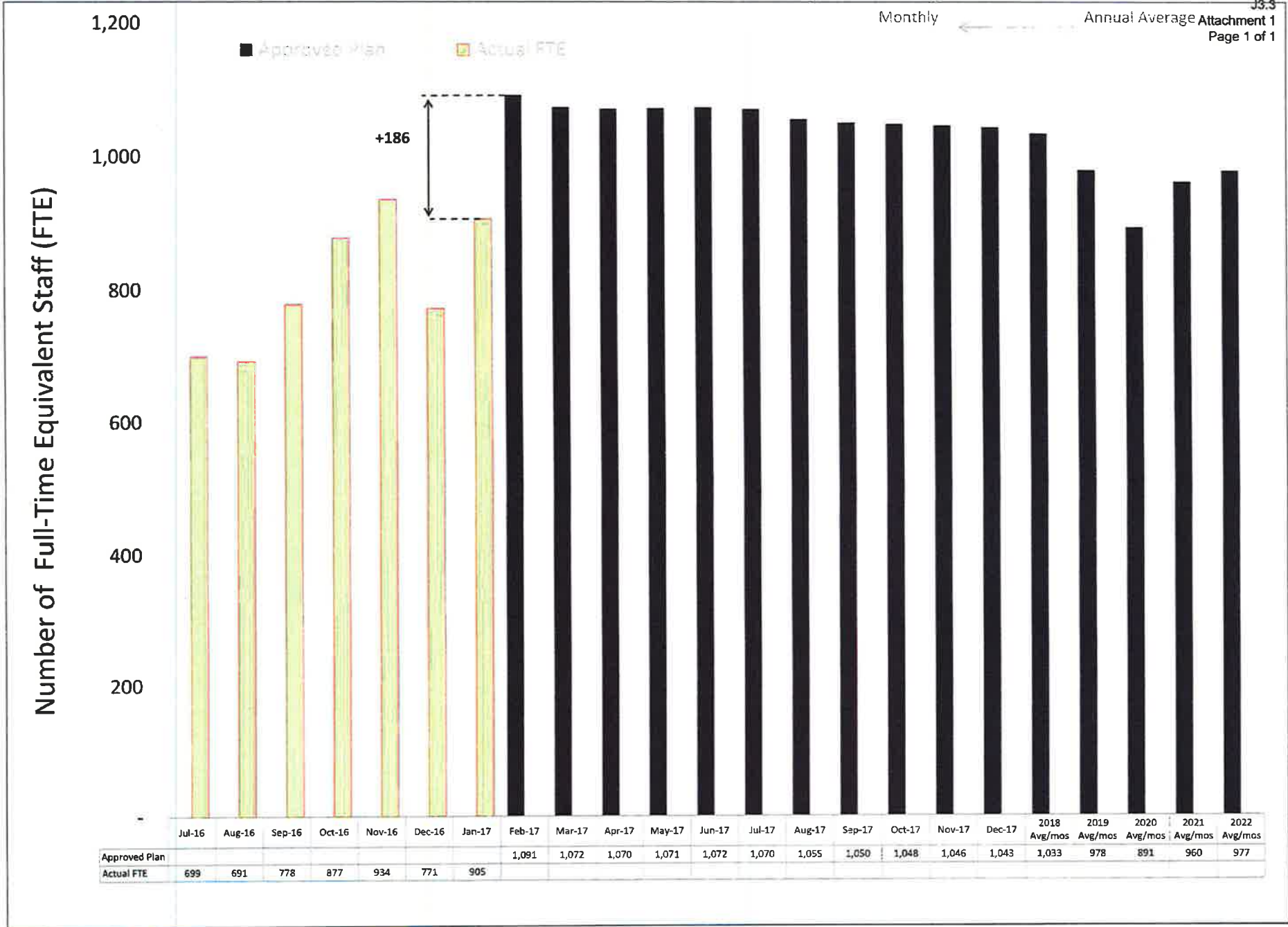
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The use of the mini-EPCs allows OPG to contract for EPC-style risk as it is applied to the specific islands of work. The applicable EPC contractor will be responsible for its island of work. As to the particular island of work, OPG has appropriately attempted to shift the risk of island-specific performance to qualified contractors to perform the riskiest portions of the work. Because OPG does not routinely self-perform work on mega-projects the size of DRP, OPG, by hiring contractors with qualified personnel, is able to mitigate some of the risks related to hiring qualified staff for a multi-prime project with potentially hundreds of contractors.

