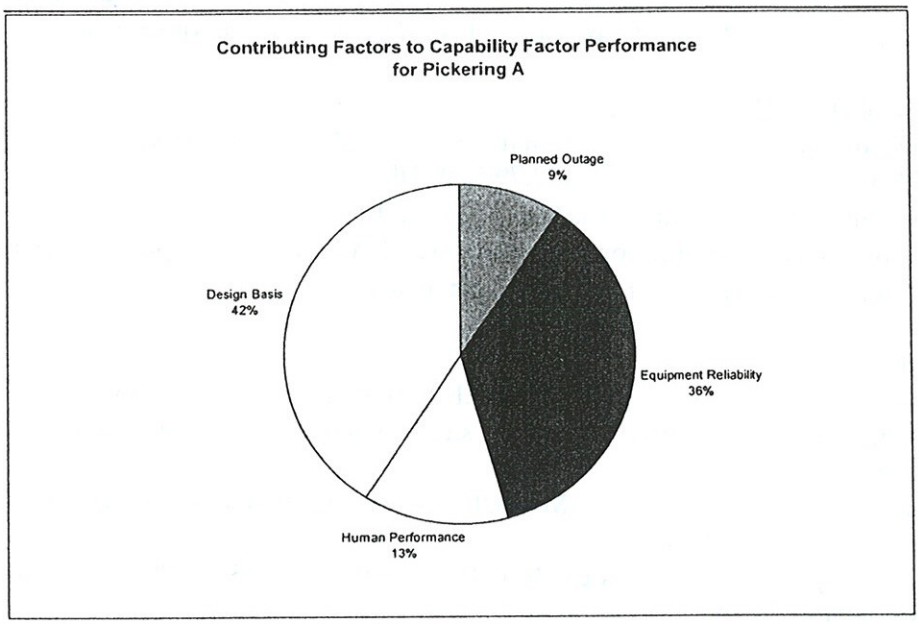
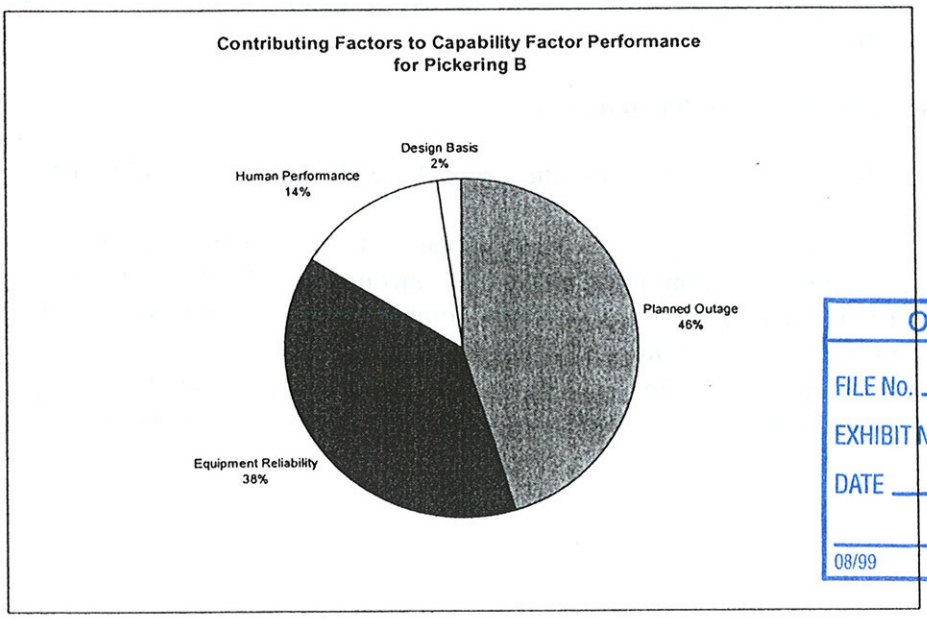
K3.1





Factors Contributing to Performance (Cont'd)

Examples of Contributing Incidents

- Equipment Reliability, Design Basis and Human Performance contributors to UCF are consistent with Forced Loss Rate and are discussed under that metric
- Planned outage critical scope items driving outage length included boiler tube inspections, feeder inspections, feeder replacements, CIGAR inspections, and turbine work

Observations – 3-Year Capital Costs per MW DER (All North American)

2008 (3-Year Rolling Average)

- Best quartile threshold for capital costs per MW DER across the North American EUCG peer panel plants was $32.79/MW DER
- Median cost for the panel was $46.22/MW DER
- Darlington had the third lowest capital costs/MW DER of any plant in the peer group
- Pickering A and B were both in the best quartile

Trend

- Best quartile capital costs per MW DER have increased since 2006
- Median levels for capital costs held steady from 2005 to 2007 and then escalated for 2008
- Darlington's capital cost per MW DER decreased moderately between 2005 and 2007 and escalated for 2008
- Pickering A's capital costs per MW DER rose from 2005 to 2008 but have maintained best quartile level
- Pickering B's capital costs per MW DER rose from 2005 to 2006 and have decreased through 2008

Factors Contributing to Performance

- Darlington, Pickering A, and Pickering B are all performing within the best quartile for the panel
- One contributing factor for OPG appears to be the capitalization threshold. The minimum expenditure threshold for capitalization at OPG for generating assets is $200k per unit whereas the majority of the companies in the industry have adopted minimum capitalization thresholds that are significantly lower
- A second contributing factor for OPG may be due in part to the application of the capitalization policy at OPG for purposes of classifying projects as capital or OM&A

The results of both the EUCG and the Bruce Power functional comparison showed that overall OPGN staff levels per unit exceed both the industry median and Bruce Power levels. OPGN staffing levels are higher than the peer groups for some functional areas and lower for others. For the most part, however, OPGN staff levels are generally higher than the comparison panels. It should be noted that, however, that staffing levels can be influenced by a company's approach to staffing project-based outage functions. Certain North American operators rely extensively on third-party contractors for such services, whereas others, including OPGN, largely rely on in-house resources.

When comparing staff levels one must be careful to consider the underlying work allocation which requires in-depth, top-down staffing analysis. The results of both the EUCG and Bruce Power functional comparison confirmed general assumptions regarding OPGN staffing levels and provided guidance and insight to the sites, functional/peer teams and the business support units in their development of improvement initiatives. The generally lower staffing levels found at other plants encouraged all of these teams to explore ways to deliver current service levels more productively and with fewer employees.

3.3.2 In-Depth, Top-Down Staffing Analysis Pilot

In order to demonstrate how detailed top-down staffing analysis can be used to identify and drive staffing reduction, ScottMadden piloted a top-down staffing analysis using the OPGN Radiation Protection (RP) function as an example. This effort involved: (a) identifying initial top-down benchmark targets based upon EUCG and Bruce Power staff levels for RP, (b) defining current OPGN activities for RP by position, (c) identifying the FTEs associated with each RP activity, (d) benchmarking these activities against peer companies (Bruce Power and Duke Energy), and (e) developing estimates of potential OPGN future staff levels. ScottMadden provided the methodology and templates used and facilitated the process.

The RP Pilot resulted in a number of recommended changes for future consideration by OPG, including: (a) the development of a standard organization structure for the RP function at each site, (b) a revised organization structure for RP services and training, (c) various process improvement recommendations, and (d) a potential reduction of 53 FTEs in the RP function (28%). These reductions would result from:

- Consolidation of resources performing similar job functions at Pickering A and Pickering B
- Elimination of positions dedicated to the new build initiative which has been postponed
- Reduction in the number of instructors required through utilization of computer-based training for courses and evaluations and right-sizing to fit the reduced number of RP staff

Of the potential 48 FTEs reduced, 35 would potentially be reassigned to other functional organization through improved resource alignment while 13 would be eliminated altogether. These changes were still being considered by OPGN at the time this report was prepared. A presentation of the standard site RP organization chart, the revised Health Physics organization chart, and a summary of the staffing analysis results are presented in Appendix I.

exceeded the value of the electricity generated and asked the Board to withhold payments for any facility that raises the cost of power for consumers.

