

Board Staff Interrogatory #219

Issue Number: 10.2

Issue: Is the monitoring and reporting of performance proposed by OPG for the regulated hydroelectric facilities appropriate?

Interrogatory

Reference:

Ref: Exh A1-3-2 Chart 11

Ref: EB-2013-0321 Decision page 17

OPG proposes to file safety, reliability and cost effectiveness performance measures for the regulated hydroelectric facilities annually. OPG states that these are the four measures under the same key performance areas were filed in the previous payment amounts proceeding, EB-2013-0321.

The proposed cost effectiveness measure is OM&A Unit Energy Cost (\$/MWh). In the EB-2013-0321 decision, the OEB found OPG's hydroelectric benchmarking to be inadequate, commenting that only base OM&A was considered, which is only 50% of total OM&A expenses.

Please confirm whether the proposed cost effectiveness measure is base OM&A only. If yes, please explain why this measure is appropriate in light of the EB-2013-0321 decision.

Response

As defined in EB-2013-0321, Ex. F1-1-1, p. 26, OM&A Unit Energy Cost is broader than base OM&A. It measures total hydroelectric OM&A expense, including allocated central support costs.

Board Staff Interrogatory #220

Issue Number: 10.2

Issue: Is the monitoring and reporting of performance proposed by OPG for the regulated hydroelectric facilities appropriate?

Interrogatory

Reference:

Ref: Exh A1-3-2 Chart 11

Ref: Exh A2-2-1 Attachment 1 page 34 Ref: Exh A1-3-2 Attachment 2 page 10

- a) On page 34 of Attachment 1 to Exh A2-2-1 (OPG business plan), the operational targets for Hydro Thermal Operations, designed to drive continuous performance, are set out. Why has OPG proposed to report only a few of these measures, and in some cases different measures, e.g. the business plan reports Total Hydroelectric Generating Cost per MWh?
- b) The Total Hydroelectric Generating Cost per MWh, as reported in the business plan, would include regulated and non-regulated hydroelectric facilities. Does OPG track Total Hydroelectric Generating Cost per MWh for the regulated hydroelectric facilities? If so, please explain why OPG has proposed annual reporting on OM&A Unit Energy Cost.
- c) On page 10 of Attachment 2 to Exh A1-3-2, the functions that Navigant used to benchmark the cost OPG's regulated hydroelectric facilities are summarized. Why has OPG proposed to report only OM&A Unit Energy Cost and not some/all of the cost performance measures used by Navigant?

Response

- a) The hydroelectric performance measures proposed within the rate application include all the operational targets defined on p. 34 of Ex. A2-2-1, Attachment 1, with the exception of Capacity and Total Hydroelectric Generating Cost per MWh.

Capacity is excluded as a performance measure as there is very little opportunity to increase the capacity of OPG's regulated hydroelectric portfolio.

OPG believes that an appropriate hydroelectric efficiency metric is one that directly relates to the company's regulated hydroelectric operations. The Total Hydroelectric Generating Cost per MWh is a new corporate target adopted in the 2017-2019 business plan, and is applied to OPG's regulated and contracted hydroelectric assets on a combined basis. Therefore, it would not be an appropriate reporting metric of the cost effectiveness for the prescribed hydroelectric facilities. Total Hydroelectric Generating Cost per MWh does not replace the OM&A Unit Energy Cost (\$/MWh) measure, which

1 OPG continues to use as a benchmark to assess the effectiveness of the hydroelectric
2 operations. This information is available annually through EUCG, and is widely used by
3 hydroelectric generators to assess operational performance.
4

5 The Environmental Performance Index (EPI) that OPG proposes to report encompasses
6 the individual environmental performance targets referenced in the OPG business plan.
7 The EPI was described in EB-2013-0321, Ex. F1-1-1, p. 10, lines 16-19: "The [EPI]
8 includes a variety of measures and deliverables, some that are specific targets (such as
9 minimizing the number of spills and MOE infractions) and some that are environmental
10 initiatives (such as compliance cost management, Endangered Species Act, etc.)."
11

12 b) As noted in part a), Total Hydroelectric Generating Cost per MWh includes both regulated
13 and unregulated hydroelectric generation assets. OPG does not track Total Hydroelectric
14 Generating Cost per MWh for the regulated hydroelectric facilities alone. OPG proposes
15 to report OM&A Unit Energy Cost (\$/MWh) rather than Total Hydroelectric Generating
16 Cost per MWh because it is a direct measure of the cost effectiveness of the operation of
17 OPG's regulated hydroelectric stations.
18

19 c) Please see the answer to part b) above.

Board Staff Interrogatory #221

Issue Number: 10.3

Issue: Is the monitoring and reporting of performance proposed by OPG for the nuclear facilities appropriate?

Interrogatory

Reference:

Ref: Exh A1-3-2 Chart 12

OPG proposes to report the key performance measures that are used in its annual nuclear benchmarking report.

- a) The 2015 nuclear benchmarking report on 2014 performance is dated November 2015. The 2016-2018 business plan, which lists some of the 2015 actual nuclear performance measures is dated May 2016. When will the 2016 nuclear benchmarking report on 2015 performance be completed?
- b) Will the proposed annual report include best quartile and median information for peers?
- c) Will the proposed annual report include actual data for the year as well as rolling averages?
- d) Will the proposed annual report only provide the results for Darlington and Pickering separately or will there be some measures reported for OPG?

Response

a) OPG is planning to complete 2015 nuclear benchmarking report in November 2016.

b), c), and d)

OPG intends to file the annual nuclear performance measures listed in Ex. A1-3-2, page 42. The information will be reported for these metrics in the same manner and level of detail provided in Ex. F2-1-1 Attachment 1, page 6, Table 2, which is a summary of OPG's nuclear performance compared to benchmark results. Table 2 provides best quartile and median information. The data underpinning the metrics in Table 2 is either annual data, two or three year rolling average, or 18 months, as identified in Table 2. Information will be provided for Darlington and Pickering separately.

AMPCO Interrogatory #152

Issue Number: 10.3

Issue: Is the monitoring and reporting of performance proposed by OPG for the regulated hydroelectric facilities appropriate?

Interrogatory

Reference:

Ref: A1-3-2 Page 37

a) Please provide the targets OPG has set for its Human Performance, Outage Performance, Equipment Reliability and Parts Improvement initiatives.

Response

Human Performance Initiative:

For the 2016-2018 Business Plan, OPG is targeting an improvement in human performance by reducing the rate of human errors.

Performance Measure	2016 Target	2017 Target	2018 Target
18- Month Human Performance Error Rate (# per 10k ISAR hours) – Pickering	0.003	0.003	0.003
18- Month Human Performance Error Rate (# per 10k ISAR hours) – Darlington	0.003	0.002	0.002

Outage Performance Initiative:

For the 2016-2018 Business Plan, OPG is targeting elimination of Forced Extension to Planned Outage days to eliminate loss of production, avoid additional outage OM&A costs and achieve targeted production levels.

Performance Measure	2016 Target	2017 Target	2018 Target
Forced Extension to Planned Outage days - Pickering	0	0	0
Forced Extension to Planned Outage days - Darlington	0	0	0

Equipment Reliability Initiative:

For the 2016-2018 Business Plan, OPG is targeting improved equipment reliability performance as measured by the Equipment Reliability Index (ERI).

Performance Measure	2016 Target	2017 Target	2018 Target
Equipment Reliability Index - Pickering	70	72	74
Equipment Reliability Index - Darlington	80	85	89

Parts Improvement Initiative:

For the 2016-2018 Business Plan, the primary measure related to the Parts Improvement Initiative is Work Orders with Material Request Execution.

Performance Measure	2016 Target	2017 Target	2018 Target
Work Orders with Material Request Execution (Fleet)	40	50	60

In addition to the above primary measure, the overall duration it takes to complete a job that requires parts (i.e., Cycle Time) is expected to improve to 650 days by the end of 2018. This represents a 110 day improvement compared to the baseline average fleet score measured at the start of the initiative (2014 year end – 12 month average).

AMPCO Interrogatory #153

Issue Number: 10.3

Issue: Is the monitoring and reporting of performance proposed by OPG for the regulated hydroelectric facilities appropriate?

Interrogatory

Reference:

Ref: A1-3-2 Page 42, Chart 12

a) Please provide the annual targets for the years 2016 to 2021 for each nuclear performance measure.

Response

Please see response to Ex. L-6.1-15 SEC-54.

Board Staff Interrogatory #222

Issue Number: 10.4

Issue: Is the proposed reporting for the Darlington Refurbishment Program appropriate?

Interrogatory

Reference:

Ref: Exh A2-1-1, Attachment 3, page 100 Ref: Exh D2-2-2, page 8

The first reference above provides a list of members of the Darlington Refurbishment Committee and the second reference refers to the Refurbishment Construction Review Board and the Ministry of Energy's oversight.