The use of mini-EPCs also gives OPG the benefit of having single-point responsibility for performance of the applicable EPC work. Moreover, under OPG's mini-EPC contracts, OPG has tried, to the extent possible, to shift the financial risk for the applicable islands of work through various fixed, target, and cost-plus price structures and by using contract incentives and disincentives.

This is not to say that even with OPG deploying mini-EPC models for select scopes of work, OPG is devoid of responsibility. Effective management of multiple EPC prime contracts also requires a strong team capable of performing upfront work to establish key project requirements and carefully monitoring the EPC contractor's progress to the program's conclusion. This obligation is heightened in a nuclear environment where OPG has appropriately assumed responsibility for much of the nuclear risks related to safety, insurance, indemnity, and environmental issues. The key issue is whether OPG's project team can be mobilized to manage the day-to-day work during the Project. Given the current status of the Program (discussed above), OPG needs to meet its staffing plan to have all positions in both the construction and design management teams filled timely to be in a position to manage the execution of the work. The management and coordination risk related to the prime contractors,

J 3.3 Attachment 1 : January 2017 Full Time Equivalents Against Staffing Plan at RQE



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purchase order. OPG should not depend exclusively on reporting by the contractors. At any given point in the Program, the applicable contractor may have an “incentive” to commingle fixed price work with reimbursable work under certain circumstances (i.e., threatened with having to pay disincentives vs. desire to receive incentives). This type of situation can also occur under the SS&E scenario where the contractor could use Reimbursable SS&E personnel to perform fixed price work and vice-versa. OPG has attempted to mitigate the potential for cost overruns by providing fixed price work and target price work that attempt to provide a ceiling on the potential liability of OPG, and it is important to note that the contractors are not simply working under a straight time-and-material pricing model for all scopes of work with no cap or limitation on cost overruns.

Q: Based on the contracts, are there any schedule issues that may create risk for OPG?

A: Yes. OPG’s right to demand a Recovery Plan (See e.g., Steam Generator Contract, Section 8.6; Turbine Contract, Section 8.6) (the “Section 8.6 Recovery Plan”) is not contractually triggered until after the contractor actually accrues schedule disincentives which are tied to the guaranteed dates. In Schiff’s experience, the potential to exercise this right occurs too late to effectively manage or mitigate earlier project schedule risks and its value is diminished as a result. Generally, the best opportunity to correct the delay or potential delay generally occurs earlier in the project when an owner can review the applicable data and determine that a milestone or guaranteed date is either threatened or will be missed. While the contracts appropriately have identified milestone dates and “guaranteed” milestone dates for completion of major activities at the end of the Program, all of the contracts should have provisions mandating that the contractors are obligated to meet the agreed to interim milestones.

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- File semiannual monitoring reports with the Commission on the dates requested addressing the topics and areas identified in the Stipulation⁷²;
- Provide the Commission with monthly status reports regarding the construction work in progress⁷³;
- Enact a records retention program acceptable to the Commission for records relating to the Vogtle Project⁷⁴; and
- “[P]ay up to \$600,000 per year for each year of construction for an independent Construction Monitor (“CM”) to assist the Staff in monitoring the construction work in progress. . . .”⁷⁵

These reporting requirements promote transparency and provide the Staff with the tools to understand the status of the Vogtle Project and whether Georgia Power is in fact exercising reasonable and prudent management and cost management *during* the life cycle of the project. As a result, the reporting and claw-back provisions help protect the ratepayers from the risk of runaway costs on the Vogtle Project.