AMPCO argued that over the 2005 to 2007 period, the average cost of Pickering A power was double the Hourly Ontario Energy Price and the nuclear payment amount received by OPG under O. Reg. 53/05. AMPCO concluded that even with the forecasted cost of 8.1 cent/kWh (AMPCO's calculation) in the test period, the prudence of continued operation of Pickering A remains a concern. AMPCO argued that OPG should be required to file a long-term assessment of the viability of Pickering A in the next rates application. SEC also argued that OPG should be directed to file a plan which demonstrates that Pickering A and Pickering B can operate at costs similar to other generators.

OPG responded that the Board's role in this application is to review the costs of Pickering A, and based on these costs, set reasonable payment amounts. OPG argued that the Board should not, and cannot, decide the ultimate viability of Pickering A, as this is beyond the scope of Section 78.1 of the *OEB Act*.

Regarding the AMPCO and SEC submissions that OPG's costs are excessive given the benchmarking results, OPG responded that the intervenors used selective data and disregarded technical differences regarding Pickering A and Pickering B. OPG also argued that AMPCO's assertion that OPG was resistant to benchmarking was unsupported. OPG maintained that it is committed to benchmarking and is in full compliance with the requirements in the MOA.

OPG also noted that it expects Pickering A and B's performance to improve substantially in the future and submitted that Darlington will continue to perform as well as it has in the past. Most of the intervenors countered that the forecasted results for 2008 and 2009 are unduly optimistic and the Board should discount these projections.

OPG also questioned the arguments by a number of intervenors that the Navigant Study supports the conclusion that 2006 staffing levels were 12% higher than benchmark. OPG claimed that the Navigant Study cannot be used to test the level and reasonableness of OPG's labour cost because the Navigant Study is not representative of staffing levels in the test period.

3. Assign a single point of accountability for reporting OPG data to EUCG, WANO and other outside organizations. This will help improve data quality and consistency of presentation.

4.2 Target Setting

The next step in gap-based business planning is to use the results of the benchmarking effort to establish meaningful targets that will help drive future performance. This step was completed by OPG during June and July 2009.

Target Setting	
Observations	**Conclusions**
▪ OPG used the 2009 Benchmarking Report to educate managers and raise performance expectations ▪ OPG conducted two formal target setting workshops and established desired performance levels for the year 2014 across common performance metrics ▪ Specific 2014 targets were set for each site and support unit ▪ The process of setting top-down performance targets based upon where OPG wants to be by 2014 represented a significant departure from past OPGN business planning practices. Adopting this practice represented a major cultural change within the organization at multiple levels ▪ The targets were agreed to by all of the site and support unit executives and were distributed to the site and support unit business managers for adoption in their 2010-2014 five-year business plan	▪ OPG executive leadership demonstrated a firm commitment to top-down business planning throughout the planning process ▪ While the targets set for 2014 will not achieve "best quartile" performance in all performance categories for all sites, they represent a significant improvement over current performance ▪ In our opinion, the targets established by OPG management are fair and reasonable given OPGN's baseline position ▪ Without downplaying the success achieved during the current planning cycle, we believe that opportunities remain for continuous improvement beyond the current business planning horizon

Related Recommendations:

1. When the OPG Nuclear Benchmarking Report is updated in 2010, analyze the new benchmarks and use them to establish operational and financial performance targets for 2015.

2. Through a process of continuous improvement, continue closing the gap to "best quartile" industry performance for all metrics and at all sites as additional years are added to the rolling five-year plan.

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Board Staff Interrogatory #060

Ref: Ex. F5-T1-S2, page 32

Issue Number: 6.5
Issue: Has OPG responded appropriately to the observations and recommendations in the benchmarking report?

Interrogatory

In section 4.2, the report notes *"Without downplaying the success achieved during the current planning cycle, we believe that opportunities remain for continuous improvement beyond the current business planning horizon".* Did ScottMadden identify any such "opportunities" that remain? If so, please identify those opportunities and provide an explanation for each. Please explain why the remaining opportunities are not being pursued.

Response

No, ScottMadden did not identify any opportunities beyond the current business planning horizon. The quotation found in the interrogatory refers to a general opportunity for OPG to pursue continuous improvement, over and above the specific targets which have been set in the business planning process.

OPG is committed to a process of continuous improvement. Indeed, the 2005 Memorandum of Agreement between OPG and its shareholder (provided at Ex. A1-T4-S1, Attachment 2) directs OPG to "seek continuous improvement in its nuclear generation business and internal services". OPG's Nuclear Business Plan (Ex. F2-T1-S1, Attachment 1) sets out Nuclear's five-year performance plan, which embodies OPG's commitment to continuous improvement.

Related Recommendations:

1. Encourage the functional/peer teams to refine and improve their initiatives throughout the remainder of the planning cycle and into implementation.

2. Re-examine the current functional/peer team structure and governance. Expand the number of formal peer teams to cover additional functions. Revise the program to strengthen the ability of the peer teams to identify and drive meaningful change.

3. As part of continuous improvement to operational and financial excellence, challenge the teams next year to identify further improvements within their respective functional areas.

4.4 Site and Support Business Unit Plans

At the same time the functional/peer teams were developing their fleet-wide improvement initiatives, the sites and business support units were identifying improvement opportunities specific to their individual sites or units. When the fleet-wide initiatives were finalized and agreed to, they were subsequently incorporated into the site and support unit plans for execution. The fleet-wide initiatives supplemented the site and support unit initiatives and became part of their respective business plans. The site and support unit business plans were then submitted to the NEC on September 11th. In the table below, we summarize our observations and conclusions regarding the development of the site and support business unit plans.

Site and Support Unit Plans	
Observations	**Conclusions**
▪ A total of nine business unit plans were prepared – one for each of the three nuclear stations (Pickering A, Pickering B and Darlington), and one for each of the six nuclear support units ▪ The business managers for each of the nine business units were well versed in the development of annual business plans and required minimal support from ScottMadden during this project ▪ Initially, there was some resistance to embracing top-down planning. In time, this was resolved and the business managers prepared solid business plans designed to achieve the targets they committed to ▪ At the time of ScottMadden's departure from the project, some issues remained open with respect to the financial targets in selected business unit plans	▪ There was extensive culture change involved in moving to the new gap-based, top-down business planning process ▪ In the end, the executives, business managers, and functional teams achieved alignment and the process resulted in the creation of business unit plans designed to achieve the desired targets. In ScottMadden's opinion, this is a major step forward in the development of gap-based business planning at OPGN

Board Staff Interrogatory #061

Ref: Ex. F5-T1-S2, page 34

Issue Number: 6.5
Issue: Has OPG responded appropriately to the observations and recommendations in the benchmarking report?

