November 13, 2005

Mr. David A. Christian
Sr. Vice President and Chief Nuclear Officer
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Innsbrook Technical Center
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SUBJECT: MILLSTONE POWER STATION, UNIT NO. 3 - RESPONSE TO NRC BULLETIN 2003-01, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY SUMP RECIRCULATION AT PRESSURIZED WATER REACTORS" (TAC NO. MB9589)

Dear Mr. Christian:

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

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.

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 the containment and reactor core, and operating the CSS intermittently); (3) ensuring that alternative water sources are available to refill the refueling water storage tank (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; and (6) ensuring sump screens are free of adverse gaps and breaches.

You stated in your bulletin response to Option 2 dated August 7, 2003, that you had implemented the following interim compensatory measures:

(1) a loss of-coolant-accident (LOCA) strategy based upon the Westinghouse Owners Group (WOG) Emergency Response Guidelines (ERGs), explaining that for small break LOCAs for which pressurizer level is not maintained, a cooldown and depressurization strategy is employed, during which ECCS injection is systematically reduced from two trains to none - ICM category #2;

(2) a WOG ERG-based strategy for larger LOCAs (where the reactor coolant system will depressurize below the reactor heat removal (RHR) shutoff head, and for which conditions for ECCS termination are not achieved), in which transfer to sump recirculation is implemented and monitored, with subsequent transfer to a loss of emergency coolant recirculation procedure if necessary - ICM category #1;

(3) a WOG ERG-based strategy which, upon indications of loss of emergency coolant recirculation, includes reducing ECCS and containment spray flows to one train, cycling the recirculation containment spray pump to minimize flow as containment pressure allows, and refilling the RWST - ICM category #1 and ICM category #3;

(4) an existing containment inspection procedure which includes: visual inspection for loose material (with examples provided); visual inspection of the containment sump for debris or component distress or corrosion; criteria for assessing which temporary equipment will remain in containment following closeout; inspection requirements for each level of containment; maintenance department inspections of recirculation spray system (RSS) pump suction piping; proceduralized locking open of containment floor drains and refueling cavity drain line isolation valves; a calculation showing adequate net positive suction head (NPSH) for pumps taking suction on the sump during recirculation with no credit taken for any of the drain lines; and a requirement for formal containment closeout procedure completion documentation - ICM category #4, ICM category #5, and ICM category #6;

(5) a comprehensive sump screen inspection procedure required by the Technical Specifications to be completed each refueling outage (we note that you described a 1997 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, and a containment water hold-up calculation) - ICM category #6.

You also stated in your Bulletin response that you would be implementing the following interim compensatory measures:

(1) Changes to procedure ES-1.3, “Transfer to Cold Leg Recirculation” to include transfer to ECA-1.1, “Loss of Emergency Coolant Recirculation” upon indications of flow blockage (e.g., low containment sump level, unstable motor current, or low RSS discharge pressure) by March 31, 2004 - ICM category #1;

(2) enhancements to the existing guidance in Generic Attachment 10 for filling the RWST to re-order the steps to minimize RWST draindown and to add additional RWST refill options such as those specified in the Severe Accident Management Guidelines (SAMGs), by March 31, 2004 - ICM category #3;

(3) interim licensed operator briefings on the issues identified in Bulletin 2003-01, the key sump performance indicators to monitor during an accident, identification of sump blockage using the indicators, and the current procedures that respond to debris blockage by August 22, 2003 - ICM category #1; and

(4) revisions to an existing safety parameter display system operator aid to improve its continuous monitoring of post-LOCA cooling, to be implemented as other related changes are made to the emergency operating procedures (EOPs) to address sump blockage, with appropriate briefings to operating personnel - ICM category #1.

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) a new foldout page in procedure E-1, “Loss of Reactor or Secondary Coolant,” which lists containment sump-related indications to be monitored - ICM category #1;

(2) a procedure ECA 1.1 modification to address the potential for entry into this procedure due to sump screen blockage - ICM category #1;

(3) adding a step to ECA 1.1 to add make-up water to the RWST upon loss of sump recirculation - ICM category #3;

(4) another procedure modification to ECA 1.1 to move termination of containment spray steps to the beginning of the procedure, including recirculation re-start with recirculation spray isolated if necessary due to sump clogging - ICM category #1; and

(5) a modification to GA-10, “Filling RWST,” to include the possibility of re-filling the RWST from the spent fuel pool - ICM category #3.