As of October 2016, Georgia Power and the Staff of the Georgia Public Service Commission are negotiating the regulatory treatment of the \$1.8 billion cost overruns to the Vogtle Project. As a result, the final prudence determination regarding the project’s costs is currently unknown.

⁷² See Georgia Public Utility Commission, March 30, 2009, Attachment 1 Stipulation to the Amended Order, 27849, 2010 Order on Remand, Docket 29800 at pp. 1-3.

⁷³ Id. at p. 1, ¶2.

⁷⁴ Id.

⁷⁵ Id. at p. 2, ¶2(b).

1 or instructions are recommended to reduce the risk of cost overruns due to these
2 deficiencies.

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Response:

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The following response was provided by Schiff Hardin:

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- a) See Schiff Hardin's Response to M1-4.3-VECC-3(b) Earned Value which lists the key construction management metrics. In addition, OPG should provide adequate personnel to be in the field to verify and monitor the contractors' progress.
- b) The author also states: "*many utility regulatory commissions require the utility to provide transparent and frequent reporting on the project status and the staff's active participation and ongoing review in the project.*" What reporting does the author recommend OPG provide to the OEB with respect to the DRP?

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Response:

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The following response was provided by Schiff Hardin:

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- b) One option is that OPG provide the OEB a written report on a quarterly basis explaining the status of the DRP. An alternative is to require OPG to provide the OEB with the contractually-required monthly contractor reports. Regardless of the source of the report, the recommended reporting should contain the relevant project data, including data relating to the topics identified in Attachment 1. Much, if not all of this data, is either accumulated by, or is available to, OPG and can be provided to OEB on a routine basis. In addition to the written reports, in order to disseminate, discuss, and evaluate the data, OEB should consider having a quarterly meeting with OPG throughout the DRP.

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estimate for the Kemper Project, the order included terms designed to appropriately balance the risk between the utility and its customers, including, but not limited to, the following:

- The Order imposed a construction cost cap of \$2.88 billion, which represents a 20% cap above the approved Kemper Project estimate.⁸⁸ The purpose of the cost cap insulates customers from large construction cost overruns by shifting this risk to the utility at a certain total cost level beyond which customers are no longer responsible, even if the costs are found to be prudent.
- The utility must provide monthly reports regarding the project status.⁸⁹
- The utility must adhere to the operational cost and performance parameters (assumptions concerning availability factor, heat rate, lignite heat content, and by-product revenues) from the cost estimates. The operational cost and performance parameters assure that ratepayers will not pay for an underperforming asset.⁹⁰
- Maintenance of the provisions in the Baseload Act allowing for project cancellation.⁹¹
- The utility must periodically re-evaluate the economic viability of the Kemper Project to confirm that it remains in the overall best interest of customers.⁹² This helps mitigate the risk that a better option becomes available because of subsequent changes in the technology, cost, energy markets and/or utility regulation.

In November 2007, the Indiana Utility Regulatory Commission approved Duke Energy Indiana, Inc. (“Duke”)’s cost estimate of US\$1.985 billion including allowance for funds used

⁸⁸ April 24, 2012, Mississippi Public Utility Commission Order, Docket No. 2009-UA-014, Case No. EC-120-0097-00, at p. 21, ¶36 and pp. 97-107.

⁸⁹ *Id.* at p. 28 ¶52.

⁹⁰ *Id.* at pp. 107-108.

⁹¹ *Id.* at p. 110.

⁹² *Id.* at pp. 29-30.

Energy Probe Interrogatory #8

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Issue Number: 4.3

Issue: Are the proposed nuclear capital expenditures and/or financial commitments for the Darlington Refurbishment Program reasonable?

Interrogatory:

Reference: Exhibit M1 Page 5-6

The report states: "A high-level review is an appropriate scope of review because Schiff is not able to independently verify the appropriateness, sufficiency, or correctness of the scope of the DRP, the DRP cost estimate, or the DRP schedule. Additionally, Schiff did not perform a compliance audit to determine whether OPG has adhered to their internal policies, procedures, guidelines or any applicable legal regulations."