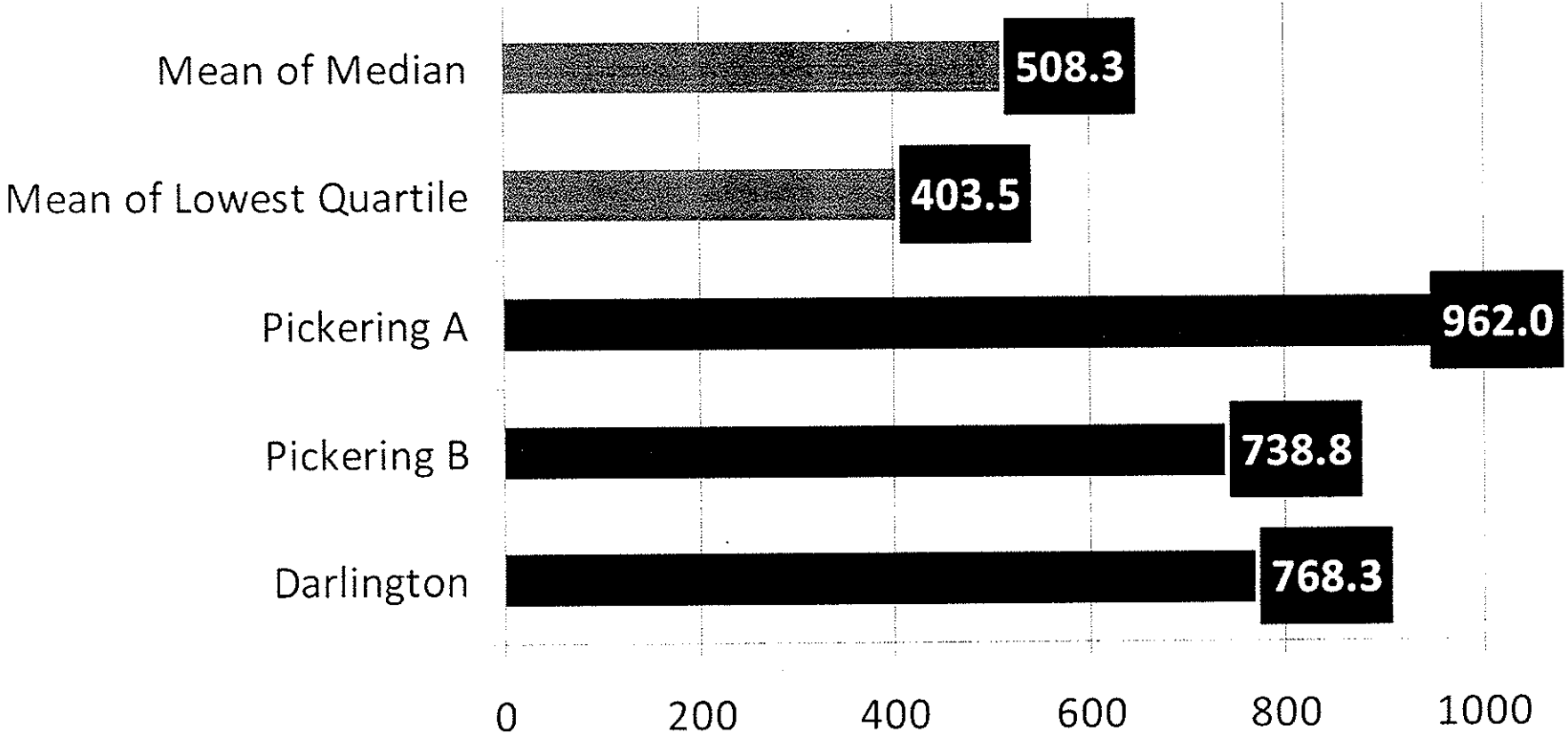
Interrogatory

In section 4.4, it notes *"At the time of ScottMadden's departure from the project, some issues remained open with respect to the financial targets in selected business unit plans".* Please identify the issues that remained open, the associated financial targets and the related business units.

Response

This observation by ScottMadden was not specifically related to "financial targets" in the 2010 – 2014 Nuclear Business Plan, as these had been set at an earlier stage in the business planning process. Rather, the reference was to the impacts of the fleet-wide initiatives on closing the financial performance gaps. As noted in Ex. F2-T1-S1, page 16, the reductions ultimately built into the 2010 – 2014 Business Plan totalled $293M, which exceeded those established in the ScottMadden Phase 2 target setting.

Total Staff Summary (Plant Level)



Source: F5-S1-T2, page 59 of 64, ScottMadden, Phase 2 Final Report, Appendix G – Staffing Benchmark Analysis – EUCG Data (Plant Level), "This appendix presents plant-level staffing comparisons prepared using EUCG data". The figures in the chart above are taken from the line referenced as "Sub-Total Total Staff" on p. 59 which excludes security as figures are not included in the report for confidentiality reasons.

Board Staff Interrogatory #057

Ref: Ex. F5-T1-S2, page 25

Issue Number: 6.5
Issue: Has OPG responded appropriately to the observations and recommendations in the benchmarking report?

Interrogatory

In regard to "offsite staffing" levels, the Phase 2 Benchmarking Report notes *"This comparison highlighted considerable differences between companies with respect to the number of offsite employees supporting nuclear stations"* and that a nuclear comparator *"reported 697 offsite employees supporting 10 stations and 17 units whereas OPGN reported 3,414 offsite employees supporting three stations and 10 units. The study team did not have adequate time to delve into the business drivers behind these variances"*. Please explain why OPG requires almost 5 times the number of offsite employees to support almost half as many units.

Response

Appendix H – "Offsite Operator Level Staffing Summary" of the ScottMadden Phase 2 report (Ex. F5-T1-S2, page 63) was produced to examine differences in the physical location of support personnel. The results show that OPG has a higher number of "off site" staff than other fleet operators. As the quote above indicates "*The study team did not have adequate time to delve into the business drivers behind these variances*".

In OPG's view, a number of different factors could contribute to the higher number of "off site" staff at OPG compared to other fleet operators. It is likely there is no single business driver but rather a combination of contributing drivers. Typical drivers include:

- Differences in geographic dispersion of the generation fleet. Generation fleets with widely dispersed plants tend to locate more support services on site, whereas those with closely grouped plants (such as OPG) will house support services in shared off-site support facilities.

- Differences in organization design philosophies. Some generation fleets have adopted a centralized approach to providing support services whereas others have adopted a decentralized approach dispersing functions out to all stations they support.

  OPG has adopted a centralized approach. For example, OPG has located design engineering, records/administrative, training, and fleet maintenance support services off-site whereas other North American fleet operators locate the majority of these staff inside their plants.

- Differences in utilization of contractor personnel (outsourcing). Many North American fleet operators use third-party contractors for a wide variety of support services. These personnel are not shown in Appendix H. OPG performs nearly all of its support services in-house and these staff are included in Appendix H.

  Examples of work performed in-house that some North American fleet operators would outsource include facility maintenance and radiation protection testing.

accountable for Pickering A Unit 2/3 Safe Storage, Inspection Maintenance and Commercial Services, and oversight of Capital and Project OM&A (Projects and Modifications, Facilities, and Nuclear Waste Projects).

5.0 OPG NUCLEAR WASTE MANAGEMENT AND DECOMMISSIONING

OPG is responsible for the ongoing long-term management of nuclear waste produced by its operations, including high and low and intermediate level radioactive waste. In addition, OPG will have to manage radioactive waste associated with the decommissioning of its nuclear generating stations (including the Bruce Generating Stations) after the end of their useful lives.

The liabilities of OPG's predecessor, Ontario Hydro, associated with nuclear waste management and decommissioning were transferred to OPG in April 1999. The responsibility for funding these liabilities is described in the Ontario Nuclear Funds Agreement ("ONFA") between the Province of Ontario and OPG. A copy of the ONFA is available on OPG's website at:
http://www.opg.com/pdf/Nuclear%20Reports%20and%20Publications/Ontario%20Nuclear%20Funds%20Agreement.pdf

Details on nuclear waste management and decommissioning including the funding of nuclear liabilities are provided in Exhibit C2.

6.0 NUCLEAR MANDATE AND OBJECTIVES

With respect to the nuclear facilities, the Memorandum of Agreement ("MOA") with the shareholder states:

> OPG's key nuclear objective will be the reduction of the risk exposure to the Province arising from its investment in nuclear generating stations in general and, in particular, the refurbishment of older units. OPG will continue to operate with a high degree of vigilance with respect to nuclear safety.
>
> OPG will seek continuous improvement in its nuclear generation business and internal services. OPG will benchmark its performance in these areas against nuclear plants worldwide as well as against the top quartile of private and

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publicly-owned nuclear electricity generators in North America. OPG's top operational priority will be to improve the operation of its existing nuclear fleet.

