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SUBJECT: VISIT OF USNRC COMMISSIONER JEFFREY MERRIFIELD TO  
CANADA (AUGUST 16-18, 2000): REPORTING CABLE

1. On August 16-18, 2000, Commissioner Jeffrey Merrifield, accompanied by his technical assistant, Brian McCabe, traveled to Canada to meet with Ontario Power Generation (OPG), the Canadian Nuclear Safety Commission (CNSC), Atomic Energy of Canada Limited (AECL), and representatives of MDS Nordion company. During the trip, Commissioner Merrifield's site visits included the Pickering Nuclear Generating Station and Chalk River Laboratories.

2. The following transmits excerpts of Commissioner Merrifield's trip report.

Ontario Power Generation Headquarters-August 16, 2000).  
Canada, (August 16, 2000. Commissioner Merrifield met with Carl Andognini, Special Advisor to OPG's President, Patrick McNeil, Vice President of Corporate Development, and several senior OPG managers. Commissioner Merrifield received informative briefings on OPG's generation and transmission capabilities, deregulation in Ontario, the Pickering A Risk

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Assessment (PARA), nuclear waste management, and OPG's Integrated Aging Management Program.

OPG has 80 generating stations with a production capacity of 30,873 megawatts (MW). OPG's generating capabilities are comprised of 13,864 MW nuclear, 9700 MW fossil, and 7309 MW hydroelectric power. Ontario's peak electricity demand is approximately 24,500 MW. Even with the Bruce A and Pickering A units out of service, there is significant reserve margin within Ontario. OPG has transmission interconnections with Quebec, Manitoba, New York, Michigan, and Minnesota. While OPG indicated that they do export power to the U.S., they would like access to U.S. markets and intend to apply to FERC for a license later this year.

In November 1998, the Electricity Competition Act was passed by the provincial legislature. The Act: 1) facilitates competition in the generation and sale of electricity, 2) establishes non-discriminatory access to the transmission and distribution systems, 3) ensures fair recovery of stranded debt, and 4) establishes an independent market operator. While the target for market opening is November 2000, OPG believes that this is likely to be delayed until at least Spring 2001. The Act would require OPG to control 35% or less of the supply options for Ontario by the end of the 10<sup>th</sup> year following market opening. Consistent with this requirement, OPG recently signed an 18 year lease with British Energy for the Bruce Nuclear Generating Plant. The plant reverts back to OPG at the end of the lease and OPG maintains responsibility for decommissioning.

OPG discussed the results of a risk assessment performed for the four Pickering A units. These CANDU units commenced operation in the early 1970s and are currently laid up as part of an extended performance improvement outage. The risk assessment concluded that the frequency of severe core damage was  $1.3 \times 10^{-4}$  occurrences per reactor year and the frequency of large off-site release was  $1.2 \times 10^{-7}$  per reactor year. OPG indicated that the public risk was low due to the absence of containment failure mechanisms; however, the severe core damage frequency was higher than the current OPG safety goal limit. OPG is in the process of making design improvements to the plant that will be completed prior to restart of the units and will reduce the severe core damage frequency to about  $2 \times 10^{-5}$ /year. OPG indicated that they intend to approach the CNSC about utilizing risk insights to make regulatory improvements and it was clear that OPG is closely watching events in the U.S. associated with risk-informed regulation.

OPG presented an overview of its nuclear waste management

program. Currently, low and intermediate level waste is stored centrally at the Bruce plant's waste management facility. Used fuel is stored in wet bays at each nuclear station for a minimum of 10 years, and will be transferred to dry storage facilities at each station when the wet bays are nearing capacity. OPG speculated that the earliest that spent fuel could be stored in a geologic repository is 2035.

OPG hosted a lunch during which OPG's nuclear plant performance improvement initiatives, recovery efforts at the Bruce A and Pickering A facilities, the challenges associated with the renewal of each plant's operating license every 2 years, deregulation in the U.S., the status of the NRC's license renewal and license transfer activities, risk-informed regulation, tritium production, and other challenges and opportunities facing the Canadian and American nuclear programs as well as the NRC and CNSC were discussed. Lunch was concluded with discussions of the NRC's public confidence initiatives and the public confidence challenges facing OPG's nuclear program. OPG noted that public opposition in and around the Pickering plant has risen in recent years as a result of the extended shutdown of the Pickering A units because of performance problems. OPG anticipates significant public interest in the hearings associated with the restart of the Pickering A units. On the contrary, the Bruce facility has experienced little or no public opposition as a result of the extended shutdown of the four A units.