- a) Please provide details if there have been any changes to the makeup of the Darlington Refurbishment Committee.
- b) Provide a copy of the charter or any other governance documents regarding the creation and scope of responsibility of the Darlington Refurbishment Committee.
- c) Who are the members of the Refurbishment Construction Review Board? Please provide names and resumes.
- d) Provide a copy of the Refurbishment Construction Review Board's charter or any other governance documents regarding the creation, purpose, scope of responsibility, and role during the execution phase of the DRP.
- e) Please provide details of the frequency and type of reporting that the Darlington Refurbishment Committee and the Refurbishment Construction Review Committee will receive.
- f) In addition to the oversight being provided by the Darlington Refurbishment Committee and the Refurbishment Construction Review Committee, please provide details of the oversight that is being provided by the Government of Ontario? For example, what is the reporting frequency and how actively involved will the government's team be in the ongoing monitoring of the program's process?

Response

- (a) There have been no changes to the makeup of the Darlington Refurbishment Committee.
- (b) A copy of the Darlington Refurbishment Committee Charter is attached as Attachment 1.
- (c) The external members of the Refurbishment Construction Review Board are:

Witness Panel: Darlington Refurbishment Program

- a. Ken Ellis (Acting Chair)
- b. Britt McKinney
- c. Drew Feters
- d. Oswald "Ike" Zeringue

A copy of each member's resumes is attached as Attachment 2.

The Refurbishment Construction Review Board will also be augmented by one senior OPG staff at each meeting.

(d) A copy of the Refurbishment Construction Review Board Terms of Reference is attached as Attachment 3.

(e) The Darlington Refurbishment Committee meets quarterly, and will hold special meetings throughout the year as required. The types of reporting received by the Darlington Refurbishment Committee include quarterly program updates on the DRP, assurance reporting, external oversight reports (including meetings with external oversight bodies such as the Refurbishment Construction Review Board), and any requests for release of funds as required. During the execution phase, the DRC will receive monthly reports on the status of each unit's execution.

The Refurbishment Construction Review Board will be brought in 2-4 times a year to examine project areas as dictated by major project milestones and as specified by either the CEO or Chief Nuclear Officer. The Refurbishment Construction Review Board will conduct its review through a combination of (but not limited to) interviews, field walkdowns, meeting observations, and document reviews. The quarterly focus areas will be determined according to current project requirements and project milestones.

(f) Infrastructure Ontario has retained an advisor, at OPG's cost, to provide independent oversight of DRP to the Ministry of Energy. The advisor sits as an observer on the Darlington Refurbishment Committee of the OPG board of directors, though not on the board itself. The advisor has full access to senior OPG management and other key project personnel as required to perform his oversight duties. The advisor also has access to all relevant documentation on DRP and regularly attends key project meetings to gather relevant information on the project. The advisor reports to the Minister of Energy on the status, performance and risks of the project following each quarterly meeting of the Darlington Refurbishment Committee. The advisor also engages in technical discussions with Ministry staff as needed to provide updates on his work. The Ministry is responsible for ensuring that any potential concerns identified by the advisor are addressed in a timely and effective manner. The advisor's deliverables will be provided on a confidential basis exclusively to the Ministry of Energy, and Infrastructure Ontario, as applicable, but will not be provided to OPG except as the Ministry of Energy may do so.

Ontario Power Generation

Darlington Refurbishment Committee of the Board

CHARTER

Purpose

The basic function and purpose of the Darlington Refurbishment Committee is to assist the Board of Directors in their responsibility for oversight of matters relating to the refurbishment of Darlington GS:

1. external independent oversight
2. final execution phase scope, budget and schedule
3. execution phase project monitoring and safety, scope, budget and schedule performance reporting
4. decision to proceed with the refurbishment of subsequent Darlington units
5. assessment of committee performance.

Committee Responsibilities and Duties

The Committee shall perform the duties set out in this Charter and shall perform such other duties as may be necessary or appropriate under applicable law or securities rules, or as may be delegated to the Committee by the Board from time to time.

1. External independent oversight

The Committee reviews and approves:

- a) The retention and compensation of qualified advisors, independent of OPG management, to monitor and report to the Committee on the progress and performance of the Project against an approved execution plan, including scope, budget and schedule.

In carrying out its responsibilities for oversight of external experts and/or independent oversight, the Committee reviews:

- b) results and/or major findings from external assessments of the Darlington Refurbishment project, and Management's proposed remediation programs and plans.

2. Final execution phase scope, budget and schedule

The Committee reviews and makes recommendations to the Board with respect to:

- a) OPG Management's development of the "release quality estimate" for the Darlington Refurbishment project.
- b) the execution phase final scope, budget and schedule, and decision to proceed with refurbishment of the first unit.

3. Execution phase project monitoring and performance reporting

The Committee reviews and makes recommendations to the Board with respect to:

- a) material changes to scope, budget and schedule proposed by Management.

In carrying out its responsibilities for oversight of execution phase monitoring and performance reporting, the Committee reviews:

- b) execution phase progress on safety, scope, budget and schedule performance against the Board approved budget and schedule, starting with the first unit,

- c) reports, as required, from OPG's Chief Audit Executive and Chief Risk Officer.
- d) results and/or major findings from internal assessments of the Darlington Refurbishment project, and Management's proposed remediation programs and plans.

4. Decision to proceed with refurbishment of subsequent Darlington units

The Committee reviews and makes recommendations to the Board with respect to:

- a) Management's report on scope, budget, schedule and decision to proceed with refurbishment of subsequent Darlington units.
- b) other approvals related to the execution of the Darlington Refurbishment project, as may be required from time to time.

5. Annual assessment of committee performance

In carrying out its responsibilities for annual assessment of committee performance the Committee shall:

- a) Review and assess its performance, including a review of its compliance with this Charter, in accordance with the evaluation process approved by the Board. The Committee shall also assess the adequacy of this Charter taking into account all legislative and regulatory requirements applicable to the Committee as well as any best practice guidelines recommended by regulators with whom OPG has a reporting relationship.

Organization

Members

The Committee shall consist of three or more OPG directors as determined by the Board. The majority of members of the Committee shall be independent, as defined by the Ontario Securities Commission, and not "affiliated" with OPG.

The Board shall appoint the members of the Committee and the Chair of the Committee. The Board may appoint a member to fill a vacancy which occurs in the Committee between annual elections of Directors. Any member of the Committee may be removed or replaced at any time by the Board.

If a member of the Committee becomes "affiliated" with OPG, the member may continue as a member of the Committee with the approval of the Board Chair, in consultation with the Corporate Secretary.

The OPG Board Chair and OPG President and CEO will attend all meetings of the Committee.

Meetings

The Committee shall meet as frequently as it determines necessary but not less than four times a year.

Notice of the time and place of each meeting of the Committee must be given to each member of the Committee not less than 48 hours before the time of the meeting. If less than 48 hours notice is given, a waiver of notice requirements will be received from all members.

A quorum of the Committee shall be a majority of its members. The powers of the Committee may be exercised at a meeting at which a quorum of the Committee is present in person or by telephone or other electronic means or by a resolution signed by all members entitled to vote on that resolution at a meeting of the Committee. Each member is entitled to one vote in Committee proceedings.

The Committee Chair shall preside at all meetings of the Committee at which he or she is present (or if not able to be present designate another member of the Committee to chair the meeting) and shall develop the agenda for each Committee meeting. The agenda for each meeting of the Committee shall be delivered to each member of the Committee at least 48 hours prior to any meeting of the Committee, together with such other materials as the Chair determines necessary.

Minutes shall be kept of all meetings of the Committee and shall be maintained by OPG's Corporate Secretary.

The Committee may meet in camera (without management present) at any time during the meeting consistent with the OPG Board guideline on the conduct of in camera sessions and the keeping of minutes from in camera sessions.

The Committee may invite any Director, officer or employee of OPG or OPG's counsel or any other person to attend meetings of the Committee to assist in the discussion and examination of the matters under consideration by the Committee.

Reports

The Committee will report its activities and actions to the Board of Directors with recommendations for approval, as the Committee deems appropriate.

Authority

Delegation of Authority

The Committee may not delegate its oversight responsibilities. The Committee may delegate to a sub-committee, the Chief Executive Officer or any employee of OPG the authority to exercise any right, power or responsibility that the Committee may have on such terms and conditions and within such limits as the Committee deems appropriate provided that the sub-committee, Chief Executive Officer or employee subsequently advises the Committee of any right, power or responsibility so exercised.

Access to Management and Outside Advisors

The Committee shall have full, free and unrestricted access to management, employees and relevant information.

The Committee has the sole authority to retain legal counsel, consultants or other advisors, with respect to any issue or to assist in fulfilling its responsibilities and OPG shall provide appropriate funding, as determined by the Committee, for any such advisors.