Consistent with OPG's mandate and its vision and mission, OPG Nuclear has the following cornerstone objectives with the purpose of making the existing nuclear facilities more dependable, predictable, and cost effective:

- **Safety:** Makes nuclear safety, employee safety and environmental safety the overriding priority. Makes sure all laws are met and activities are performed conservatively and responsibly. Makes business decisions with the full knowledge of the risks and potential impacts.
- **Human Performance:** Recognizes that managing individual fallibility and organizational defences is the basis for excellence.
- **Reliability:** Operates, maintains and engineers OPG nuclear facilities such that equipment, performance, availability and output are optimized.
- **Value for Money:** Delivers solutions that are the best combination of cost, quality and performance.

These cornerstone objectives are the basis for the establishment of performance targets and key initiatives during the benchmarking and business planning process. In 2009, consistent with the 2005 MOA between OPG and its shareholder, OPG undertook a major nuclear benchmarking initiative in conjunction with its 2010 - 2014 Business Plan, as discussed in Ex. F2-T1-S1.

In June 2006, the shareholder directed OPG to begin feasibility studies on refurbishing its existing nuclear plants, and to begin an environmental assessment ("EA") on refurbishing Pickering B's four nuclear units.

In 2009, OPG completed its feasibility assessment of the economics of refurbishing its Darlington units. Work is now proceeding on the next phase of the Darlington Refurbishment project, as discussed in Ex. D2-T2-S1.

Board Staff Interrogatory #055

Ref: Ex. F5-T1-S1, page 138

Issue Number: 6.5
Issue: Has OPG responded appropriately to the observations and recommendations in the benchmarking report?

Interrogatory

In regard to 3-Year Capital Costs per MW DER (Design Electrical Rating), ScottMadden's Observation in the Phase 1 Benchmarking Report was that Darlington had the third lowest capital costs of any plant in the peer group and Pickering A and B were both in the best quartile. The report notes *"One contributing factor for OPG appears to be the capitalization threshold. The minimum expenditure threshold for capitalization at OPG for generating assets is $200k per unit whereas the majority of the companies in the industry have adopted minimum capitalization thresholds that are significantly lower".* Please explain why OPG has a significantly higher capitalization threshold than the majority of the companies in the industry.

Response

OPG's $200k threshold for capitalization is the same as that used in EB-2007-0905. In EB-2007-0905, Ex. L-14-46, OPG provided the process by which the capitalization materiality thresholds are determined. This process continues to be followed. The major elements are:

- Materiality thresholds are identified as part of OPG's capitalization eligibility procedure which is regularly reviewed and updated.
- As part of the review, OPG considers thresholds employed by companies of a similar size in capital intensive industries.
- OPG considers the materiality of the income statement impact of any changes in the thresholds.
- OPG also considers whether capitalization of numerous small items would result in an excessive administrative burden.
- The materiality thresholds are reviewed by OPG's external auditor through the audit of OPG's consolidated financial statements.

While OPG's process considers the materiality thresholds of other companies, OPG does not necessarily adjust its own thresholds in response. OPG's threshold of $200k is appropriate and is in accordance with generally accepted accounting principles ("GAAP").

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MR. THOMPSON: Thanks.

MR. KEIZER: Thank you. Moving on to page 22 of the compendium, in particular, Question No. 7 relating to revenue requirement changes.

MR. REEVE: This question related to capitalization thresholds. The response is that OPG expects that there would be minimal impact on revenue requirement in the test period as a result of changing the threshold for capitalization from 200,000 to 100,000 for OPG-regulated business.

To complete the full assessment would require consideration of whether planned work programs and activities in the nuclear and regulated hydroelectric businesses that fall between these amounts meet the other criteria for capitalization produced by OPG in accordance with generally accepted accounting principles. These are outlined in A2, T2, S1, section 5.1.

MR. KEIZER: Okay. Moving on, then, to Question No. 9 relating to total human resource related cost.

MS. IRVINE: I believe that the question is referencing chart 3 on page 7 of Exhibit F4, tab 3, schedule 1, and I am afraid I don't understand what is being asked in the question.

What would you like me to clarify?

MR. THOMPSON: All right. Well, it is probably just semantics, but in the answer -- I am looking at Board Staff No. 76.

MS. IRVINE: Hmm-hmm.

Board Staff Interrogatory #058

Ref: Ex. F5-T1-S2, page 26

Issue Number: 6.5
Issue: Has OPG responded appropriately to the observations and recommendations in the benchmarking report?

Interrogatory

Section 3.3.2 of the Phase 2 Benchmarking Report notes that ScottMadden piloted a top-down staffing analysis using the OPGN Radiation Protection (RP) function as an example and the recommended changes for future consideration by OPG include *"a potential reduction of 53 FTEs...(28%)"*. The report then notes *"Of the potential 48 FTEs reduced, 35 would potentially be reassigned to other functional organization through improved resource alignment while 13 would be eliminated altogether. These changes were still being considered by OPGN at the time this report was prepared."* Please clarify whether the potential reduction was actually 53 or 48 FTEs. Please also identify if this recommendation was implemented by OPG and how OPG plans to build on this pilot in terms of other segments of the organization.

Response

OPG has clarified with ScottMadden that the reference in the Phase 2 Final Report (page 25) to "...a potential reduction of 53 FTEs in the RP..." should have stated 48 full-time equivalents ("FTEs"), not 53 FTEs.

The 48 FTEs comprised a reduction of 13 FTEs in the Radiation Protection ("RP") function and a relocation of 35 FTEs to other parts of the business.

Some initiatives associated with the recommendation have been implemented. Specifically, 35 staff have been reassigned to other functional organizations, including training and outage management, and one position has been eliminated.

Implementation of the additional proposed reductions in RP was not part of the 2010 – 2014 business plan. OPG Nuclear considered a large number of initiatives that could be implemented to reduce the overall OM&A and improve operating performance, and other initiatives were pursued at this time. OPG Nuclear countinues to consider options for reduction of the 13 FTEs, under its commitment to ongoing performance improvement.

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no, it is not. It is, in fact, a portion of the total contingency that was approved. So it looks like, you know, perhaps just a little less than 50 percent of the contingency that was originally approved was, in fact, used by the portfolio in those years.

Part C of the question asks to clarify the distinction between general and specific contingency.

This is terminology used when developing the business case summary. Sometimes there are specific elements of the project that have not yet been firmed up. For example, projects may be approved before a fixed price contract is set. If that is the case, we may specify a specific contingency amount associated with that known-unknown, if you will, in the project.

For those things that are not known, project managers sometimes refer to these as "unknown-unknowns" but for those other items, a general contingency amount is specified for the project, as well.

MR. KEIZER: Then moving on to Board Staff question No. 18, relating to issue 6.5 and the staffing analysis.

MR. LEAVITT: So this question refers to some staffing analysis that was done near the end of the benchmarking work in 2009. And it had -- it had made recommendations that would be typical of what could be applied across nuclear.

So we were -- we had, I guess, noted that one position has been eliminated and 35 staff have been reassigned, as was recommended, to other functional organizations, and

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these are included training and outage management.

And there are 13 remaining positions. We have not built the reduction of those 13 positions into the 2010-2014 business plan, but we are considering organizational changes across nuclear in the current business planning process for the 2011-2015 period.

MR. KEIZER: Moving on, then, to Board Staff Question No. 19, relating to cancelled initiatives.

MR. LEAVITT: So this question refers to the 33 initiatives that eventually became part of the 2009-2014 business plan and asks about the two initiatives that were cancelled and why, basically.

So 33 initiatives were built into the business plan. And this is an ongoing and evolving process, so each year we see ourselves with some initiatives completed, new initiatives drafted, and ultimately approved.

Of the original 33, five are now complete. Six were combined with other initiatives already underway, and these two were, in fact, cancelled.