Pickering Nuclear Generating Station (August 16, 2000) . In the afternoon of August 16<sup>th</sup>, Commissioner Merrifield visited the Pickering Nuclear Generating Plant. Pickering's eight CANDU units can each generate about 540 megawatts-electric. The "A" units came into service between 1971 and 1973, and the "B" units between 1983 and 1986. The four Pickering A units have been laid up since 1998 to divert additional staff to eliminate maintenance backlogs and complete other improvement initiatives on the Pickering B units. At the time of Commissioner Merrifield's visit, one of the Pickering B units was shutdown for an extensive maintenance outage.

At the site, Commissioner Merrifield was met by Mr. William Robinson, Pickering's Site Vice President, Mr. Pierre Tremblay, Pickering's Director of Operations and Maintenance, and several senior staff members. Mr. Robinson briefed Commissioner Merrifield on the general features of the CANDU design, the on-line refueling process, the status of the Pickering B units, the status of recovery efforts associated with the Pickering A units, performance improvement initiatives, and challenges associated with the 2-year license renewal process. He confirmed that OPG will likely face

public opposition during the hearings associated with the restart of the A units. The first unit could return to service as early as the 4<sup>th</sup> quarter of 2001, with each of the remaining three units being returned to service sequentially at 6-month intervals. Lisa Love-Tedjoutomo, CNSC's Project Officer assigned to the Pickering site, also attended this briefing and indicated that CNSC was considering extending the license renewal interval.

Commissioner Merrifield toured the major areas of the facility, led by Mr. Robinson and several members of his management team. The tour included thorough presentations of the equipment and operation associated with on-line refueling, as well as the turbine refurbishment work ongoing at one of the Pickering B units. He also visited Pickering's above-ground dry cask storage facility, the common control room for all 4 B units, and the exterior of the containment vacuum building.

Commissioner Merrifield's observations and insights gained during the tour include:

1. Probabilistic risk assessments are not integrated into the plant's decision-making process related to maintenance and operations.
2. The operators indicated that the operator licensing process is more lengthy than that in the U.S..
3. The spent fuel storage casks are housed in a covered storage facility. It is quite unique to store dry casks in a covered building. It came as no surprise that weather was a factor in OPG's decision to store casks in a covered facility.
4. The management team and staff at Pickering are committed to improving operational performance on the B units, are committed to the safe recovery of the A units, and understand and are addressing the stakeholder challenges that have grown in recent years.

At the end of the plant tour, Commissioner Merrifield conducted an exit meeting with Mr. Robinson and Mr. Tremblay. They discussed the material condition of the plant, on-line maintenance at Pickering, process improvement initiatives, utilization of risk insights, the recovery of the A units, the future of nuclear power in Canada, and regulatory challenges in the U.S. and Canada.

Atomic Energy of Canada, Ltd.'s Chalk River Laboratories-  
(August 17, 2000).

On the morning of August 17, 2000, Commissioner Merrifield flew from Toronto to Pembroke, Ontario. He was met at the Pembroke airport by representatives of the U.S. Embassy in Ottawa and proceeded to the Chalk River Laboratories (CRL) which is operated by AECL. At CRL, Commissioner Merrifield was met by Dr. Paul Fehrenbach, General Manager of CANDU Technology Development and Site Head, and Dr. Aly Aly, the CNSC's Director of the Research and Production Facilities Division.