Effective: May 22, 2015
Revised: November 18, 2015
February 11, 2016

KEN ELLIS, B.ENG, P.ENG

1. Final Formal Education

1977 **Royal Military College of Canada** Kingston, ON
Bachelor of Engineering (Mechanical)

2. Areas of Expertise

- Nuclear Power Plant Operations (CANDU)
- Corporate Governance
- Human Performance
- Equipment Reliability
- Corporate Reviews and Peer Reviews
- Organizational Effectiveness

3. Summary of Experience

2016 – Present – Retired. Member of the Advisor Council of EPRI, member of the International Technical Advisory Committee of NEIL.

2013 to 2015 – 3 years as the CEO of WANO based in London, England. Accountable to the WANO Board of Governors for the leadership, direction, governance and oversight of WANO services worldwide. Member of the WANO Board of Governors, ex-officio member of the World Nuclear Association, Advisor to World Nuclear University.

1981 to 2012 – 31 years of experience in CANDU nuclear power plant operations (licensed Shift Manager Bruce B, Safety Superintendent, Operations Manager, Site VP Maintenance, site VP Engineering & Chief Engineer, Site VP Bruce B, EVP & CNO Bruce B). The entities served included Ontario Hydro, EDF (Ontario Hydro Liaison Engineer to EDF), Ontario Power Generation, and Bruce Power. Member of the Board of Directors CANDU Owners Group Dec05-Feb06, Chair of the Canadian Nuclear Utility Executive Forum Jun09-Dec12, Chair of the 17 nation INPO International Participants Forum Jun09-Apr13. During my tenure as EVP & CNO Bruce B we increased our WANO/INPO rating by one having been many years at a lower rating.

1978 to 1981 – Officer (Captain) in the Canadian Armed Forces, employed as an aerospace engineer responsible for maintenance of Base Comox Search & Rescue fixed wing and rotary wing aircraft.

4. Professional Record

2013 – 2015 **World Association of Nuclear Operators** London, England
Chief Executive Officer

The mission of the World Association of Nuclear Operators (WANO) is to maximize the safety and reliability of nuclear power plants worldwide by working together to assess, benchmark and improve performance through mutual support, exchange of information and emulation of best practice. The corporate office is in London England with regional centres in Atlanta, Paris, Moscow and Tokyo. All 438 commercial nuclear power plants worldwide are members of WANO.

- Accountable to the WANO Governing Board for the day-to-day implementation of WANO's vision, governance, strategies, direction and goals, providing leadership for the WANO Executive Leadership Team which consists of the CEO WANO and the four Regional Centre Directors in Atlanta, Paris, Moscow & Tokyo, serve as the principal interface between WANO and the leadership of member utilities and serve as the principal interface with international organizations that promote safety of nuclear power plants. During my tenure we put in place WANO Assessments worldwide (similar to INPO rating) and also Plants of Focus. Both programs (on a worldwide scale) were believed not to be possible by many in the industry. I also produced WANO 2015-2019 strategic plan titled COMPASS that has received wide acclaim.

2001 -2012

Bruce Power LLP

Tiverton, Ontario

Various Positions

Bruce Power (BP) is a nuclear power generating facility consisting of 8 operating CANDU reactors, with an installed capacity of 6300MW including two refurbished reactors (a \$5B project completed in 2012). With all eight units operational, BP is the largest nuclear site in the world, employing more than 4000 staff; at the peak of the Restart project an additional 3500 workers were on site. Investors are TCPL, OMERS (also formerly Cameco).

- 2009 - 2012 - *Chief Nuclear Officer and Executive Vice President Bruce B.* Accountable to the CEO for the application of the Bruce B Managed System to ensure the achievement of corporate governance needs, business objectives (safety, operational & financial), regulatory licensing requirements, and delivery of the business plan, assist the Bruce Power Executive Team in the formulation and realization of the corporation's future direction including the corporation's vision, mission, values, objectives, initiatives and operating priorities, development of medium and long term strategies, provide oversight of the delivery of all Engineering services on site, provide oversight on the development and application of operational programs on site, line manager of 1450 operational staff, including 400 engineers. During my tenure Bruce B was awarded an exemplary rating by the World Association of Nuclear Operators (WANO) having realised performance improvements in virtually all areas. Organizational Effectiveness was cited as a strength.
- 2008 – 2009 *Station Vice President Bruce B.* Accountable for all operational, maintenance, and safety (reactor, industrial, radiological and environmental) for four operating reactors including financial performance, line manager for 1000 staff. Carefully selected a cohesive management team and launched a focused initiative improving both human performance and equipment reliability. Recognized by WANO as having established the foundational processes to bring Bruce B to the next performance level (which indeed occurred at the next WANO peer review).
- 2006-2007 *Chief Engineer and VP Engineering.* Ultimate accountability as the Design Authority and responsible for all Engineering activities for 6 operating Reactors, responsible for 6 departments providing system engineering, component engineering, design engineering, life cycle management, reactor safety support, and nuclear physics & thermohydraulic safety analysis, responsible for ensuring all engineering activities are performed in a conservative fashion with due regard for nuclear, radiological, environmental and industrial safety, line manager for 380 engineering staff. During my tenure I restructured engineering to provide improved responsiveness and ownership of engineering

services at the Bruce A & B stations, and instituted a campaign, which improved the business acumen of Engineering staff.

- 2001 – 2005 *Vice President Maintenance*. Responsible for establishing a site Maintenance organisation for 6 Reactors by amalgamating all maintenance staff at Bruce B, Central Services and Bruce A restart staff under one site maintenance organisation, establishing and implementing a cost effective maintenance program on site tailored to the safety and production significance of the various plant systems, integrating Maintenance Engineering activities (predictive, preventive, Instrumentation & Control, Valves and Mechanical Equipment) with the maintenance craft activities, and ensuring all maintenance activities are performed in a conservative fashion with due regard for nuclear, radiological, environmental and industrial safety. During my tenure the maintenance department was awarded 5 strengths in 2005 by WANO setting a North American record.

1982 -2000 **Ontario Power Generation / Ontario Hydro** Tiverton, Ontario

During this entire period I worked at the Bruce Nuclear site, which was part of the Ontario Hydro then Ontario Power Generation assets.

- 1995 – 2000 Held numerous positions during this period such as Operations Production Manager Bruce B and Components Engineering Manager for the site. The Component Engineering department did not exist hence under my direction we created such a department.
- 1993 – 1994 Ontario Hydro Liaison Engineer to EDF. The assignment was due to a bilateral technical information exchange agreement between Ontario Hydro and EDF, each company selecting one engineer for the exchange. Assigned to the EDF Nuclear Inspectorate Group, which provided the corporate level internal control and audit function at EDF. Responsible for identifying good practices and strengths of EDF, and advising Ontario Hydro via formal reports on how Ontario Hydro could apply such practices to better our nuclear program, and to provide EDF with my assessment of their practices. Conducted numerous evaluations of operations, maintenance, nuclear safety, fire prevention, business strategies, and major improvement campaigns at the French Nuclear Stations.
- 1982 – 1992 Held numerous positions during this period such as Safety Superintendent Bruce B (conventional, radiological, and emergency preparedness), plus I was a licenced Shift Manager at Bruce B.

1978 -1981 **Canadian Armed Forces** Comox, British Columbia

Base Avionics Officer & Aircraft Maintenance Officer 442 Search & Rescue Squadron

- Held positions such as Aircraft Maintenance Officer: 442 Squadron Search & Rescue where I responsible for all field level maintenance on 3 Buffalo Transport aircraft and 3 Labrador helicopters. I was also promoted to captain and was appointed the Base Comox Avionics Support Officer where I was accountable for the avionics systems for all Base Comox aircraft, and finally I and was part of the CF 18 Hornet acquisition team based in Ottawa.

5. Professional Affiliations

1985 to Present: Professional Engineers Ontario

6. Key Project Involvement

- Provided ongoing support as CNO Bruce B to the Bruce A Unit 1&2 refurbishment.
- Oversaw the creation and implementation of the Bruce B Electrical overhaul project. The project was a multi-year project which involved the replacement of Mercury Wetted Relays with electromechanical relays, protective relay replacements, replacement of the 600 V ITE breakers, main synchronizing breaker replacements, MOT replacements, SG control replacements and engine overhauls, EPG overhauls and controls replacement, 120 V breaker replacements, new lighting throughout the station, and installation of a lightning elimination system. During the projects execution, worked with members of the project team on such topics as project cost and schedule controls, estimating, project performance monitoring, and risk management.
- Contributed to the Bruce Power Continuous Improvement initiative using Lean methodologies, which focused on work management (work requests & work orders, assessing, clearance requests & clearance orders etc.), fuel handling processes, and outage management.