Their designation is M.A.-04, titled: "Centralized measurement and test equipment facility," and M.A.-06: "Maintenance helpers."

The centralized measurement and test equipment facility initiative was originally envisioned to be the development of an off-site facility to calibrate and test measurement equipment. It was dependent on obtaining a low-rent or existing facility off-site, and the business case was dependent on using existing resources, but at a

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Board Staff Interrogatory #053

Ref: Ex. F2-T1-S1, page 13

Issue Number: 6.4
Issue: Is the benchmarking methodology reasonable? Are the benchmarking results and targets flowing from those results for OPG's nuclear facilities reasonable?

Interrogatory

The application notes that the targeted performance improvement by 2014 with respect to Total Generating Cost for the Pickering stations is below median. It also notes *"this reflects the reality of OPG's initial starting point in terms of the material condition of these plants".* Please elaborate on the "material condition" of the Pickering stations and to what extent it is a factor (relative to comparator nuclear plants) in terms of not being able to achieve the median by 2014.

Response

The material condition of the Pickering stations is reflected in higher outage days and forced loss rates ("FLR") compared to the industry median which yields lower generation output and higher costs. This impacts the ability of these stations to achieve industry median in terms of total generating costs/MWh.

Though Pickering B has shown significant improvement in performance as a result of its efforts to improve its material condition (i.e., an improvement in FLR from 24.2 per cent in 2007 to 5.8 per cent in 2008), Pickering A is still addressing issues associated with the seven-year shutdown of the units prior to their return to service in 2003 and 2005. Total generating cost targets for 2014 for both Pickering A and Pickering B assume improved material condition as reflected in improvement in FLRs and a reduction in the number of outage days.

The 2014 total generating cost target for Pickering A incorporates a significant improvement in FLR from 8 per cent in 2010 to 4 per cent in 2014. Pickering B's total generating cost targets, however, are negatively affected by increased outage days required for the Pickering B Continued Operations initiative. OPG continues to invest in both stations and equipment reliability initiatives continue to be implemented with the goal of improving material condition.

Poor material condition is only one factor limiting the ability of Pickering A and B to achieve median total generating cost performance by 2014. Among the structural factors that drive higher costs at the Pickering stations, as discussed at Ex. F2-T1-S1 pages 13-14, are the size of the reactor units compared to industry median and the complexity of CANDU technology compared to the benchmarked reactors which are predominantly PWR and BWR.

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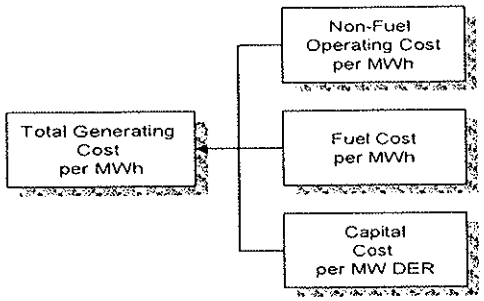
These factors are outside of OPG's control and are differences that will continue to exist in the future.

Diagram of Summary Relationship of Value for Money Metrics



Capital cost is reported on a capital cost per MW DER basis individually; because that is the most appropriate benchmarking metric (output or MWh are not appropriate values to normalize for capital investment). When totaled to calculated total generating cost per MWh, the denominator for capital cost is changed to MWh to maintain consistency of units.

Capital costs per MW DER: The benchmark data indicates that OPG per unit capital spending is the lowest in North America with Darlington, Pickering A and Pickering B all performing within the best quartile for the panel. Lower capital costs could be in part due to the application of the capitalization policy at OPG for purposes of classifying projects as capital or OM&A or due to the use of higher capitalization threshold at OPG than at most other plants in the panel. When OPG OM&A projects are added to capital expenditures, the resulting total is more consistent with the per unit capital spending of other plants in the EUCG panel.

As a result, the benchmark data suggests that the lower capital costs results in higher non-fuel operating cost per MWh. In other words, the impact of low capital project costs offset by high OM&A projects costs results in OM&A expenses appearing slightly higher against benchmark plants and capital expenditures appearing lower against benchmark plants.

The best way to address this difference is to utilize total generating cost per MWh (i.e. the sum of non-fuel operating cost, fuel cost, and capital cost) as the primary financial benchmark to eliminate any unintended impact of the capitalization policy on total operating cost per MWh.

Fuel costs per MWh: Fuel cost, primarily driven by the technological differences in CANDU technology, are lower for OPG than for most North American PWR/BWR reactors. CANDUs do not require enriched uranium like BWRs and PWRs and, as a result, experience lower fuel costs. This provides a significant advantage for OPG in this cost category. Fuel cost per MWh for Darlington, Pickering A, and Pickering B are each approximately $2.30/MWh better than the best quartile value for this metric.

Non-fuel operating costs per MWh: Performance in non-fuel operating cost per MWh drives the majority of OPG financial performance. Removing OPG's advantages in fuel costs and capital costs reveals relatively poor financial performance at all three OPG facilities with respect to non-fuel operating cost per MWh. Specific drivers of performance vary from station to station and will be discussed in more detail later in the report, but overall the biggest drivers are; capability factor, station size, CANDU technology, corporate cost allocation and potential controllable costs. In more detail:

- The 'capability factor' driver is related specifically to generation performance of the station in relation to the overall potential for the station (results are discussed within the Reliability section within the 2-Year Unit Capability Factor metric).
- The 'station size' driver is the combined effect of number of units and size of units. The number of units and size of those units can have significant impacts on plant cost performance and review of the benchmarking data reveals a link between the two.

- The 'CANDU technology' driver relates specifically to the concept that CANDU technology results in some specific cost disadvantages related to the overall engineering and maintenance costs. In addition, this factor is influenced by the fact that CANDU plants have less well-developed user groups to share and adopt competitive advantage information, than do longer-established user groups for PWRs and BWRs. Quantification of CANDU technology impact to cost remains most difficult of all drivers.
- The 'corporate cost allocations' driver relates directly to the allocated corporate support costs charged to the nuclear group.
- The 'potential controllable costs' driver relate to the remaining costs which are not attributable to other specific cost drivers – and provide a potential improvement opportunity for further analysis.

Observations – 3-Year Fuel Costs per MWh (All North American)

2008 (3-Year Rolling Average)

Trend

- The best quartile 3-year fuel costs per MWh have been slowing rising since 2005 with the greatest increase in 2008
- Since 2006 fuel costs per MWh for all three OPG plants have been rising with the greatest increase in 2008
- Fuel costs per MWh at the three OPG plants have been converging and currently are very similar to one another

Factors Contributing to Performance

Best quartile fuel cost performance noted above is due to three significant factors:

- Uranium fuel costs: Raw uranium is processed directly into uranium dioxide to make fuel pellets, without the cost and process complexity of enriching the fuel as required in light water reactors. The advantage due to fuel costs also includes transportation, handling and shipping costs
- Reactor core efficiency: CANDU is the most efficient of all reactors in using uranium, requiring about 15% less uranium than a pressurized water reactor for each megawatt of electricity produced
- Fuel assembly manufacturing costs: Manufacturing costs for light water reactor fuel assemblies are significantly higher than CANDU fuel bundles, due to physical design complexity and increased amount of materials

SEC Interrogatory #030

Ref: Ex. F2-T1-S1, Attachment 1

Issue Number: 6.5
Issue: Has OPG responded appropriately to the observations and recommendations in the benchmarking report?

Interrogatory

a) Please provide an explanation as to why the Darlington GS FLR targets for 2011 and 2012 were chosen at 63 per cent above the achieved 2008 rate.

b) What would be the incremental revenue (at the proposed rates) if it were assumed Darlington GS had an FLR rate remain unchanged from that achieved in 2008 (i.e. .93).

