UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 17, 2008

Mr. David A. Christian
President and Chief Nuclear Officer
Virginia Electric and Power Company
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: MILLSTONE POWER STATION, UNIT NOS. 2 AND 3 – REQUEST FOR ADDITIONAL INFORMATION REGARDING GL 2004-02 (TAC NOS. MC4694 AND MC4695)

By letters dated March 4, and September 1, 2005, November 15, 2007, and February 29, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML050630559, ML052500378, ML073190553 and ML080650561, respectively), Dominion Nuclear Connecticut, Inc. (DNC or the licensee), submitted responses to Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors," for Millstone Power Station, Units 2 and 3 (MPS2 and MPS3, respectively).

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's submittals. The process involved a detailed review with a focus on the review areas described in the NRC's "Revised Content Guide for Generic Letter 2004-02 Supplemental Responses" (ADAMS Accession No. ML073110389). Based on these reviews, the staff has determined that additional information is needed in order to determine if GL 2004-02 has been satisfactorily addressed for MPS2 and MPS3. The enclosed documents describe the requests for additional information (RAIs).

The NRC requests that DNC respond to these RAIs within 90 days of the date of this letter. However, the NRC would like to receive only one response letter for all RAIs with the exceptions stated below. If the licensee concludes that more time is required to respond, the licensee should request additional time, including a basis for why the extension is needed.

The exception to the above response timeline is RAI question 10 for MPS2, and RAI question 13 for MPS3, in the enclosures. The NRC staff considers in-vessel downstream effects to not be fully addressed at MPS2 and MPS3, as well as at other pressurized water reactors (PWRs). DNC's submittal refers to Revision 0 of PWR Owners Group (PWROG) topical report WCAP-16793-NP, "Evaluation of Long-Term Cooling Considering Particulate, Fibrous, and Chemical Debris in the Recirculating Fluid." At this time, the NRC staff has not issued a final safety evaluation (SE) for this topical report since the PWROG intends to submit Revision 1 to address several issues identified by the Advisory Committee on Reactor Safeguards and the NRC staff.

DNC may demonstrate that in-vessel downstream effects issues are resolved for MPS2 and MPS3, by showing that the licensee's plant conditions are bounded by the revised version of WCAP-16793 and the corresponding final NRC staff SE, and by addressing the conditions and limitations in the final SE. DNC may also resolve RAI question 10 for MPS2, and RAI question 13 for MPS3, by demonstrating, without reference to revised WCAP-16793 or the NRC staff's

SE, that in-vessel downstream effects have been addressed at MPS2 and MPS3. The specific issues raised in RAI question 10 for MPS2, and RAI question 13 for MPS3, should be addressed regardless of the approach the licensee chooses to take.

DNC should report how it has addressed the in-vessel downstream effects issue and the associated RAI referenced above within 90 days of issuance of the final NRC staff SE on WCAP-16793. The NRC staff is currently developing a Regulatory Issue Summary to inform licensees of the NRC staff's expectations and plans regarding resolution of this remaining aspect of Generic Safety Issue 191, "Assessment of Debris Accumulation on PWR Sump Performance."

If DNC concludes, based on its review of the RAIs, that additional corrective actions are needed for GL 2004-02, DNC should request additional time to complete such corrective actions as needed. Criteria for such extension requests are contained in SECY-06-0078 (ADAMS Accession No. ML053620174) and examples of previous requests and approvals can be found on the NRC's sump performance website, located at: http://www.nrc.gov/reactors/operating/ops-experience/pwr-sump-performance.html.

Any extension request should also include results of contingency planning that will result in near term identification and implementation of any and all modifications needed to fully address GL 2004-02. The NRC strongly suggests that DNC discuss such plans with the staff before formally transmitting an extension request.

The draft RAIs were sent to Mr. Geoff Wertz and Mr. Bill Bartron, from your staff, to ensure that the questions were understandable, the regulatory basis for the questions were clear, and to determine if the information was previously docketed. On December 1, 2008, Mr. Bartron indicated that the licensee will submit a response within 90 days of the date of this letter, with the exception discussed above. Please note that if you do not respond to this letter by the agreed-upon date or provide an acceptable alternate date in writing, we may reject your application for amendment under the provisions of Title 10 of the *Code of Federal Regulations,* Section 2.108. If you have any questions, please contact Carleen Sanders at (301) 415-1603.