- a) Given the above comments, how can Schiff Hardin be confident in the estimates and planning for the DRP when it hasn't considered whether the company has even followed its own policies in terms of project management?
- b) Has Schiff Hardin looked at OPG's previous projects to see how its project management has improved/declined for the DRP?

Response:

The following response was provided by Schiff Hardin:

- a) Schiff did not express any specific level of confidence in the cost estimate or OPG's planning activities. Schiff's opinion is that OPG's planned project controls systems for the DRP to manage cost and schedule are consistent with industry standard practices used by utilities on large capital construction projects (including mega-programs) of similar size and complexity.
- b) Schiff has not prepared any sort of analysis or comparison; however, based on Schiff's prior involvement with OPG, OPG's project management has improved since Schiff's involvement in the Pickering Unit 4 return to service project.

May 2014



Report to Nuclear Oversight Committee – 2Q 2014
Darlington Nuclear Refurbishment Project



- Reviewed the management structure and capabilities of the P&M team that started this work down the current path. We have also spent time with P&M's new VP and members of P&M's restructured leadership team to convey our findings and recommendations and gauge the effectiveness of P&M's current initiatives to improve performance and mitigate these earlier management failures.

As noted, these Campus Plan Projects have been plagued by myriad problems that have resulted in significant schedule and cost variances. Our findings show that the predominant cause of these overruns was P&M's original strategy to use a project "oversight" management model for the EPC contracting strategy utilized by OPG that was inappropriate in application and led to a series of cascading management failures and contractor performance issues. The oversight management model employed a disengaged, "hands-off" approach by the P&M organization which caused the fledgling P&M organization to: (1) wrongly assume that the contractors understood the scope on the basis of performance specifications that outlined scope initial requirements; (2) utilize inexperienced project managers; (3) allow Operations & Maintenance and other OPG stakeholders to initiate scope changes to these projects long after the conceptual design period ended; (4) to accept the poor schedules and cost estimates by the contractors without appropriate vetting and challenge, and which were not updated to incorporate the impact of scope changes on a timely basis; and (5) to inaccurately or untimely report the projects' progress, risks and cost and schedule overruns to the DR Team and senior management.

B. OPG Contractor Management and Contractor Performance

1. Summary

Based on the information we have reviewed, it is apparent that P&M put excessive faith in the ESMSA Contractors' ability to perform this work and an over-reliance on the perceived ability of the EPC contracting model to shift project risk to the contractor and alleviate the need for active project management. As a result, OPG chose to provide oversight of the contractor's work at arms-length. In a recent self-assessment related to the D2O Storage Project's delays, the P&M Project team ("P&M Team") noted that at the onset of the Project, P&M believed "the EPC Process" would mitigate known risks via "project efficiency gains due to the expertise and autonomy of the contractor."² This exemplified OPG management's initial hands-off approach to project management that P&M piloted under which the contractor was given autonomy to develop its own scope requirements without process monitoring. As noted in P&M's self-assessment, this model resulted in "unclear expectations, re-work, frustration."³ P&M's error was misunderstanding the essential nature of the ESMSA contracts, which are not fixed-price EPC contracts that shift all risk and responsibility for performance to the contractors (nor were they ever meant to be). The majority of the Campus Plan Project's execution cost is being performed on a cost-reimbursable target price, where contractors have only a portion of their fee at risk in the event that the target price is exceeded. In our experience, the nature of this work (refurbishment and construction of new facilities on an operating nuclear site) and the fact that the contract is cost reimbursable, require the owner to engage in active management of the contractors and coordinate interfaces. This means providing very specific instructions to lock down scope at the project's conceptual design phase and holding the contractors accountable on a daily basis to meet expected cost and schedule.

- Moreover, it is apparent that the P&M Team did not have the necessary experience, training or internal management direction to properly manage this work. Attachment B is a matrix that provides a summary of our observations regarding the five major ongoing F&I Projects. This matrix shows, among other things, that in the management of the work, P&M:
- Routinely accepted poor quality schedules and cost estimates without adequate vetting;

² SCR Number D-2013-19100, January 22, 2014.

³ Id.