Response

a) The Interrogatory refers to Ex. F2-T1-S1, Attachment 1 that shows a 2-year rolling average Force Loss Rate ("FLR") of 0.93 per cent for Darlington Generating Station in 2008. As shown in Ex. E2-T1-S2, Table 1c, Darlington's FLR targets for 2011 and 2012 are 1.50 per cent in each year. These are one year targets and not rolling averages.

The chart below shows actual yearly FLRs from 2005 – 2009 for Darlington Generating Station.

Year	FLR (%)
2005	1.3
2006	3.2
2007	1.1
2008	0.7
2009	1.6
5 Yr Average	**1.6**

Darlington Generating Station was able to achieve very impressive FLR performance in 2008. However, as the chart indicates, that performance has not been consistently achieved over the past five years.

Darlington 2011 and 2012 FLR targets were based on projected improvements in plant health and human performance factors which is expected to result in Darlington's FLR continuing to be better than CANDU median performance. The 2011 and 2012 FLR targets reflect these multi-year improvement plans and expected performance in these areas.

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b) Incremental revenue for 2011 and 2012 would be approximately $10.3M per year based on a 0.17 TWh per year increase in generation resulting from an FLR of 0.93 per cent versus the 1.5 per cent FLR target.

SEC Interrogatory #029

Ref: Ex. F2-T1-S1, Attachment 8, Darlington Benchmark Targets

Issue Number: 6.5
Issue: Has OPG responded appropriately to the observations and recommendations in the benchmarking report?

Interrogatory

The targeted benchmark for Total Generating Costs per Net MWh, is $35.70 and $36.69 for 2011 and 2012 for the Darlington GS. Please provide the rationale for selecting benchmarks approximately 19% above 22% above the achieved benchmark for Darlington in 2008? Please also provide the inflation assumptions that were used to set the 2011 and 2012 benchmarks.

Response

The actual Total Generating Costs/MWh in 2008 for Darlington was $31.56, and excludes Other Post Employment Benefit ("OPEB") costs. The Electric Utility Cost Group ("EUCG") database from which this value is taken excludes OPEB costs when calculating Total Generating Cost. OPG's targeted Total Generating Costs/MWh benchmark for Darlington for 2011 and 2012 of $35.70 and $36.69 includes OPEB costs for business planning. To provide a more appropriate and accurate comparison, the target Total Generating Costs/MWh for 2011 and 2012 excluding OPEB costs is $34.21 and $35.14. The annual targets set for 2011 and 2012 are therefore 8.4 per cent and 11.3 per cent higher than the 2008 performance, not 19 per cent and 22 per cent.

The annual targets for 2011 and 2012 were set above the performance achieved in 2008 to recognize industry inflation. As explained below, the overall industry inflation assumption is for Total Generating Costs to increase by approximately 4 per cent per annum. Darlington's projected increase of 8.4 per cent over three years and 11.33 per cent over four years is therefore reasonable when benchmarked against these industry projections.

During the target setting process (Ex. F2-T1-S1, page 13) industry "inflation" assumptions were derived by ScottMadden and applied to the 2014 industry targets based on historical escalation rates derived from the Electric Utility Cost Group ("EUCG") database. Industry Non-fuel costs were escalated approximately 4.5 per cent per annum, fuel costs by 7.2 per cent per annum, and capital costs by 1.33 per cent per annum based on the EUCG historical data. This equates to an annual increase in Total Generating Costs of approximately 4 per cent.

The four components that make up Total Generating Costs (Total Non-fuel Operating Costs; Fuel Costs; Capital Costs and Net Electrical Production) and their respective 2008, 2011 and

2012 amounts for Darlington Generating Station can be found in the table below. As shown in the table, Total Non-fuel Operating Costs, Fuel Costs and Capital Costs are increasing, while Net Electrical Production is flat.

Total Non-fuel Operating Costs consist of station costs (inclusive of Nuclear support costs), corporate cost allocations and pension burden costs. For these items, Darlington Generating Station's costs are targeted to reduce from the 2008 levels by 9 per cent and 7 per cent in 2011 and 2012, respectively, offset by increases in corporate cost allocations and pension burden costs. Fuel costs from inventory are projected to increase as discussed in Ex. F2-T5-S1. The increase in Darlington Generating Station capital costs is based on an increase projected allocation from the fixed capital portfolio and align with the assumption that more capital will be invested in Darlington Generating Station as it ages and less in Pickering Generating Station as it nears its end of life (see Ex. L-11- 015).

Darlington	**2008**	**2011**	**2012**
Total Non-Fuel Operating Costs (k$) [Note 1]	718,895	722,186	737,420
Fuel Costs (k$)	91,080	134,426	145,646
Capital Costs (k$)	101,887	130,757	136,014
Total Generating Costs (k$)[1]	911,862	987,370	1,019,081
Net Electrical Production Target (TWh)	28.89	28.86	29.00
Total Non-Fuel Operating Costs per Net MWh ($/MWh)[1]	$ 24.88	$ 25.02	$ 25.43
Fuel Costs per Net MWh ($/MWh)	$ 3.15	$ 4.66	$ 5.02
Capital Costs per MW DER (k$/MW DER)	$ 29.01	$ 37.23	$ 38.73
Total Generating Costs per Net MWh ($/MWh)[1]	$ 31.56	$ 34.21	$ 35.14

Note 1: Excludes OPEB costs

SEC Interrogatory #026

Ref: Ex. F2-T2-S1, page 5, A, Table 1

Issue Number: 6.4
Issue: Is the benchmarking methodology reasonable? Are the benchmarking results and targets flowing from those results for OPG's nuclear facilities reasonable?

Interrogatory

Please calculate the OM&A reduction that would be required for the Darlington GS in order to maintain the 2008 non-fuel benchmark of $25.10 MWh.

Response

The 2008 non-fuel benchmark of $25.10/MWh for Darlington Generating Station is based on a three year average while the targets of $28.22, $26.52 and $26.98 for 2010 - 2012 in Ex. F2-T1-S1, Attachment 8 are based on annual performance.

The Interrogatory references Ex. F2-T2-S1, Table 1 which is Base OM&A only whereas the non-fuel benchmark includes Total OM&A including all operating costs such as Project OM&A and Corporate Support that are outside the Base OM&A table.

In order to maintain the non-fuel benchmark of $25.10/MWh, and given the generation plan for the years in question, the following Total OM&A (including Station, Nuclear Support, Projects and Corporate Support) reduction would be required:

	2010	2011	2012
Non-Fuel Operating Costs Target ($/MWh)	28.22	26.52	26.98
Net Electrical Production Target (TWh)	27.74	28.86	29.00
Required Non-Fuel Operating Costs Reduction ($M)	**86.61**	**40.89**	**54.62**
Non-Fuel Operating Costs Revised ($/MWh)	25.10	25.10	25.10

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BASE OM&A – NUCLEAR

1.0 PURPOSE

This evidence provides a description of the nuclear base OM&A expense for the historical years, bridge year, and test period.

2.0 OVERVIEW

The nuclear base OM&A expense for 2007 - 2012 is provided in Ex. F2-T2-S1 Table 1. The test period base OM&A expense of $1,192.3M and $1,219.8M in 2011 and 2012, respectively forms part of the OM&A expense in the revenue requirement.

OPG has made significant operational and cost improvements which have been demonstrated since the previous application: Specifically:

- 2012 base OM&A costs are to be forecast to be below 2008 actual costs, with cumulative work-driven cost savings of $260M for the 2010 - 2012 period;
- 2012 regular staff levels are forecast below 2008 levels by 689 staff, while non-regular staff FTEs ("full time equivalents") are reduced by 559;
- 2009 elective and corrective maintenance backlogs are below 2008 actuals, with 2012 forecast levels for maintenance backlogs significantly lower again.
- 2009 total Nuclear FLR is below 2008 actual (2008 actual of 12.3 per cent versus 2009 actual of 6.4 per cent); with 2012 forecast levels of 2.8 per cent.