7. Continuing Education

2013	Institute of Corporate Directors Rotman School of Management <i>Directors Education Program</i>	Toronto, ON
2005	University of Western Ontario <i>Ivey Executive Program</i>	London, ON
1997	Ontario Hydro <i>Senior Nuclear Plant Manager Course</i>	ON

8. Other Important Information

Appointed Honorary Colonel RCAF 437 Transport Squadron in June 2013. The squadron flies the VVIP's such as the Canadian Prime Minister on international trips and flies the British Royals while they are visiting Canada on official tours. The squadron also transport Canadian soldiers to required destinations, and is the RCAF air-to-air refuelling squadron.

BRITT T. MCKINNEY

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Lynchburg, VA 24503

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EDUCATION:

M.S.E.E., New Mexico State University, Las Cruces, New Mexico, May 1975
Major: Power Engineering; Fellowship with the Electric Utilities Management Program

B.S.E.S., Regis College, Denver, Colorado, May 1974 (cum laude)
Triple Major: Engineering Science, Business Administration and Mathematics

NEI Executive Course, Darden University, 2007

LICENSES AND CERTIFICATIONS:

Senior Reactor Operator License SOP-43220, Docket 55-40262
“L” level Security Clearance, two stations
Level III, ANS 3.1
Level III, ANSI N45.2
Lead Auditor, ANSI N45.2.23

EXPERIENCE:

**AMEC FOSTER WHEELER, Inc., Toronto, Ontario, Canada
Darlington and Pickering Nuclear Generation Stations**

EXECUTIVE CONSULTANT: 12/15 to present

Chairman of the Ontario Power Generation (OPG) Nuclear Safety Review Board (NSRB) for the Darlington and Pickering Nuclear Generating Stations, through AMEC Foster Wheeler. Coordinate the review for Operations, Maintenance, Engineering, Organizational Effectiveness and Plant Support. The NSRB provides the Chief Nuclear Officer (CNO) with independent assessments of Ontario Power Generation's Nuclear activities that may impact on nuclear safety and performance. Areas of focus include: Safety, Productivity, Human Performance, Material Condition and Plant Reliability.

**POLESTAR TECHNICAL SERVICES, Inc.
Millstone Unit 3 and Seabrook Nuclear Generating Stations**

EXECUTIVE CONSULTANT: 5/12 to present

Provide oversight and assessment for Massachusetts Municipal Wholesale Electric Company (MMWEC) at the Millstone Unit 3 and Seabrook Nuclear Power Stations, through Polestar Technical Services. MMWEC is a minority owner, and NRC licensee in these units. I provide review and oversight of operations, safety, engineering, management effectiveness, and organizational effectiveness of the stations through periodic onsite assessments. These assessments include interviews with personnel at all levels in the organization, attending meetings of plant management and staff, plant walk downs and observation of operations and maintenance activities.

AMEC FOSTER WHEELER, Inc., Toronto, Ontario, Canada
Darlington and Pickering Nuclear Generation Stations

EXECUTIVE CONSULTANT: 4/16 to present

Member of the Refurbishment Construction Review Board for the Darlington Refurbishment Project, through AMEC Foster Wheeler. This Board is responsible to advise Ontario Power Generation (OPG) on all aspects of the \$12.8 Billion dollar 10-year project to update and refurbish all four nuclear units. The Board will assess project team actions and ensure that expectations, commitments and performance follow industry-proven management practices. Recommendations by the Board for potential solutions to issues and gaps will be provided.

AMEC NSS, Inc., Toronto, Ontario, Canada
Darlington and Pickering Nuclear Generation Stations

EXECUTIVE CONSULTANT: 3/13 to 12/15

Operations Committee Chairman for the Nuclear Safety Review Board (NSRB) at the Ontario Power Generation owned Darlington and Pickering Nuclear Generating Stations, through AMEC NSS. The NSRB provides the Chief Nuclear Officer (CNO) with independent assessments of Ontario Power Generation's nuclear activities that may impact on nuclear safety and performance. Areas of focus include: Safety, Productivity, Human Performance, Material Condition and Plant Reliability.

AREVA Inc., Lynchburg, Virginia

SENIOR VICE PRESIDENT, U.S. FUEL BUSINESS UNIT: 6/09 to 10/11

This position was responsible for coordinating all fuel activities in the United States for the AREVA World Wide Fuel Organization, which included research and development, customer service, fuel field services, fuel fabrication and conversion facilities, engineering and manufacturing. I interfaced with the international fuel organizations and customer relations in the US and Asia. Coordinated with CEZUS, the European zirconium business unit for all fuel related components. Directed the closure and transfer of the Mount Athos Fuel Facility in Virginia to the Richland Site in Washington State, interfaced with US Electric Utility Executives, and represented the AREVA Fuel Excellence Plan in the US---including the annual Fuel User Group conferences. I was also involved in cooperative efforts with non-AREVA fuel companies in the United States, Europe and Asia.

AMEC NSS, Inc., Toronto, Ontario, Canada
New Nuclear Units at Darlington, Ontario, Canada

DIRECTOR SERVICES, (contract position): 1/09 to 6/09

Assisted AMEC NSS prepare and present the bid for Owner Engineer Services for the construction of two new nuclear units for the Province of Ontario, Canada. AMEC NSS was awarded the Owner Engineer contract to assist Ontario Power Generation (OPG) in the licensing, site preparation, design review and construction of the new units to be built near the Darlington site. This position would provide the primary interface between OPG, the regulatory agencies and the reactor vendor.

PPL CORPORATION, Allentown, Pennsylvania
Susquehanna Steam Electric Station, dual-unit GE BWR

CHIEF NUCLEAR OFFICER and SENIOR VICE PRESIDENT: 5/05 to 1/09

This position was responsible for all nuclear operations. During this time, significant budgetary, performance, and plant modifications were put in place. The station achieved the 3rd longest continuous BWR generation record during this time, including a breaker-to-breaker operating cycle. The station License Renewal application was prepared, submitted and accepted by the NRC. The Extended Power Up-rate application was prepared, submitted and issued by the NRC. Both units received extensive modification, including new feed water heaters, neutron monitoring systems, condensate pump replacement, new steam dryers, etc. A dual unit ILRT was also successfully completed. Both units will attain 1300 MWe after full up-rate for a two year operating cycle, with enough reactor power to overcome summer ambient losses. A significant industry issue was discovered, managed and resolved involving Control Cell Friction, for both units. Rechanneling of all active fuel and operational decisions were completed in 2 operating cycles. The station received a 'Strength' in organization effectiveness from INPO for this effort. Station excellence continued to improve with a strong INPO 2 rating, with an improving trend. Also during this time, I provided nuclear expertise and recommendations for the potential purchase of three nuclear stations. In addition, the COL for a new nuclear unit, Bell Bend, was initiated, including selection of the nuclear vendor. Served on the Board of Directors for the Utility Service Alliance, as a member of the North East Alliance of NRC Region 1 sites, and as a member of the INPO Executive Review Group. Mentored the MIT Executive Course on nuclear technology for non-nuclear industry executives. Participated in the Allegheny Electric (10% owner) public board meetings.

VICE PRESIDENT NUCLEAR SITE OPERATIONS: 5/04 TO 5/05

This position was responsible for all operations, maintenance, engineering, and plant support activities for the site. It also included responsibility for extended power up-rate, license renewal, and all revenue generating projects. Significant activities were implemented to improve human performance, corrective action, and outage duration. Compliance with the recently issued NRC Security B.5.b requirements, fire protection upgrades and site excellence plans were developed and implemented. Served on the Susquehanna nuclear Safety Review Committee (SRC) and the Fermi Station Nuclear Safety Review Committee. Substantial budgetary and labor management strategies were also developed and implemented, including extensive bargaining unit strike preparations which included a full replacement work force.

WOLF CREEK NUCLEAR OPERATING CORPORATION, Burlington, Kansas
Wolf Creek Nuclear Generating Station, single-unit Westinghouse PWR

SITE VICE PRESIDENT (title changed from VP, Operations): 1/03 to 5/04

This position was responsible for site direction, including engineering functions. Directed a significant reorganization of Engineering personnel and priorities. Established an engineering FIN (fix-it-now) team to address short duration designs needed to support operations and maintenance. In addition, formed a Major Modifications group to address the significant effort involved in obtaining an operating license extension, a ~60 MWe secondary plant up-rate and the replacement of plant control systems with a Distributed Control System. A new Performance Improvement and Learning organization was developed to integrate the human performance, root cause determination, corrective action, self-assessment and benchmarking, process improvement, trending and training aspects of station performance. In addition to my leadership role in the Utilities Service Alliance (USA), also provided similar input for the Strategic Teaming and Resource Sharing (STARS) Alliance. I represented the STARS units on the NEI Emergency Planning Working Group. This group worked closely with the NRC and the industry in setting the proper balance on accident mitigation and security influences. Continued to serve the State of Kansas as the Vice-Chair on the Committee for Emergency Planning and Response (CEPR). This group is responsible for state-

wide command, control and communication during state disasters. Was selected to the INPO/NANT Academy Council for Training and am actively involved in the Supervisory Leadership Initiative. Participated in the INPO/NANT self-assessment of their Training Initiative, and served on both the Wolf Creek and Palo Verde Nuclear Safety Review Committees.

