

September 26, 2005

Mr. David A. Christian
Sr. Vice President and Chief Nuclear Officer
Dominion Nuclear Connecticut, Inc.
Innsbrook Technical Center
5000 Dominion Boulevard
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SUBJECT: MILLSTONE POWER STATION, UNIT NO. 2 - RESPONSE TO NRC BULLETIN 2003-01, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY SUMP RECIRCULATION AT PRESSURIZED WATER REACTORS" (TAC NO. MB9588)

Dear Mr. Christian:

The Nuclear Regulatory Commission (NRC) issued Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized Water Reactors," dated June 9, 2003. A response was requested to provide the information stated in Option 1 or Option 2 of Bulletin 2003-01. By letter dated August 7, 2003, Dominion Nuclear Connecticut, Inc. provided a response to Option 2 regarding Millstone Power Station, Unit No. 2 (MPS2). Option 2 states:

Describe any interim compensatory measures that have been implemented or that will be implemented to reduce the risk which may be associated with potentially degraded or nonconforming ECCS [emergency core cooling system] and CSS [containment spray system] recirculation functions until an evaluation to determine compliance is complete. If any of the interim compensatory measures listed in the Discussion section will not be implemented, provide a justification. Additionally, for any planned interim measures that will not be in place prior to your response to this bulletin, submit an implementation schedule and provide the basis for concluding that their implementation is not practical until a later date.

Bulletin 2003-01 identified six categories of interim compensatory measures (ICMs), namely:

- ICM category (1): Operator training on indications of and responses to sump clogging.
- ICM category (2): Procedural modifications if appropriate, that would delay the switchover to containment sump recirculation (e.g., shutting down redundant pumps that are not necessary to provide required flows to cool the containment and reactor core, and operating the CSS intermittently).
- ICM category (3): Ensuring that alternative water sources are available to refill the RWST [refueling water storage tank] or to otherwise provide inventory to inject into the reactor core and spray into the containment atmosphere.

- ICM category (4): More aggressive containment cleaning and increased foreign material controls.
- ICM category (5): Ensuring containment drainage paths are unblocked.
- ICM category (6): Ensuring sump screens are free of adverse gaps and breaches.

In your letter of August 7, 2003, in regard to the six ICMs listed above, you stated that you had implemented the ICMs, as follows:

- A loss of coolant accident (LOCA) strategy based upon the Combustion Engineering Owners Group (CEOG) Emergency Procedure Guidelines (EPGs), explaining that for small-break LOCAs where reactor vessel and pressurizer level, reactor coolant system (RCS) subcooling and steam generator heat removal can be maintained or restored, high pressure safety injection (HPSI) flow will be throttled or stopped - ICM category (1) and ICM category (2).
- A CEOG EPG-based strategy for larger LOCAs (where HPSI throttle/stop criteria are not met), in which ECCS injection will continue until low level is reached in the RWST, sump recirculation is initiated, HPSI pump flow and pump current are monitored to detect inadequate Net Positive Suction Head (NPSH) due to debris blockage in the sump, and potentially one HPSI pump is stopped - ICM category (1).
- An existing checklist-based containment inspection procedure which includes visual inspection for loose material, removal of loose debris, removal of temporary equipment used in containment, the restraint of any temporary material that is to be left in containment, and inspection for any debris which could block containment drainage paths (two refueling cavity drains and a reactor cavity drain between the reactor vessel and the shield wall) - ICM category (4) and ICM category (5).
- A post-refueling filtered draindown procedure for the refueling pool in which normal drains are opened and left open to drain collected water to the containment sump - ICM category (5).
- A comprehensive sump screen inspection procedure required by Technical Specifications to be completed each refueling outage (the NRC staff notes that you described a 1996 comprehensive design review and inspection of the sump screens, including review of sump screen area and opening size, with a mechanistic debris transport calculation, a containment water level calculation, a containment water hold-up calculation, and resultant redesign and rebuild of the emergency sump screen, to ensure the sump screen's capability to perform during sump recirculation) - ICM category (6).