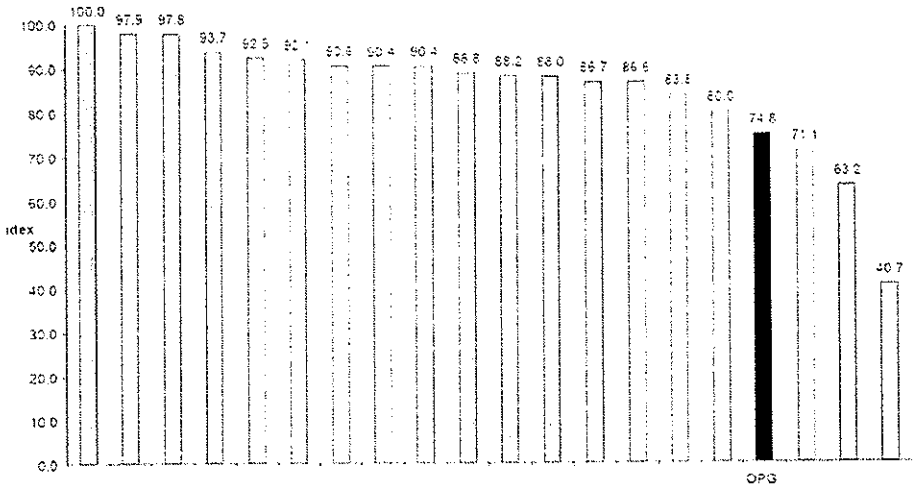
Further details are provided in this exhibit and in Ex. E2-T1-S1. Base OM&A provides the main source of funding for operating and maintaining the nuclear stations in support of:

- The ongoing production of electricity from the operating units
- Ensuring safe operation of the plants
- Maintaining or improving reliability of the nuclear assets
- Ensuring compliance with applicable legislation and nuclear regulatory requirements

In addition to the routine activities listed here, base OM&A is also used to fund the cost of:

- Regular staff labour for planned outages.

2008 WANO NPI for Major Operators*



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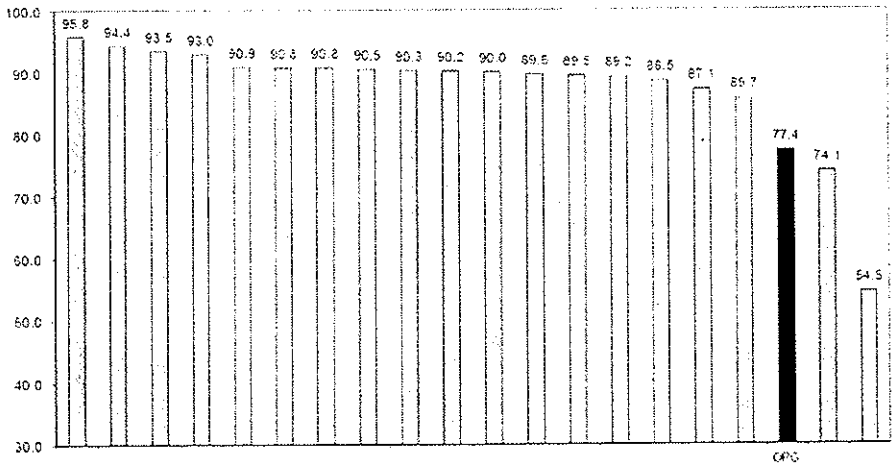
2008 2 Year Unit Capability Factor Ranking
for Major Operators*



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2008 3 Year Total Generating Costs per MWh

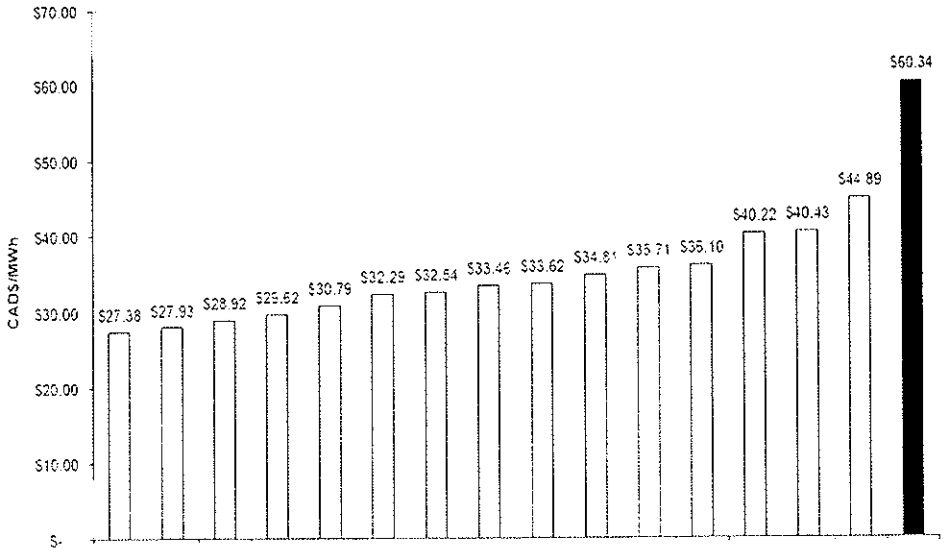

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Chart 1

Summary Comparison of 2008 OPG Nuclear Performance to Industry Benchmarks

Metric	Best Quartile	Median	Pickering A	Pickering B	Darlington
Safety					
All Injury Rate			0.73	0.96	1.04
2-Year Industrial Safety Accident Rate	0.05	0.09	0.14	0.07	0.04
2-Year Collective Radiation Exposure (man-rem per unit)	62.15	81.84	44.2	95.81	72.83
Airborne Tritium (TBq) Emissions per Unit	46.0	101.0	101.0	50.7	40.0
Fuel Reliability (microcuries per gram)	0.000001	0.000165	0.00059		0.00025
2-Year Reactor Trip Rate (# per 7,000 hrs)	0.00	0.33		0.26	0.00
3-Year Auxiliary Feedwater System Unavailability	0.0014	0.0020	0.0119	0.0040	0.0017
3-Year Emergency AC Power Unavailability	0.0024	0.0076	0.0081	0.0091	0.0020
3-Year High Pressure Safety Injection Unavailability	0.0001	0.0037	0.0012	0.0001	0.0003
Reliability					
WANO NPI (Index)	96.19	62.46	60.84	60.93	95.67
2-Year Forced Loss Rate (%)	0.68	3.79			0.93
2-Year Unit Capability Factor (%)	90.97	84.31			91.99
2-Year Chemistry Performance Indicator (Index)	1.00	1.01			1.00
1-Year Online Elective Maintenance (work orders/unit)	218	278			311
1-Year Online Corrective Maintenance (work orders/unit)	4	7			
Value for Money					
3-Year Total Generating Costs per MWh ($/Net MWh)	28.66	32.31			30.08
3-Year Non-Fuel Operating Costs per MWh ($/Net MWh)	18.06	21.28			25.10
3-Year Fuel Costs per MWh ($/Net MWh)	5.02	5.37	2.64	2.68	2.62
3-Year Capital Costs per MW DER	32.79	46.22	42.07	32.44	18.79

KEY: Green = best quartile performance/max NPI points achieved if applicable
White = 2nd quartile performance
Yellow = 3rd quartile performance
Red = lowest quartile performance