VICE PRESIDENT, OPERATIONS (equivalent to Site VP): 6/01 to 1/03

This position was responsible for site direction, after elimination of the Chief Operating Officer position, and had the following reports: Plant Manager, Emergency Planning, Security, Resource Protection, Environmental Management and Training. Was placed in this position after a significant management re-organization, and I promoted the first female Plant Manager in the industry to replace me. This was an intense period of time for the station due to decisions made by previous officers, and two hostile take-over attempts involving WCNOG ownership. Performance had declined to INPO 2 and the Technical Training programs had been placed on probation. My first priority was to direct the Technical Training program recovery. This included the rewriting of all initial training programs using the integrated approach with the VISION software. Significant training ownership and integration issues were addressed. The Technical Training programs were successfully renewed after the probation period.

Helped develop and implement an Associate Degree in Power Plant Technology program with the Flint Hills Technical College to prepare for future work force issues due to our aging work force. Initiated and oversaw the implementation of the Behavior Based Safety program at the station. This program has enabled WCNOG to greatly increase the reporting and correction of issues and improve performance in the area of industrial safety. Formed a multi-disciplined task force to address fire protection issues well in advance of our first triennial fire inspection, which was completed with no significant violations. Co-chaired the Plant Modification reduction effort to reduce the engineering design and implementation backlog (over 1000) to within the industry standard. Significant strategy and resources were expended in meeting the new Security Orders due to the 9/11 tragedy. Volunteered the station to be a pilot plant for the 'force-on-force' exercises where we successfully met all threats. Wolf Creek was rated in the top 10 in the United States and in the top 15 in the World for both the three year average in total generation and three year average capacity factor. Was appointed by the Governor of State of Kansas to the Committee for Emergency Planning and Response (CEPR) and later elected as Vice-Chair. Continued to serve as the Vice-Chair for the Utilities Service Alliance (USA) Fleet Operations Steering Committee (FOSC), which directs the activities for the combined and mutual improvement efforts for 7 stations and 9 units. This group has directed substantial improvement in the INPO/WANO composite performance indicator score for all stations. Served on the Wolf Creek and Palo Verde Nuclear Safety Review Committees.

VICE PRESIDENT, PLANT OPERATIONS and PLANT MANAGER: 1/99 to 6/01

I was selected to serve as an Officer of WCNOG by the three owner companies: Western Resources, Kansas City Power and Light, and the Kansas Electric Power Cooperatives. This position reported to the Chief Operating Officer. Wolf Creek received its third consecutive 'Excellence' rating from INPO during this time. In addition, the Unit completed a record 488 consecutive day run by operating safely, 'breaker to breaker' between refueling outages. Wolf Creek was rated in the top 10 in the World for generation and capacity factor. I was elected as Vice-Chair for the Utilities Service Alliance (USA) Fleet Operations Steering Committee (FOSC), which directed the activities for the combined and mutual improvement efforts for 7 stations and 9 units. Served on the WCNOG Nuclear Safety Review Committee and continued to serve on Cooper Nuclear Station's Safety Review Advisory Board.

PLANT MANAGER: 5/96 to 1/99

Was responsible for the safe operation of the plant and directed the following functions: Maintenance, Operations, Integrated Plant Scheduling, Outage Management, Health Physics and Chemistry. Directed significant initiatives to improve the Corrective Action Program. PII (Performance Improvement International) was selected to help the site address the issues, and organized and chaired the Corrective

Action Review Board for root cause review. A new electronic Work Control Process was implemented to consolidate outage and normal work scheduling. These efforts resulted in integrated schedules and logic ties which greatly improved technical specification allowed outage time and reduced unavailability of key station equipment. Also prioritized the reduction of the station's backlogs. The maintenance corrective backlog was reduced from almost 2,000 items to fewer than 250. Control room work was reduced from over 100 to single digits. Significant equipment issues were corrected which increased station reliability. Established the first overall station performance indicators. Significant effort was placed on outage performance, specifically: outage performance indicators, milestones and review processes. These efforts enabled outage durations to improve from the high 40s and higher, to the mid 30s. We maintained our INPO 1 rating for the second consecutive evaluation period.

Successfully addressed the significant standard and performance issues in the Health Physics division. Operations and Technical Training programs were successfully re-accredited by INPO/NANT during this time frame. Directed the Plant Safety Review Committee, Jobs Review Board and co-chaired the General Safety Committee. Generation in excess of 10,000,000 KWhr was accomplished for the third time in the plant's history with a 487 day continuous run and continued to place in the top 10% for capacity factor and generation in both the United States and the World categories. Was qualified as On-site and Off-site Emergency Manager for emergency planning functions and participated in two successful graded exercises as the Off-site Emergency Manager. Served as the Vice-Chair and member of the Operations and Training subcommittee for Cooper Nuclear Station's Safety Review Advisory Board.

MANAGER, OPERATIONS: 10/93 to 5/96

I managed the direct operation of the plant. This included all licensed and non-licensed personnel responsible for its safe and efficient operation. Selected for this position by the new CEO due to significant operations challenges and events that were occurring. Staffing, standards, conduct of operations, decision making and accountability were key areas that were addressed. Used innovative concepts such as 'managers on shift' to provide coaching, communication drills on the simulator, and established a dedicated operations liaison with the training division to ensure continuity of expectations. Also instituted a reactivity management working group and formed the station's first integrated corrective action process involving coding, trending and common cause. Guided the recovery of the division and the implementation of new expectations through the use of shift manager teams, team building sessions with consultants, standards of appearance, conduct and decision making sessions and personal contact time. During this time, the division went from NRC SALP 3 and INPO 2, to NRC SALP 1 and INPO 1. Served as alternate Chair of the Plant Safety Review Committee, chair of the Operations Subcommittee, and as a member of the Nuclear Safety Review Committee. The Operations Training Programs were successfully re-accredited by INPO/NANT during this time frame. Generation in excess of 10,000,000 KWhr was accomplished for the second time in the plant's history.

MANAGER, TRAINING: 2/91 to 10/93

I was requested by the CEO of Wolf Creek Nuclear Operating Corporation to return to Wolf Creek to assist in restoring the Licensed Operator Re-qualification Program to "satisfactory" status with the NRC. Directed significant organization and budgetary changes to regain this status. This included significant re-direction in standards, procedures, personnel changes and upgrades to the facilities. Oversaw a significant upgrade to the Simulator computer and support systems and system model upgrades. In addition to accomplishing this challenge, the Maintenance, Chemistry and Health Physics Training Programs were successfully re-accredited with INPO/NANT. The initial Engineering and Technical Staff training programs were also successfully developed, implemented and accredited by INPO/NANT. Also integrated the training division with the human resources division for the processing of outage personnel for the first time at the station. Served as a member of the Engineering Subcommittee of the Nuclear Safety Review Committee, and as a member of the General Safety Committee. Qualified as Emergency Manager and Emergency Director for the emergency planning function. Performed the Shift Outage Manager duties

during refueling outages. Also provided oversight and direction for the Reactor Coolant System Thermal Expansion Event.

TENNESSEE VALLEY AUTHORITY, Decatur, Alabama
Browns Ferry Nuclear Generating Station, 3-unit General Electric BWR

TECHNICAL SUPPORT MANAGER: 1/90 to 2/91

Managed all engineers and technical specialists for NSSS, BOP, Electrical, Instrumentation and Control and Reactor Engineering System activities. These encompassed all ASME Pump and Valve testing, vibration analysis, thermal and performance monitoring, fire protection, leak rate testing including ILRT, hydrostatic testing and engineering support for station procedures and programs. Responsibilities included plant recovery and restart for Unit 2, recovery preparation of Unit 3 and 'lay-up' activities for Unit 1. This consisted of: design basis verification (SPAЕ) and design baseline testing (RTP), design change notice and modification closure of all post modification testing (PMT), final plant acceptance of systems for restart (SPOC), Technical Specification operability testing and power ascension testing. Provided the final authorizing signature for systems returned to Operations. All fuel load systems and 54 of 80 overall systems required for the restart of Unit 2 were completed during this year.

Provided direction, coaching and helped create the teamwork needed to recover from 7 years of plant shutdown. Acted as Plant Manager and Site Outage Director. Was qualified as the Emergency Plan Site Emergency Director and Technical Support Manager. Served as the Technical Support manager for the successful graded exercise needed for restart of Unit 2. Technical Training Programs were successfully renewed by INPO/NANT and participated in the recovery accreditation board for those programs. Served as alternate Chairman of the Plant Operations Review Committee and on the ALARA committee.