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, 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 a May 17, 2005, response to an April 8, 2005, supplemental NRC RAI, you stated that the WOG WCAP-16204, “Evaluation of Potential ERG and EPG [emergency procedure guideline] Changes to Address NRC Bulletin 2003-01 Recommendations (PA-SEE-0085), Revision 1,” contained a sump blockage control room guideline (SBCRG) for responding to a loss of recirculation due to debris blockage of the containment sump, and that the March 2004 EOP changes implemented at Millstone Unit 3 (see above) had incorporated all seven major actions

of the SBCRG. You noted that the March 2004, EOP changes provided streamlined instructions for operator monitoring of key sump performance parameters and a direct path to alternate core cooling if all emergency recirculation is lost.

In your May 17, 2005, response, you included a "Table 3" which provided discussions of each of the WOG WCAP-16204, Revision 1 candidate operator actions (COAs) as follows:

(1) COA A1a, "Operator Action to Secure One Spray Pump," concluding that since the Millstone Unit 3 containment fan coolers are located in the basement of the containment, they would be flooded during a LOCA event and, therefore, unavailable to remove heat loads, and since a failure of the running spray pump would result in increased offsite dose, this COA would not be implemented at Millstone Unit 3;

(2) COA A1b, "Operator Action to Secure Both Spray Pumps," concluding that since the Millstone Unit 3 containment fan coolers are located in the basement of the containment, they would be flooded during a LOCA event and, therefore, unavailable to remove heat loads, and since there would be a significant increase in containment pressure and offsite dose without spray pumps, this COA would not be implemented;

(3) COA A2, "Manually Establish One Train of Containment Sump Recirculation Prior to Automatic Actuation," concluding that since only a small fraction of the RWST inventory would have been injected, there would be little or no water on the containment floor, providing too small of an available NPSH margin to support early switchover to sump recirculation, this COA would not be implemented;

(4) COA A3, "Terminate One Train of Safety Injection After Recirculation Alignment," concluding that, since a failure of the running train could potentially result in an increase in peak clad temperature and consequently a significant increase in radiological dose to the public, this COA would not be implemented;

(5) COA A4, "Early Termination of One LPSI [low-pressure safety injection]/RHR Pump Prior to Recirculation Alignment," concluding that this COA applies to Combustion Engineering, Inc. (CE) plants and is, therefore, not applicable to the Millstone Unit 3 Westinghouse design;

(6) COA A5, "Refill of Refueling Water Storage Tank," concluding that this COA had been incorporated into the Millstone Unit 3 EOPs (see above) - 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 and also measures to reduce RWST drawdown are is already included in the Millstone Unit 3 EOPs and SAMGs - ICM category #3;

(8) COA A7, "Provide More Aggressive Coodown and Depressurization Following a Small Break LOCA," concluding that the Millstone Unit 3 EOPs already included guidance for aggressive cooldown and depressurization - ICM category #2;

(9) COA A8, “Provide Guidance on Symptoms and Identification of Containment Sump Blockage,” concluding that this COA has been incorporated into the Millstone Unit 3 EOPs (see above) - ICM category #1;

(10) COA A9, “Develop Contingency Actions in Response to Containment Sump Blockage, Loss of Suction, and Cavitation,” concluding that this COA has been incorporated into the Millstone Unit 3 EOPs (see above) - ICM category #1;

(11) COA A10, “Early Termination of One Train of HPSI [high-pressure safety injection]/High-head Injection Prior to Recirculation Alignment,” concluding that this COA was prepared for CE plants and is not applicable to the Millstone Unit 3 Westinghouse design; and

(12) COA A11, “Prevent or Delay Containment Spray for Small Break LOCAs in Ice Condenser Plants,” concluding that this COA is not applicable to Millstone Unit 3, which has a large, dry containment design.

In an August 26, 2005, letter in response to a July 13, 2005, conference call with the NRC staff, you stated that for COA A5, in accordance with the guidance in Volume II of WCAP-16204, the Millstone 3 EOPs are being modified to direct the operators to initiate RWST refill once injection from the RWST has stopped and the RWST has been isolated (completion 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.

Sincerely,

***/RA/***

George F. Wunder, Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-423

cc: See next page

(9) COA A8, “Provide Guidance on Symptoms and Identification of Containment Sump Blockage,” concluding that this COA has been incorporated into the Millstone Unit 3 EOPs (see above) - ICM category #1;

(10) COA A9, “Develop Contingency Actions in Response to Containment Sump Blockage, Loss of Suction, and Cavitation,” concluding that this COA has been incorporated into the Millstone Unit 3 EOPs (see above) - ICM category #1;

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George F. Wunder, Project Manager
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