OPG Nuclear Operations

Benchmarking Indicators - Targets	2010	2011	2012	2013	2014
Safety					
All Injury Rate (#/200k hours worked)	1.28	1.26	1.24	1.22	1.20
Industrial Safety Accident Rate* (#/200k hours worked)	0.15	0.15	0.15	0.15	0.15
Fuel Reliability* (micro-curies I131/g)	N/A	N/A	N/A	N/A	N/A
Reactor Trip Rate* (trips/7k hr critical)*	N/A	N/A	N/A	N/A	N/A
Auxiliary Feedwater System Unavailability* (#)	N/A	N/A	N/A	N/A	N/A
Emergency AC Power Unavailability* (#)	N/A	N/A	N/A	N/A	N/A
High Pressure Safety Injection Unavailability* (#)	N/A	N/A	N/A	N/A	N/A
Collective Radiation Exposure* (person rem/unit)	102.14	85.47	90.85	93.99	87.81
Airborne Tritium Emissions per Unit (Curies)	24,300	23,900	21,000	18,600	15,400
Reliability					
Nuclear Performance Index (%)	79.3	80.6	85.0	87.0	87.2
Forced Loss Rate* (%)	3.54	3.20	2.77	2.81	2.47
Unit Capability Factor* (%)	83.3	88.1	89.8	86.8	88.8
Chemistry Performance Indicator* (#)	1.05	1.04	1.04	1.03	1.03
On-line Elective Maintenance Backlog (work orders/unit)	380	337	318	290	261
On-line Corrective Maintenance Backlog (work orders/unit)	16	13	13	12	9
Value for Money					
Total Generating Costs per Net MWh ($/MWh)	49.41	46.86	47.10	52.28	51.22
Non-Fuel Operating Costs per Net MWh ($/MWh)	41.10	38.33	38.27	43.13	42.13
Fuel Costs per Net MWh ($/MWh)	4.32	4.77	5.15	5.33	5.36
Capital Costs per MW DER (k$/MW DER)	29.10	29.02	28.99	29.00	29.03

* Sub-indicator of WANO NPI

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Darlington

Benchmarking Indicators - Targets	2010	2011	2012	2013	2014
Safety					
All Injury Rate (#/200k hours worked)	1.28	1.26	1.24	1.22	1.20
Industrial Safety Accident Rate* (#/200k hours worked)	0.15	0.15	0.15	0.15	0.15
Fuel Reliability* (micro-curies I131/g)	0.00050	0.00050	0.00050	0.00050	0.00050
Reactor Trip Rate* (trips/7k hr critical)*	0.50	0.50	0.50	0.50	0.50
Auxiliary Feedwater System Unavailability* (#)	0.0200	0.0200	0.0200	0.0200	0.0200
Emergency AC Power Unavailability* (#)	0.0250	0.0250	0.0250	0.0250	0.0250
High Pressure Safety Injection Unavailability* (#)	0.0200	0.0200	0.0200	0.0200	0.0200
Collective Radiation Exposure* (person rem/unit)	89.20	55.00	50.00	100.00	66.00
Airborne Tritium Emissions per Unit (Curies)	4,000	4,000	4,000	4,000	4,000
Reliability					
Nuclear Performance Index (%)	96.5	96.0	98.8	98.6	98.3
Forced Loss Rate* (%)	1.68	1.50	1.50	1.50	1.25
Unit Capability Factor* (%)	90.3	93.9	94.1	88.7	93.3
Chemistry Performance Indicator* (#)	1.01	1.01	1.01	1.01	1.01
On-line Elective Maintenance Backlog (work orders/unit)	275	250	235	225	214
On-line Corrective Maintenance Backlog (work orders/unit)	9	8	7	6	4
Value for Money					
Total Generating Costs per Net MWh ($/MWh)	36.83	35.70	36.69	43.52	40.08
Non-Fuel Operating Costs per Net MWh ($/MWh)	28.22	26.52	26.98	33.75	30.66
Fuel Costs per Net MWh ($/MWh)	4.24	4.66	5.02	5.16	5.21
Capital Costs per MW DER (k$/MW DER)	34.52	37.23	38.73	35.74	34.30

* Sub-indicator of WANO NPI

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Exhibit F2-1-1
Attachment 8

Pickering A

Benchmarking Indicators - Targets	2010	2011	2012	2013	2014
Safety					
All Injury Rate (#/200k hours worked)	1.28	1.26	1.24	1.22	1.20
Industrial Safety Accident Rate* (#/200k hours worked)	0.15	0.15	0.15	0.15	0.15
Fuel Reliability* (micro-curies I131/g)	0.00050	0.00050	0.00050	0.00050	0.00050
Reactor Trip Rate* (trips/7k hr critical)*	0.50	0.50	0.50	0.50	0.50
Auxiliary Feedwater System Unavailability* (#)	0.0200	0.0200	0.0200	0.0200	0.0200
Emergency AC Power Unavailability* (#)	0.0250	0.0250	0.0250	0.0250	0.0250
High Pressure Safety Injection Unavailability* (#)	0.0200	0.0200	0.0200	0.0200	0.0200
Collective Radiation Exposure* (person rem/unit)	120.52	147.00	189.00	120.00	130.00
Airborne Tritium Emissions per Unit (Curies)	11,500	11,500	9,000	7,000	6,000
Reliability					
Nuclear Performance Index (%)	60.3	61.6	68.1	73.6	76.8
Forced Loss Rate* (%)	8.00	7.00	5.00	5.00	4.00
Unit Capability Factor* (%)	73.7	82.6	85.3	84.8	86.8
Chemistry Performance Indicator* (#)	1.07	1.06	1.05	1.04	1.04
On-line Elective Maintenance Backlog (work orders/unit)	350	335	320	300	278
On-line Corrective Maintenance Backlog (work orders/unit)	10	10	10	10	9
Value for Money					
Total Generating Costs per Net MWh ($/MWh)	80.35	72.99	71.30	74.62	76.06
Non-Fuel Operating Costs per Net MWh ($/MWh)	70.12	63.37	62.38	64.63	65.78
Fuel Costs per Net MWh ($/MWh)	4.54	4.81	5.20	5.41	5.44
Capital Costs per MW DER (k$/MW DER)	36.56	34.63	27.74	33.85	36.63

* Sub-indicator of WANO NPI

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Exhibit F2-1-1
Attachment 8

Pickering B

Benchmarking Indicators - Targets	2010	2011	2012	2013	2014
Safety					
All Injury Rate (#/200k hours worked)	1.28	1.26	1.24	1.22	1.20
Industrial Safety Accident Rate* (#/200k hours worked)	0.15	0.15	0.15	0.15	0.15
Fuel Reliability* (micro-curies I131/g)	0.00050	0.00050	0.00050	0.00050	0.00050
Reactor Trip Rate* (trips/7k hr critical)*	0.50	0.50	0.50	0.50	0.50
Auxiliary Feedwater System Unavailability* (#)	0.0200	0.0200	0.0200	0.0200	0.0200
Emergency AC Power Unavailability* (#)	0.0250	0.0250	0.0250	0.0250	0.0250
High Pressure Safety Injection Unavailability* (#)	0.0200	0.0200	0.0200	0.0200	0.0200
Collective Radiation Exposure* (person rem/unit)	105.90	85.18	82.63	74.98	88.53
Airborne Tritium Emissions per Unit (Curies)	8,800	8,400	8,000	7,600	5,400
Reliability					
Nuclear Performance Index (%)	71.7	74.8	79.7	82.0	81.2
Forced Loss Rate* (%)	5.00	4.50	4.00	4.00	4.00
Unit Capability Factor* (%)	76.1	81.0	84.7	84.4	81.9
Chemistry Performance Indicator* (#)	1.07	1.06	1.05	1.04	1.04
On-line Elective Maintenance Backlog (work orders/unit)	500	425	400	350	300
On-line Corrective Maintenance Backlog (work orders/unit)	25	20	20	20	15
Value for Money					
Total Generating Costs per Net MWh ($/MWh)	59.94	55.64	54.67	56.75	59.73
Non-Fuel Operating Costs per Net MWh ($/MWh)	53.14	48.95	47.54	49.12	51.87
Fuel Costs per Net MWh ($/MWh)	4.37	4.96	5.38	5.58	5.59
Capital Costs per MW DER (k$/MW DER)	16.15	12.25	13.03	15.12	16.25

* Sub-indicator of WANO NPI