WOLF CREEK NUCLEAR OPERATING CORPORATION, Burlington, Kansas
Wolf Creek Nuclear Generating Station, single-unit Westinghouse PWR

MANAGER, OPERATIONS: 1/89 to 1/90

Managed the direct operation of the plant. This included all licensed and non-licensed personnel responsible for its safe and efficient operation. During this year, the Wolf Creek Station was the No. 1 producer of electrical power in the United States with over 10,000,000 KWhr and was rated 3rd in world electrical production. The station also achieved the 'lowest cost producer' distinction for single units. Acted as Plant Manager and Duty/Call Superintendent and maintained qualification as Emergency Director for emergency planning functions. Served as a permanent member and alternate Chairman of the Plant Safety Review Committee, and as a member of the Rad Waste Committee. Maintained an active Senior Reactor Operators License. The operations division was understaffed significantly during this time, with up to 7 station operator watches and 2 licensed watches requiring overtime for filling. Resources were not being authorized to correct issues.

MANAGER, TECHNICAL SUPPORT: 6/86 to 1/89

Managed the Instrumentation and Controls, Results Engineering, Reactor Engineering, Chemistry, Health Physics and the Site Emergency Planning Divisions. Developed the concepts for containment work management and the Containment Coordinator and performed these duties for the initial trial. Prevented the torque down of the reactor vessel head by observing work practices that allowed foreign material on the flange surface. Developed the Shift Outage Manager role for overall outage coordination and filled the role for the initial trial. During these first years of plant operation, coordinated the integration of Chemistry, Health Physics and Reactor Engineering activities into the operating routine. Helped correct and upgrade the logic for classification, protective action recommendation and implementation of the Emergency Plan.

Coordinated the efforts to properly separate normal activities from those that should be outage activities. Also chaired committees that addressed feed water and other scram reduction efforts. Oversaw the initial Integrated Leak Rate Testing and revamped the approach to training and performance of Local Leak Rate testing. Served as member and alternate Chairman of the Plant Safety Review Committee. Served on the ALARA and Rad Waste committees and maintained my duty Emergency Director qualifications. Was qualified to act as Plant Manager and Duty/Call Superintendent. I also maintained an active Senior Reactor Operators License.

INSTRUMENTATION AND CONTROL SUPERVISOR: 8/80 to 6/86

This position directed four groups: Instrumentation and Controls, Computer Engineering (both hardware and software), Relay and Metering and the station Metrology/Standards Lab (traceable to the National Bureau of Standards). Developed these groups from the early construction phase of WCGS to perform pre-construction testing and verification of components, through pre-operational testing and station operation. Integrated procurement, warehouse and document control functions into the group to streamline and gain efficiency in the processes. Started technical fundamentals, plant systems and key vendor systems training programs which included task qualification prior to the origination of INPO/NANT. During plant startup, managed over 240 site and contract personnel to perform component testing and system-integrated performance checks in support of pre-operational and startup testing. The startup testing sequence and performance testing were completed without significant issues and in industry record time. Was the duty Emergency Director for Emergency Plan for the station's first graded exercise, which was successfully completed with no significant weaknesses. Also hired the first female I&C technicians and promoted the first female technical supervisor in the Company's history. Served as a permanent member and alternate Chairman of the Plant Safety Review Committee. Selected to attend the station's first Hot License Class and earned my Senior Reactor Operators License in June 1986.

PUBLIC SERVICE COMPANY OF COLORADO, Platteville, Colorado Fort St. Vrain Nuclear Generating Station, single-unit General Atomic HTGR

RESULTS ENGINEER: 6/79 to 8/80

The Results Engineering Department maintained the instrumentation and control systems for the Station. Wrote and performed surveillance tests for Technical Specification compliance, post modification and functional tests for all Engineering Department Change Notices and coordinated this work during normal plant operations and refueling. In addition, had responsibility for the Site Calibration Program for plant instrumentation and reviewed department procedures and equipment for compliance with NRC Inspection and Enforcement Bulletins. Supported Operations and Maintenance in plant system optimization and during startup/shutdown activities. Provided system expertise for plant protection and helium auxiliary systems. Was test coordinator for the Reactor Vessel depressurization test and newly added turbine building and reactor building HVAC systems. I completed the requirements to enter Reactor Operator Licensing.

QUALITY ASSURANCE ENGINEER: 8/77 to 6/79

The Quality Assurance Department provided support to all Station Departments. Reviewed Engineering Change Notices, specifications and Station Purchase Requisitions for compliance with standards and regulations. Developed and managed the Vendor Qualification Program for all safety related vendor procurement. Served as representative to C.A.S.E. (Coordinating Agency for Supplier Evaluation), an industry group responsible for the exchange of vendor acceptance audits, on the Source Certification Committee. Performed independent verification of safety related work activities for electrical motors, generators, relays and control systems. Also provided oversight for the materials testing and repair methodology for a steam generator tube leak, as well as an upgrade to the Plant Protective System logic upgrade. I completed the requirements for Lead Auditor.

RESIDENT ELECTRICAL ENGINEER: 5/75 to 8/77

The Site Engineering Department provided design, review, implementation, construction coordination and technical support for all plant systems. Responsibilities also included design, modification and review of plant systems and coordination between plant and contractor personnel during construction, startup and operation. Was the project manager for the construction of the electrical portions of the Alternate Cooling System, designed and implemented the Control Complex Halon fire protection system, designed and coordinated the implementation of the fire mitigation logic for the control room ventilation system, as well as the station breathing air system. These were required prior to plant startup, per new requirements as a result of the cable fire at Browns Ferry Nuclear Station. Was the project manager and implementation coordinator for the off-site power, fast-transfer modification. Served as Chairman of the Work Review Committee for work authorization of Change Notices, as a member of the Management Review Committee for scheduling work and as a member of the Plant Operations Review Committee.



Drew B. Fetters

Sr. Associate

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Languages

English

Education, Licenses & Certifications

- Bachelor of Science, Civil Engineering, Lehigh University – 1973
- Masters of Science, Civil & Urban Engineering, University of Pennsylvania – 1978
- Professional Engineer, Commonwealth of Pennsylvania – 1979 (retired active)
- Masters of Business Administration, St. Mary's College of California – 1984
- Project Management Professional Certification – 1994 (no longer current)

Drew Fetters – Nuclear Oversight and Project Governance Specialist

Background

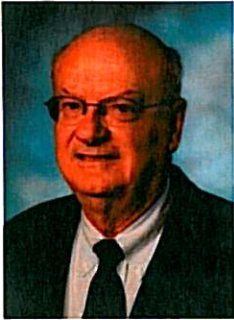
Drew has over 40 years of diverse executive, engineering management, engineering, project management, construction and maintenance experience in connection with nuclear and fossil power stations. He has demonstrated ability to deal with top management and regulatory agencies. He has technical leadership for company's acquisition of nuclear plants including evaluation of current state, opportunities for improvement and pro forma future performance results to achieve earnings targets.

Professional and Industry Experience

- Retained to be a member of a Nuclear Safety Review Board (NSRB) for the Hanford Tank Waste Treatment and Immobilization Plant (WTP). The NSRB is chartered to advise the WTP Project Director, Project Manager and senior leadership team on opportunities and methods to improve organizational performance and strengthen programs and management systems; to recommend initiatives that have a material effect on nuclear safety culture and quality; and to advocate for issues requiring attention or action of the Project Director, Project Manager, senior leadership team, or the Department of Energy, Office of River Protection.
- Consulted for the DOE Civilian Radioactive Waste Disposal Project (Yucca Mountain). Assisted Office of the Chief Engineer in preparation for NRC license submittal and planning for the future assumption of the design authority from the design engineering firm.
- Advised the Director of the Office of Civilian Radwaste Management in development opportunities for his leadership team.
- Retained by one of the owners of a large nuclear generating company to provide a project overview in support of outside financing related to the restart of two nuclear units. Also retained to provide the owner periodic project performance assessment and milestone certifications related to the financing.
- Retained by the Board of Directors of a large nuclear generating company to chair an owner oversight sub-committee and act as an independent representative responsible for presenting performance evaluations to the Board on the development and execution of a multi-billion dollar nuclear refurbishment project.
- Oversight of the construction of three combined cycle units (2580 Mwe) associated with the acquisition of Sithe Energies. Prepared evaluations on progress and made recommendations to Genco Executive Team for eventual integration of these Sithe assets into Exelon.
- Responsible for planning and leading transition of Vermont Yankee from VYNPC to AmerGen Vermont ownership prior to the termination of the purchase agreement. This included license transfer and financial closure, as well as planning for post-closing achievement of operational excellence initiatives.
- Responsible for evaluating the Company's investment opportunities in the purchase and operation of nuclear power plants in North America (specifically involved in management contracts, the AmerGen partnership and the TMI acquisition).