You also stated in your Bulletin response that you would be implementing Westinghouse Owners Group (WOG)-developed CEOG-specific EPG strategies/interim compensatory measures relating to loss of sump recirculation, which were made available in March 2004.

In a November 10, 2004, response to an NRC request for additional information (RAI) dated September 14, 2004, you elaborated on procedural enhancements completed by March 31, 2004, describing:

- Changes effective March 31, 2004, to Emergency Operating Procedure (EOP) 2532, "Loss of Coolant Accident," to address the potential for sump screen blockage, adding monitoring of HPSI pump discharge and suction pressures as indications of adequate post-sump recirculation flow (if sump blockage leads to inadequate HPSI flow, steps are specified for stopping containment spray, throttling HPSI to the minimum needed for decay heat removal, and refilling the RWST) - ICM category (1).
- Similar changes to EOP 2540CI, "Functional Recovery of RCS Inventory Control" - ICM category (1).
- Operator training for the sump blockage issue and on the procedure changes in classroom and simulator - ICM category (1).

In your November 10, 2004, RAI response you also discussed a January 2004, Generic Fundamentals licensed and non-licensed operator refresher training session on pumps and the sump clogging issue, with specific emphasis on NPSH and cavitation, and indications for both, as well as a February-March 2004, simulator training set for licensed operators and Shift Technical Advisors addressing a large-break LOCA with sump clogging (with potential EOP change elicitation from the participants) - ICM category (1).

In your November 10, 2004, RAI response you further discussed potential generic changes to CEN-152 "Combustion Engineering Emergency Procedure Guidelines," recommended in WOG WCAP-16204, "Evaluation of Potential ERG [emergency response guidelines] and EPG Changes to Address NRC Bulletin 2003-01 Recommendations (PA-SEE-0085), Revision 1." You stated that these changes had been compared to the changes already made to the MPS2 EOPs, and that these strategy changes for CEN-152 had been confirmed to have been addressed in the MPS2 changes completed in March 2004, with one exception - early termination of one containment spray train. In that regard, you stated that the MPS2 radiological analysis credits containment spray operation for two hours for iodine removal from the containment atmosphere, and that early termination of one train of containment spray would make the plant vulnerable to a subsequent single failure of the operating containment spray train (an unanalyzed condition). Although not implemented as an ICM for Bulletin 2003-01, you stated that this action was being assessed for long-term consideration. In a May 17, 2005, response to a supplemental NRC RAI dated April 8, 2005, you further elaborated on your consideration of "early termination of one containment spray train," stating that because that action would make the plant vulnerable to a subsequent single failure of the operating train (and thereby place the plant in an unanalyzed condition), and because this change would adversely affect the design-basis LOCA radiological analysis (thereby potentially significantly increasing the radiological dose to the public), you had judged that these negative impacts of this change outweighed any potential benefit in sump NPSH, and that this measure would not be undertaken even as a long-term consideration.

In your May 17, 2005, response to a supplemental NRC RAI dated April 8, 2005, you included a Table 2 which provided discussions of each of the WOG WCAP-16204, Revision 1 candidate operator actions (COA) as follows:

1. COA A1a-CE, "Operator Action to Secure One Spray Pump," concluding that for the offsite radiological dose reasons cited above, this COA would not be implemented as an ICM.
2. COA A1b, "Operator Action to Secure Both Spray Pumps," concluding that for the offsite radiological dose reasons cited above, this COA would not be implemented as an ICM;
3. COA A2, "Manually Establish One Train of Containment Sump Recirculation Prior to Automatic Actuation," concluding that, since the current design-basis post-LOCA NPSH analysis has determined that the available margin is approximately 0.3 feet, there is too little margin to support early switchover.
4. COA A3-CE, "Terminate One Train of HPSI/High-head Safety Injection After Recirculation Alignment," concluding that the failure of the remaining running train would mean an interruption of core flow until the operator could start the standby HPSI pumps, potentially resulting in a significant increase in peak clad temperature and in a possible significant increase in radiological dose to the public, and that this COA would, therefore, not be implemented.
5. COA A4, "Early Termination of One HPSI/RHR [residual heat removal] Pump Prior to Recirculation Alignment," concluding that the failure of the remaining running train would mean an interruption of core flow until the operator could start the standby low-pressure safety injection/RHR pumps, potentially resulting in a significant increase in peak clad temperature and in a possible significant increase in radiological dose to the public, and that this COA would, therefore, not be implemented.
6. COA A5, "Refill of Refueling Water Storage Tank," noting that this COA had been incorporated into the MPS2 EOPs directing "early action" to refill the RWST - ICM category (3).
7. COA A6, "Inject More Than One RWST Volume From a Refilled RWST or By Bypassing the RWST," concluding that this COA is already included in the MPS2 EOPs, with the RWST re-filling method and RCS injection path to be directed by the technical support center, with similar guidance provided in the Severe Accident Management Guidelines - ICM category (3).
8. COA A7, "Provide More Aggressive Cooldown and Depressurization Following a Small Break LOCA," concluding that this action was already incorporated in the MPS2 EOPs through notes in EOP 2532 - ICM category (2).
9. COA A8-CE, "Provide Guidance on Symptoms and Identification of Containment Sump Blockage," concluding that this COA had already been incorporated in the MPS2 EOPs (see above) - ICM category (1).

10. COA A9-CE, "Develop Contingency Actions in Response to Containment Sump Blockage, Loss of Suction, and Cavitation," concluding that this COA had already been incorporated in the MPS2 EOPs (see above) - ICM category (1).
11. COA A10, "Early Termination of One Train of HPSI/High-head Injection Prior to Recirculation Alignment," concluding that the failure of the remaining running train would mean an interruption of core flow until the operator could start the standby HPSI pumps, potentially resulting in a significant increase in peak clad temperature and in a possible significant increase in radiological dose to the public, and that this COA would, therefore, not be implemented.
12. COA A11, "Prevent or Delay Containment Spray for Small Break LOCAs in Ice Condenser Plants," concluding that this COA is not applicable to MPS2 which has a large, dry containment design.

In an August 26, 2005, response to a July 13, 2005, conference call with the NRC staff, you stated that for COA 5, "Refill of Refueling Water Storage Tank," consistent with the guidance provided in Revision 5 of CEN-152, the MPS2 EOPs are being modified to initiate actions to refill the RWST once injection from the RWST has stopped and the RWST has been isolated (to be completed by September 1, 2005) - ICM category (3).

The NRC staff has considered your Option 2 response for compensatory measures that were, or were to have been, implemented to reduce the interim risk associated with potentially degraded or nonconforming ECCS and CSS recirculation functions. Based on your response, the NRC staff considers your actions to be responsive to, and to meet the intent of, Bulletin 2003-01. Please retain any records of your actions in response to Bulletin 2003-01, as the NRC staff may conduct subsequent inspection activities regarding this issue.

Should you have any questions, please contact me at 301-415-1484, or the lead Project Manager for this issue, Mr. Alan Wang, at 301-415-1445.

Sincerely,

/RA/

Victor Nerses, Senior Project Manager, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-443

cc: See next page

10. COA A9-CE, "Develop Contingency Actions in Response to Containment Sump Blockage, Loss of Suction, and Cavitation," concluding that this COA had already been incorporated in the MPS2 EOPs (see above) - ICM category (1).
11. COA A10, "Early Termination of One Train of HPSI/High-head Injection Prior to Recirculation Alignment," concluding that the failure of the remaining running train would mean an interruption of core flow until the operator could start the standby HPSI pumps, potentially resulting in a significant increase in peak clad temperature and in a possible significant increase in radiological dose to the public, and that this COA would, therefore, not be implemented.
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/RA/

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