

September 22, 2005

MEMORANDUM TO: Darrell J. Roberts, Chief, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

FROM: David L. Solorio, Chief */RA/*
Balance of Plant Section
Plant Systems Branch
Division of Systems Safety and Analysis
Office of Nuclear Reactor Regulation

SUBJECT: MILLSTONE UNIT 3 - CLOSEOUT LETTER FOR BULLETIN 2003-01,
"POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY
SUMP RECIRCULATION AT PRESSURIZED-WATER REACTORS"

The Plant Systems Branch (SPLB) has reviewed and evaluated the information provided in responses to Bulletin 2003-01 by the licensee for the Millstone Unit 3. SPLB has determined that the licensee's actions have been responsive to and meet the intent of Bulletin 2003-01. Attached to this letter is the proposed close-out letter for the above plant. If you have any questions, please contact Leon Whitney or Alan Wang. Please include Alan Wang and Leon Whitney on the distribution list.

Docket Nos: 50-423

Attachment: As stated

CONTACTS: Leon Whitney, SPLB/DSSA
415-3081
Alan B. Wang, DLPM, PD IV
415-1445

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NRR-106

OFFICE	DLPM/PDIV-2/PM	DSSA/SPLB	DSSA/SPLB
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DATE	09/ 22 /05	09/ 20 /5	09/ 20 /05

OFFICIAL RECORD COPY

Virginia Electric and Power Company
5000 Dominion Boulevard
Glen Allen, VA 23060

SUBJECT: MILLSTONE POWER STATION UNIT 3 - RESPONSE TO NRC BULLETIN 2003-01, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY SUMP RECIRCULATION AT PRESSURIZED WATER REACTORS (TAC NO. MB9588)

Dear Mr. Gallagher:

This letter acknowledges receipt of your response dated August 7, 2003, to Nuclear Regulatory Commission (NRC) Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized Water Reactors," dated June 9, 2003. The NRC issued Bulletin 2003-01 to all pressurized-water reactor (PWR) licensees requesting that they provide a response, within 60 days of the date of Bulletin 2003-01, that contains either the information requested in following Option 1 or Option 2 stated in Bulletin 2003-01:

- Option 1: State that the emergency core cooling system (ECCS) and containment spray system (CSS) recirculation functions have been analyzed with respect to the potentially adverse post-accident debris blockage effects identified in the Discussion section, and are in compliance with all existing applicable regulatory requirements.
- Option 2: 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 and CSS 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.

You provided an Option 2 response.

Bulletin 2003-01 discussed six categories of interim compensatory measures (ICMs):

(1) operator training on indications of and responses to sump clogging; (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

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the containment and reactor core, and operating the CSS intermittently); (3) ensuring that alternative water sources are available to refill the RWST or to otherwise provide inventory to inject into the reactor core and spray into the containment atmosphere; (4) more aggressive containment cleaning and increased foreign material controls; (5) ensuring containment drainage paths are unblocked; (6) ensuring sump screens are free of adverse gaps and breaches.

You stated in your bulletin response of August 7, 2003, that you had implemented the following ICMs:

(1) 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 (SG) 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;

(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 Refueling Water Storage Tank (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;

(3) 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;

(4) 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; and

(5) a comprehensive sump screen inspection procedure required by Technical Specifications to be completed each refueling outage (we note 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) EPG strategies/ICMs relating to loss of sump recirculation, due to be available in March 2004.

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

(1) changes effective March 31, 2004, to 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;

(2) similar changes to EOP 2540CI "Functional Recovery of RCS Inventory Control" - ICM Category #1; and

(3) 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 net positive suction head (NPSH) and cavitation, and indications for both, as well as a February-March 2004, simulator training set for licensed operators and Shift Technical Advisors (STAs) 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 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 at Millstone 2 EOPs, and that these strategy changes for CEN-152 had been confirmed to have been addressed in the Millstone 3 changes completed in March, 2004, with one exception - early termination of one containment spray train. In that regard, you stated that the Millstone 3 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 interim compensatory measure 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 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 net-positive suction head (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, "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 interim compensatory measure;

(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 3, "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 4, "Early Termination of One HPSI/RHR 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 LPSI/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 5, "Refill of Refueling Water Storage Tank," noting that this COA had been incorporated into the Millstone Unit 3 EOPs directing "early action" to refill the RWST - ICM category #3;

(7) COA 6, "Inject More Than One RWST Volume From a Refilled RWST or By Bypassing the RWST," concluding that this COA is already included in the Millstone Unit 2 EOPs, with the RWST re-filling method and reactor coolant system (RCS) injection path to be directed by the technical support center (TSC), with similar guidance provided in the Severe Accident Management Guidelines (SAMGs) - ICM category #3;

(8) COA 7, "Provide More Aggressive Cooldown and Depressurization Following a Small Break LOCA," concluding that this action was already incorporated in the Millstone Unit 2 EOPs through notes in EOP 2532 - ICM category #2;

(9) COA 8, "Provide Guidance on Symptoms and Identification of Containment Sump Blockage," concluding that this COA had already been incorporated in the Millstone Unit 2 EOPs (see above) - ICM category #1;

(10) COA 9, "Develop Contingency Actions in Response to Containment Sump Blockage, Loss of Suction, and Cavitation," concluding that this COA had already been incorporated in the Millstone Unit 3 EOPs (see above) - ICM category #1;

(11) COA 10, "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;

Mr. Gallagher

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(12) COA 11, "Prevent or Delay Containment Spray for Small Break LOCAs in Ice Condenser Plants," concluding that this COA is not applicable to Millstone Unit 2 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 provide in Revision 5 of CEN-152, the Millstone Unit 2 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 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-[xxxx] or the lead PM for this issue, Alan Wang at 301-415-1445.

Sincerely,

[Name], Project Manager, Section [1 or 2]
Project Directorate [I, II, III, or IV]
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

cc: See next page [Plant Mailing List]

ADD TO DISTRIBUTION: AWang, RArchitzel, DSolorio, MKowal, LWhitney, THafera