- Responsible for leadership and oversight of central maintenance support (Reactor Services and Turbines), strategic planning, administration, business development and interface with the two PECO Energy nuclear facilities. Chairman BWROG Executive Oversight Committee.
 - Responsible for all Nuclear support functions, including Central Maintenance, Engineering, Licensing, Fuel Management, and Emergency Planning, for Nuclear's Limerick and Peach Bottom power plants. BWROG Executive Oversight Committee member.
 - Reported directly to the Vice President of Station Support Department. Responsible for nuclear plant design basis, engineering of major programs, projects and studies for PECO nuclear stations. EPRI Nuclear Power Council member.
 - Reported directly to the Vice President of Limerick Generating Station. Responsible for the planning and execution of all Maintenance and Instrument and Control activities for Limerick, two 1100 Mwe nuclear generating units.
 - Reported directly to the Senior Vice President – Financial. Responsible for the development and execution of a project plan to replace the corporate general ledger, procurement and timekeeping systems at PECO.
 - Member of a task force reporting directly to the Senior Vice President – Nuclear. This group performed a comprehensive analysis of all Nuclear Group activities and made staffing and organizational recommendations to executive management, resulting in significant cost reductions and process improvements.
 - Reported directly to the Vice President of Nuclear Engineering and Services Department. Responsible for establishing the priorities for all capital and expense modifications to the Limerick Station and through a staff of ten project managers, assuring the timely planning, engineering and installation of all modification work.
 - Reported directly to the Vice President of Nuclear Engineering Department. Responsible for coordination of all engineering activities with respect to Limerick Unit 2 construction, and responsible for coordination of engineering support for the operational Limerick Unit 1.
 - Reported to the Division Manager of Mechanical Engineering Division. Responsible for the coordination of all engineering at Bechtel and PECO Energy Company for the construction of Unit 2 and the budget and cost for the entire project.
 - Directed group of approximately 30 matrixed engineers in the review and approval of preoperational tests and results for the Preoperational Test Program for Unit 1 at Limerick.
 - One of three residents in Bechtel Power Corporation's offices in San Francisco. Performed overall owner management for Civil, Mechanical (Systems) and Plant Design work on Limerick.
 - Responsible for research and design of upgrades to containment structures and systems. Served as member of Mark I Containment Owners Group and member of Technical Review Committee for the 15 Mark I GE BWRs.
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Oswald J. "Ike" Zeringue



During his 40-year career in the power industry, Ike Zeringue has generated a record of achievements spanning the completion of nuclear units to oversight of the nation's largest public power generation and transmission system.

More specifically, Zeringue has been instrumental in the successful completion, startup, initial operation, and site management of nuclear power units; leading the Tennessee Valley Authority's (TVA's) fleet of nuclear reactors to top industry performance; overseeing TVA's power production, transmission, marketing, economic development, and resource management programs with record-setting results for generation and transmission; and directing the completion of the unit that will provide the first new nuclear generation in the United States in the 21st Century.

Zeringue's commitment to safety, performance fundamentals, high standards, and never setting goals he knew how to achieve has contributed to increasing excellence in nuclear power generation. He has contributed to the nation's renewed interest in nuclear power as a safe, reliable source of energy and provided guidance and mentoring for more than a few of today's industry leaders.

This year, the nuclear industry recognized Zeringue's contributions by selecting him as a recipient of the 2015 Nuclear Excellence Award, following a rigorous nomination and selection process. The honorary award, presented by the World Association of Nuclear Operators every two years, recognizes individuals who have made extraordinary contributions to excellence in the operation of nuclear power plants or the infrastructure that supports the nuclear power enterprise.

Professional Background

Zeringue originally joined TVA in 1975 as a nuclear engineer, supporting the startup and initial operations of TVA's Browns Ferry and Sequoyah nuclear plants. A three-unit site, Browns Ferry was the first nuclear power plant in the United States with reactors capable of generating more than 1,000 megawatts of electrical energy per unit.

In 1983, he left TVA to support the startup and initial operation of all three units at Palo Verde Nuclear Station. He was named Plant Manager for Palo Verde Unit 3, directing that unit's startup and initial operation. Palo Verde Unit 3 went on to set several U.S. and world records during its first cycle of operation.

Zeringue returned to TVA in 1989 as Site Director and Vice President at Browns Ferry Nuclear Plant to lead the recovery of the facility which was taken offline in 1985 when TVA shut down its nuclear program to strengthen management, technical, and operational programs. Under his direction, changes at Browns Ferry included reconstituting the plant's design base; restoring the operator training program to industry standards of excellence; upgrading maintenance and operating procedures; and scoping, planning, and completing extensive regulatory and reliability-related maintenance work. Browns Ferry Unit 2 was restarted in 1991. In 1992 the unit operated at 89.2 percent of its capacity and was available 95.7 percent of the time. Regulatory margin continued to improve, with Browns Ferry operations earning the highest rating given in the Nuclear Regulatory Commission's oversight process.

TVA named Zeringue Senior Vice President of Nuclear Operations in 1993. In this position, he was responsible for the overall management of TVA's operating nuclear sites, as well as the recovery and restart of Browns Ferry Unit 3 and the completion, licensing, startup, and initial operation of Watts Bar Unit 1. During his tenure in this position, TVA added more than 2,000 megawatts of nuclear generation capacity to its power system, and the nuclear fleet saw measurable and improved performance.

In 1997, Zeringue was selected as TVA's Chief Nuclear Officer and Executive Vice President. While in this position, Watts Bar Unit 1 completed the best first cycle operation for any nuclear unit in the nation, and TVA nuclear units were ranked among the top 20 performers in the U.S. and the top 50 worldwide by Nucleonics Week in 1998. That year, Zeringue was selected to serve as TVA's President and Chief Operating Office (COO), a position he held until he retired in 2005.

As the top management executive of the nation's largest public power company, Zeringue provided oversight of TVA's power production, transmission, marketing, economic development and resource management programs. While Zeringue was President and COO, the nuclear units set a company generation record for the fifth consecutive year ending in 1999, producing 44.17 billion kilowatt-hours of electricity. In 2002, TVA became the only U.S. utility to have five nuclear units with a top score from the Institute of Nuclear Power Operations (INPO), and all six TVA units maintained top INPO scores over the five-year period from 1999 to 2003. In 2004-2005, TVA's integrated power system delivered its best performance in the company's history, supplying customers with more than 171 billion kilowatt-hours of electricity and meeting peak power demands of over 29,000 megawatts on eight consecutive days in July, 2005.

Also that year, TVA's system of coal-fired plants achieved its best reliability ever recorded for a fiscal year, and an ongoing hydro power-train modernization program helped TVA dams generate 15.7 billion kilowatt-hours that year, 13 percent above normal at a time when rainfall for the year was 9 percent below normal. And, it was TVA's best year for transmission-system reliability, completing a sixth consecutive year of 99.999 percent reliability and achieving the company's best performance to date in load not served.

After being retired for approximately seven years, Zeringue rejoined TVA in 2012 as Director of Watts Bar Unit 2, overseeing engineering, construction, and pre-operational testing of a unit that was approximately 40 percent complete. Under Zeringue's direction, safety and quality goals at the completion project were met, the unit was substantially completed, and the operating license was received. Pre-operational testing and fuel load readiness preparations currently are in progress as Watts Bar Unit 2 remains on track to deliver the nation's first new nuclear generation of the 21st Century.

Educational Background

Zeringue is a graduate of the Advanced Management Program at Harvard Business School and holds a nuclear engineering degree from North Carolina State University.

Refurbishment Construction Review Board (RCRB)

Terms of Reference

Purpose

The Darlington Refurbishment represents a significant capital investment and is a key cornerstone of the OPG business plan and source of energy for the province's long-term energy plan.

Considerable downside risk to these plans exists in a failure to meet established project goals and objectives.

The Refurbishment Construction Review Board (RCRB) has been established to provide management with an independent assessment of project progress, estimates and schedules for early intervention and correction of any shortfalls in execution based on the board members' experience and accepted practices.

Standard / Overall RCRB Scope

1. Identify Safety or Nuclear Safety concerns or threats in the Refurbishment Project.
2. Review effectiveness of oversight activities.
3. Evaluate schedule and engineering to identify significant obstacles to achieving project goals, including cost and cost recovery.
4. Assess management's ability to achieve major milestones, including the accuracy and clarity of the indicated progress.
5. Identify significant issues adverse to quality.
6. Identify shortfalls in organizational capability.
7. Review progress on "next unit" preparation and readiness including incorporation of lessons learned application.
8. Observe and review any aspect of the Refurbishment Project related to:
 - a. Safety
 - b. Human Performance
 - c. Cost
 - d. Schedule
 - e. Quality

Quarterly focus areas focus will be determined according to current project requirements and project milestones.

