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NRC INTERNATIONAL TRAVEL TRIP REPORT

Traveler, Office, Division, Phone Number:

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Subject:

NRR/DSS Trip to Point Lepreau Power Station

Dates of Travel and Countries/Organizations Visited:

5/26-28/2012, New Brunswick, Canada
Canada Nuclear Safety Commission (CNSC)
NB Power, (Point LepreauNuclear Generating Station (PLGNS))
Ontario Power Generation (OPG)

Desired Outcome:

Detailed understanding of the regulatory and technical bases for the use of filtered containment venting systems (FCVS) at PLGNS to be will be considered in the development of recommendations on FCVS for Mark I and Mark II reliable hardened vents, Near Term Task Force Recommendation 5.1.

Results Achieved:

The visit exceeded expectations. Staff was briefed by CNSC and NB Power staff on the FCVS regulatory decision making by CNSC, and the technical analyses underpinning that process. The staff was told that the decision to install an FCVS was based on Level 2 PSA and detailed, systematic consideration of defense in depth. The FCVS is part of a severe accident management suite of equipment that, in addition to controlled filtered venting, accomplishes flooding under the reactor and flooding up containment. NB Power implemented to meet the Safety Goals to a level approaching that of a modern plant. The staff toured the FCVS installed at Point Lepreau, and learned of plans to be considered for the multi-unit Darlington Nuclear Generating Station, presented by OPG staff.

Summary of Trip:

Staff met at the Point Lepreau Nuclear Generating Station on May 27, 2012 with representatives of the Canadian Nuclear Safety Commission (CNSC), NB Power (Point Lepreau owner/operator), and representatives from the Ontario Power Generation (OPG) – Owner/operator of Darlington Nuclear Generating Station . The slides from their presentations are attached, and provide a good understanding of the discussions.

(b)(6) Director General for the Directorate of Power Reactor Regulation, CNSC, started the meeting by summarizing the objectives, specifically, to provide the visiting NRC staff with an understanding of the regulatory framework for decisions about FCVS, and with the analytical, engineering, and practical aspects of the FCVS installed at Point Lepreau.

Point Lepreau is a CANDU 6 that was shutdown in April 2008 to undergo substantial refurbishment activities with the objective of extending the life of the station for up to 25-30 years. In Canada life extension projects, commonly referred to as refurbishment projects, involve replacement of major reactor components such as the fuel channels and/or upgrading of safety-significant systems.

In 2007, the regulator and the utility discussed the installation of an FCVS similar to those on Swiss plants for severe accident management. The value of an FCVS was assessed by the licensee in a complete Level 2 PSA, including external events, in accordance with CNSC Regulatory Document S-294. (b)(4) (b)(6) (b)(6) (b)(4) The analysis uses Severe Core Damage Frequency (SCDF), and large release frequency (>1% Cs-137 inventory) as decision metrics that align well with IAEA SSG-3 and SSG-4. The FCVS, costing approximately $14 million Canadian, was found to be cost-beneficial when using the large release frequency metric. The stated purpose of the FCVS is "to prevent failure of containment integrity due to the increase of containment pressure beyond the failure pressure" of approximately 220-230 kPa(g), or 31.9-33.4 psig.

The CNSC requires that plants install safety improvements that are both available and have reasonable cost. This is similar to the approach used in Europe. The FCVS met these criteria.

The plant installed an AREVA-designed passive filter outside and next to the containment. This design is significantly smaller than the FILTRA design, with the scrubber tank measuring 6.5 meters high and 4 meters in diameter. The scrubber tank contains venturi nozzles in a sparger array, and a metal fiber filter for micro-aerosols. It is operated by hard-linkage isolation valves from a shielded location. It does have a rupture disk, but an isolation valve in the same path is normally closed. It is designed to retain greater than 99.9% of aerosols, greater than 99.5% elemental iodine, and greater than 99% organic iodine. The visiting staff toured the installation, consisting of a two-sided shielded filter house adjacent to the containment in a corner where the containment and the turbine building meet. The filter house is seismically qualified.

In addition, (b)(6) OPG Fukushima Response discussed plans to use a shared filter at the four-unit Darlington site. The filter would be capable of handling simultaneous accidents at all four units. In addition to the AREVA design, they are evaluating a Westinghouse dry filter design using a metal fiber filter and a zeolite "molecular sieve."

Additional Information/Discussion:

The implementation rationale/process for the FCVS on the CANDU 6 precisely parallels the implementation rationale/process found at all other foreign sites visited in Sweden and Switzerland. That is: (1) the regulator requires reasonable-cost safety upgrades consistent with industry progress in safety technology, (2) the regulator and the licensees agree on strengthening containment integrity as the goal, regardless of the calculated value of core damage frequency, for defense-in-depth recognizing the uncertainties in PSA, (3) Level 2 PSA is performed to identify the benefit of severe accident management features to strengthen containment, using a large release and/or land contamination criterion, (4) the regulator and the licensee agree on features that will (a) flood the containment to prevent core-concrete interaction, liner melt through, cover core debris, and (b) maintain containment integrity using the FCVS to mitigate over pressurization of containment /uncontrolled release scenarios (e.g., as a result of prolonged SBO), including those resulting from arrested core melt outside the reactor vessel.

Pending Actions/Planned Next Steps for NRC:

The staff plans to use the information from the trip to inform the SECY paper on severe accident-capable and filtered reliable hardened vents, as directed by the commission, in accordance with the Fukushima Lesson Learned process. AREVA staff members suggested that the designer of the FCVS might be willing to provide a briefing to the NRC staff on the design of the system. Staff ultimately met with the designer on July 12, 2012.

Attachments: (1) "CNSC-USNRC Bilateral Meeting on Emergency Filtered Containment Vents," (b)(6) NB Power, May 27, 2012, **(2)** "Venting Containment strategy for Case of Severe Accidents at Multi-unit Stations," (b)(6) OPG, May 27, 2012.

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