Dr. Fehrenbach began the day with an informative overview of CRL programs. Canada's nuclear program began at CRL; in fact, the first sustained fission reaction outside the U.S. was achieved in 1945 at CRL's Zero Energy Experimental Pile. The NRX (1947) and NRU (1957) research reactors were key facilities in the development of the CANDU design. The NRU reactor still produces approximately 70% of the world's radioisotope supply for medical and industrial applications, and continues to be used for CANDU fuel testing and for advanced materials research. Today, CRL is the main Canadian site for nuclear research and development. Deregulation within the Ontario electric market is serving as an impetus for AECL to become more business-focused and to organize along business lines. AECL recognizes that CRL must become more customer-focused and that it is essential to clearly define research priorities so that resources can be prudently allocated. Some of the business lines discussed include: the development of an evolutionary CANDU design, development associated with heavy water and tritium technology, nuclear services related to such things as life extension and fuel channel and steam generator inspections, and isotope production. New initiatives at CRL include: the two MAPLE reactors and an isotope processing facility for isotope production by MDS Nordion, new waste management facilities, and planning for a Canadian Neutron Facility to replace the NRU reactor. Finally, Dr. Fehrenbach and Commissioner Merrifield discussed the collaboration that has occurred between CRL and the NRC on such research initiatives as severe accident research and agreed that both organizations should continue to look for areas where future collaboration could be beneficial.

During Commissioner Merrifield's visit to CRL, he visited a waste management area which contains canister storage of fissile waste from isotope production, the MAPLE reactors and new processing facilities, the NRU reactor, the recycle fuel fabrication laboratory, the New Fuel Fabrication Facility, and the MOX handling laboratory. Commissioner Merrifield was particularly impressed with the technical proficiency

associated with the team responsible for the CRL MOX project. CRL is a key player in the research associated with the Plutonium disposition project. CRL recently received MOX fuel from the United States and expected to receive MOX fuel from Russia within weeks of the visit. They were able to physically handle the fuel rods containing MOX fuel from the U.S., discuss the transportation challenges associated with getting the MOX fuel from the U.S. to CRL, and exchange insights on the U.S. government's decision regarding its planned approach to the MOX issue.

Commissioner Merrifield's tour of the MAPLE reactors was led by Mr. Grant Malkoske, Vice President of MDS Nordion. Mr. Malkoske reiterated that Nordion has made significant progress over the past year in identifying, analyzing, and resolving issues relevant to the conversion of the Maple reactors and new processing facility to LEU targets. Mr. Malkoske briefly discussed challenges associated with the use of LEU instead of HEU targets, including those associated with the processing of twice the volume of liquid waste containing a significantly higher amount of uranium. This creates a likely bottleneck in the calcining stage of the new processing facility. In response to a question, Mr. Malkoske pointed out the physical layout and challenges associated with what has come to be known as the "pipe-through-the-wall" modification. Mr. Malkoske and Commissioner Merrifield also discussed the NRC's responsibilities associated with the Schumer Amendment. Mr. Malkoske noted that the MAPLE reactor was shut down due to fuel handling difficulties. When questioned, he was not able to detail when he expected these problems to be resolved.

(Canadian Nuclear Safety Commission-(August 18, 2000).  
For three hours on the morning of August 18<sup>th</sup>, Commissioner Merrifield participated in a round-table discussion with Dr. Bishop and her Executive Team. He was extremely pleased by the openness and candor of the discussions. It was clear that many of those involved in the discussions were surprised by the similarity of the challenges facing the CNSC and NRC, and pleased to learn of opportunities in which the CNSC and/or the NRC could benefit from further dialogue on both regulatory and administrative matters as well as from more formal cooperative initiatives on common regulatory challenges. Given the productive nature of the discussions, there was agreement to extend their discussions into the afternoon for an additional two hours during a working lunch hosted by CNSC.

Commissioner Merrifield's observations and insights gained during his meeting with CNSC include:

The Canadian Nuclear Safety Commission replaced the Atomic

Energy Control Board (AECB) on June 1, 2000. The CNSC was created as part of Canada's Nuclear Safety and Control Act of 1997, which became effective on May 31, 2000. The new law and regulations represented the first major overhaul of Canada's nuclear regulatory regime since the AECB was established more than half a century ago. Dr. Bishop provided her perspective on the new law and its practical implications. The CNSC has strengthened regulations and increased enforcement powers to enable the agency to better protect the public and to uphold its international commitments. However, the new legislation is not intended to dramatically change the way in which Canada's nuclear industry is regulated; instead it essentially codified into law prior practices of the AECB, including fee recovery.