The review will be performed through a combination of (but not limited to) interviews, field walkdowns, meeting observations, and document reviews.

Composition

Membership of the RCRB will consist of four core external members, and will be augmented by one internal OPG member. Seven (7) external members are being retained for the purposes of the RCRB; the four core members will be selected from this pool depending on the desired RCRB quarterly scope.

The board may be further augmented on composition to tailor expertise according to project requirements and project milestones.

The chair of the Nuclear Safety Review Board (NSRB) will also participate on the RCRB to provide continuity and avoid duplication of NSRB focus areas.

Frequency

The board will meet quarterly and, in addition, may be brought in to examine project areas as dictated by major project milestones and as specified by either the CEO or CNO.

It is expected that the board's activities will take from 3-5 days on site and may be executed in conjunction with the NSRB.

Duration

Duration is expected to be from May 2016 until breaker closure on Unit 2 (end of 2019).

Deliverables

The RCRB will provide a briefing and a report of its findings and any recommended actions quarterly to the CEO and CNO one month prior to the scheduled OPG Board of Director's meetings.

The CEO or CNO may require the Chair to report directly to the Darlington Refurbishment Committee (DRC) according to project requirements and board approvals.

The RCRB will develop its report through inspection and dialogue with the project team and project leadership.

Board Staff Interrogatory #223

Issue Number: 10.4

Issue: Is the proposed reporting for the Darlington Refurbishment Program appropriate?

Interrogatory

Reference:

Ref: D2-2-9 page 8 and 9

OPG plans to issue annual status reports to the public for the duration of the DRP through its website.

- a) When does OPG plan to issue the first report through its website?
- b) Other than the website report, how will OPG report on the project status to the OEB and other interested parties? Explain the format, content and frequency of external reporting for earned value, budget status, safety and project status.
- c) Explain the format, content and frequency of internal reporting for earned value, budget status, safety and project status.

Response

- a) OPG issued its latest Darlington Refurbishment Program Performance Report in August 2016 through OPG's website. The Performance Report will be issued no less than annually, with the current plan being twice a year in alignment with OPG's financial reporting.
- b) OPG will provide frequent updates to the public, key stakeholders and media on the status and performance of the Darlington Refurbishment Program through its dedicated website on www.opg.com, direct public and stakeholder communications, public events and speaking engagements, and through project newsletters.

OPG also proposes to report annually to the OEB on the Darlington Refurbishment Program performance measures set out in Ex. D2-2-9, pp. 9-10 in conjunction with the reporting on the hydroelectric and nuclear performance measures set out in Ex. A1-3-2, pp. 41-42.
- c) Internal reporting takes on various forms with certain reports issued daily, weekly, and monthly. A detailed review of the reporting tools for earned value, budget status and project status, including the format, content, frequency and receiver of the reports, is set out in L-4.3-1 Staff-57.

AMPCO Interrogatory #154

Issue Number: 10.4

Issue: Is the proposed reporting for the Darlington Refurbishment Program appropriate?

Interrogatory

Reference:

Ref: D2-2-9 Page 9

Does OPG plan on reporting on reporting specifically on the status of the interest and contingency costs as part of the cost reporting?

Response

OPG does not propose to report on the status of interest and contingency costs as part of its cost reporting. As indicated in Ex. D2-2-9, pp. 9-10, OPG will report on a number of measures, including for cost, the Cost Performance Index, Life-to-date Cost, Forecast to Complete, and Estimate at Completion. The cost measures implicitly include reporting on contingency in the aggregate. The Life-to-date Cost includes contingency spent, and the Forecast to Complete and Estimate at Completion measures include a forecast of future contingency use based on the current risk profile.

AMPCO Interrogatory #155

Issue Number: 10.4

Issue: Is the proposed reporting for the Darlington Refurbishment Program appropriate?

Interrogatory

Reference:

Ref: 2-2-9, page 5, Section 4.0
D2-2-9, Attachment 2 Page 17

Preamble: Given that OPG has already had to reallocate \$290mm in costs from DRP to OM&A, please explain how OPG will ensure that:

- a) OM&A costs are properly allocated between DRP and normal operations.
- b) OM&A costs are properly recorded in real time; and
- c) These allocations and reports will be auditable.

Response

- a) Costs charged to the Darlington Refurbishment Program ("DRP") and Operations OM&A will be based on the nature of the work and will be directly recorded against those activities. There will be no cost allocations. Separate project numbers and cost accounts, each with distinctive accounting coding, will be used for DRP and/or Operations OM&A projects.

Refer to Ex. L-4.5-2 AMPCO-105 for additional details regarding the criteria used to determine the DRP cost baseline.

- b) Operations OM&A costs will be recorded in the OPG financial statements using existing financial systems and processes. OPG labour costs are collected through the Tempus time reporting system on a weekly basis. Contractors charge their time through the ONCORE contractor system on a weekly or monthly basis, depending on the contractor.
- c) As noted in part a, all costs are derived directly from OPG source system and are not allocations. These costs are auditable back to OPG source systems and contractor billing records.

CCC Interrogatory #41

Issue Number: 10.4

Issue: Is the proposed reporting for the Darlington Refurbishment Program appropriate?

Interrogatory

Reference:

Reference: D2/T2/S1

Given the magnitude of the DRP does OPG have plans to provide ongoing reporting specifically to the OEB regarding the progress of the project? If so, please set out what type of reporting will be provided. OPG is seeking approval of 5 years of revenue requirement for its nuclear facilities. If the underlying costs on which these revenue requirements are based change during the rate term significantly, will OPG be reporting this to the OEB?

Response

Exhibit D2-2-9 section 7 details OPG's DRP reporting proposal. Chart 1 outlines the planned Public Reporting metrics.

Cost performance is included as a category of DRP reporting that OPG has proposed.

VECC Interrogatory #43

Issue Number: 10.4

Issue: Is the proposed reporting for the Darlington Refurbishment Program appropriate?

Interrogatory

Reference:

Reference: D2/T2/S9

- a) Please provide all internal audits present to the CEO and OPG Board of Directors in 2015 and 2016.
- b) Please provide all presentations and reports made to the Darlington Refurbishment Committee in 2015 and 2016.

Response

- (a) OPG declines to answer on the basis that this is not an appropriate question. The question ignores the principle of proportionality which underlies the interrogatory process, in that it is overly broad and all encompassing.

The question asks for all audits over a two-year period. OPG's business generates a large quantity of documents that may be captured by the question asked in this interrogatory that are not relevant to this application.

Without waiving this objection, OPG notes that it has provided a listing of audits undertaken over the last three years in response to L-1.2-15 SEC-2. If the question was refined to reference specific materials relating to an issue on the approved issues list, OPG could undertake to produce relevant materials. For example, OPG has provided responsive material on audits of the Darlington Refurbishment Program at L-4.3-1 Staff-72 (b).

- (b) Please see L-4.3-6 EP-19 (c).

VECC Interrogatory #44

Issue Number: 10.4

Issue: Is the proposed reporting for the Darlington Refurbishment Program appropriate?

Interrogatory

Reference:

Reference: Technical Conference, September 23, 2016 Darlington Slide deck page 36 & D2/T2/S9/pg.12

- a) Please explain if/(why not) the reports, as set out in D2-2-9 Attachment 2 and provided to the Darlington Refurbishment Committee could be used as the basis of periodic reporting to the OEB.
- b) Is this report the only document which OPG will be using to monitor progress on the DRP? If not please identify the other progress reports that will be used by OPG. Please explain why/if these reports might be shared with the OEB for the purpose of periodic reporting on the DSP.

Response

- a) Burns McDonnell/Modus were retained by OPG's Board of Directors to provide independent oversight support. Public reporting is not the mandate of Burns McDonnell/Modus.
- b) Section 8 of Ex. D2-2-9 sets out the extensive oversight and assurance model that OPG has in place to monitor progress on the Darlington Refurbishment Program. Please see Ex. L-4.3-1 Staff-072 for the third party oversight reports that are generated by those supporting OPG's oversight.

In addition, as discussed in Ex. L-10.4-1 Staff-223 and Ex. L-4.3-1 Staff-057, extensive internal reporting will be used to manage the project, including numerous reports used by management and staff to manage the project on a daily basis. There will also be weekly project status reports and monthly project status reports used by the project teams, in addition to the reports that are provided to OPG Senior Management, the OPG Board of Directors, and external stakeholders.

A large amount of information is generated by the extensive monitoring program in place for the DRP. For the purposes of public reporting, OPG will report key metrics as discussed in section 7 of Ex. D2-2-9 and Ex. L-10.4-1 Staff-223.