Deregulation of the electric market in Ontario, and the recent lease agreement between OPG and British Energy for the Bruce Nuclear Generating Plant, have heightened CNSC's interest in better understanding the implications of privatization and in ensuring that its regulatory framework is sound in relation to privatization. Jim Harvie, Director General of Reactor Regulation, was complimentary of the NRC's license transfer review process and very appreciative of the license transfer information and insights that Sam Collins and NRR have shared with him and his staff. It is interesting to note that while the dynamic nature of the electric market in the U.S. is resulting in a consolidation of ownership of nuclear plants, deregulation of the electric markets in Canada is certain to have the opposite effect on nuclear plant ownership. While the CNSC and NRC will face many of the same challenges in this area, the different trends in ownership will bring with them unique regulatory challenges.

There was a very informative exchange of information on risk-informed regulation and PRA quality. Commissioner Merrifield explained the NRC and industry initiatives related to PRA quality and a PRA standard. The CNSC clearly has developed experience with PRAs and is using risk-insights to identify design vulnerabilities and prudent design improvements. As he discussed above, the Pickering A PRA was effective in identifying such design vulnerabilities and as a result, design changes will be made prior to the restart of those units.

There was a discussion of orphan sources, their tracking of radioactive sources, and the steel industry's concerns regarding the release of slightly contaminated solid material into the recycle stream. What became clear to everyone participating in this discussion was that the CNSC and NRC

share similar concerns, share similar regulatory challenges and vulnerabilities, and share similar stakeholder interests. Yet, while our countries share a border over which such materials can be transported and indeed, are the world's largest trading partners, they are not actively working together on potential solutions. Both Dr. Bishop and Commissioner Merrifield expressed views they believe their agencies could benefit from greater cooperation on these matters. Furthermore, since the U.S. shares a border with Mexico, Commissioner Merrifield suggested that it may be beneficial to have greater cooperation between the U.S., Canada, and Mexico on these important matters. Commissioner Merrifield informed Dr. Bishop that he would discuss this matter further with his Commission colleagues.

CNSC, like NRC, is actively seeking to enhance public confidence and to become more open and transparent in its day-to-day operations. Of particular interest to the CNSC was how NRC uses information technology in that endeavor. They had extensive discussions about the NRC's website, video-streaming of Commission meetings, ADAMS and the challenges associated with it, NRC's new reactor oversight program and the placement of performance indicator data on the web, and NRC planned initiatives associated with Yucca Mountain. The CNSC team was interested in E-commerce issues, and Commissioner Merrifield suggested that they be in contact with NRC Chief Information Officer to discuss shared interests in this matter.

The CNSC team was interested in hearing about the NRC's planning, budgeting, and performance management (PBPM) processes. Like the NRC, the CNSC is actively seeking to improve its planning and budgeting processes, and is moving toward becoming an outcome-based organization. After Commissioner Merrifield discussed the Government Performance and Results Act and the NRC's PBPM process, they shared insights on the organizational and management challenges associated with making such dramatic changes to the planning, budgeting, and performance measurement process. Commissioner Merrifield shared personal views that while the PBPM process is far from perfect, he believes the agency benefits from greater management accountability for both resource utilization and meeting performance goals. Commissioner Merrifield shared some observations about how NRC struggled with the difficult transition from an output-based to an outcome-based approach, and also had difficulty getting managers to shift their focus from "what do we do?" to "why do we do it?". Finally, he expressed that NRC has not been entirely successful in breaking down organizational allegiances that sometimes impede an arena-focused approach to

budgeting, planning, and performance measurement. Dr. Bishop commented that the CNSC faces similar problems.

The CNSC, like the NRC, is facing the serious challenges associated with an aging workforce and an aging senior management team. These challenges are exacerbated by declining university enrollments in nuclear programs, and by strong national economies that attract young engineering talent to highly paid, upwardly mobile information technology positions. Commissioner Merrifield sensed that the NRC is further along in its succession planning and staff development efforts. However, based on their limited discussions, he believes the CNSC may work more effectively with universities on initiatives designed to attract college students to the nuclear field, and a career with the agency. Commissioner Merrifield intends to discuss this further with the Chairman and Paul Bird, Director of the Office of Human Resources, with the hope of encouraging NRC's Office of Human Resources to contact the CNSC about any recruiting insights NRC may gain.

End of trip report

3. If additional information is requested, please contact Brian McCabe (301) 415-1850.

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