Sincerely,

Carleen J. Sanders, Project Manager
Plant Licensing Branch, 1-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-336 and 50-423

Enclosures: As stated

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MILLSTONE POWER STATION, UNIT NO. 2

REQUEST FOR ADDITIONAL INFORMATION

SUPPLEMENTAL RESPONSE TO GENERIC LETTER (GL) 2004-02

DOCKET NO. 50-336

By letters dated March 4, and September 1, 2005, November 15, 2007, and February 29, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML050630559, ML052500378, ML073190553 and ML080650561, respectively), Dominion (DNC or the licensee) submitted responses to Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors," for Millstone Power Station, Units 2 and 3 (MPS2 and MPS3, respectively).

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's submittals and has the following questions regarding MPS2.

1. DNC's strainer head loss testing, including chemical effects, was not complete at the time the February 2008 supplemental response was developed. To the extent it was not provided in the February 2008 submittal, please provide the information requested under item 3.f, "Head Loss and Vortexing," in the "Revised Content Guide for Generic Letter 2004-02 Supplemental Response," dated November 2007 (ADAMS Accession No. ML073110389). Specifically, please provide an update to the final head loss and vortexing evaluation based on completed testing.

2. Please state and provide the basis for the assumed particulate filtration fraction at the strainer for downstream wear evaluations.

3. Please explain and justify whether a disturbance could occur to a water surface impacted by a break flow rate of thousands of gallons per minute falling from approximately 20 ft, such that significant quantities of air could be ingested into the strainer. Discuss both small and large breaks from this perspective. Please explain the role of the non-QA (quality assurance) cover plate in providing protection against this impinging water.

4. Please provide results of a flashing evaluation for the strainer once the final head loss numbers have been determined.

5. Please provide information that shows that stirring of the tank used to test strainer performance did not adversely affect formation of the debris bed on the strainer during thin-bed testing. Although the staff has found the debris preparation and introduction practices used at Atomic Energy of Canada Limited (AECL) to be generally adequate, the potential exists that stirring of the tank results in non-prototypical transport of fibrous debris shreds to the strainer during thin-bed testing. These shreds could disturb the formation of fine debris into a bed and reduce the head losses recorded during testing.

6. The NRC staff has been interacting with AECL and Dominion Energy Kewaunee, Inc., Dominion Nuclear Connecticut, Inc., and Virginia Electric and Power Company (collectively Dominion) regarding the current ongoing chemical effects testing for MPS2 and the other Dominion nuclear sites (RIG-89), which starts with a complete non-chemically laden debris bed of fibers and particulates. The NRC staff has noted that the non-chemical head losses (head loss prior to chemical additions) in the current chemical effects tests are significantly lower than for the similarly scaled debris loads in the previous non-chemical large scale and reduced scale tests. Please provide a comparison of the non-chemical head losses determined during the previous large- and reduced-scale testing to the non-chemical head losses obtained during the current chemical effects testing. Please provide justification for the final chemically laden head loss number used in the strainer evaluation considering that previous non-chemical head losses were significantly higher than the non-chemical head losses determined in association with the recent chemical testing.

7. The assumptions that were made in the supplemental response that led to a change in the limiting net positive suction head (NPSH) margin from 0.83 ft to 1.05 ft are not identified in the licensees submittal. Some assumptions, involving consideration of additional water holdup mechanisms, would lead to decreasing margins. The additional assumptions that more than compensated for these were not identified. Please provide a discussion of the changes to the NPSH calculation that result in the limiting NPSH margin increasing from 0.83 ft to 1.05 ft, and the resulting changes in the NPSH margin values that are presented in Table 3.6.2-1 of the NRC Audit Report.

8. The supplemental response stated that operators would be capable of terminating flow from a low pressure safety injection (LPSI) pump which failed to stop at switchover to sump recirculation (by closing LPSI injection valves). However, no information was provided on how this action is to be prioritized. Please provide a summary of the emergency operating procedure guidance that directs operators to resolve this single-failure scenario and prioritizes these operator actions. Please discuss operator recognition time and response times.

9. Please provide the information regarding ex-vessel downstream effects requested under item 3.m, "Downstream effects – Components and Systems," in the "Revised Content Guide for Generic Letter 2004-02 Supplemental Response," dated November 2007.

10. The NRC staff considers in-vessel downstream effects to not be fully addressed at MPS2 as well as at other pressurized water reactors (PWRs). DNC's submittal refers to Revision 0 of the PWR Owners Group (PWROG) topical report WCAP-16793-NP, "Evaluation of Long-Term Cooling Considering Particulate, Fibrous, and Chemical Debris in the Recirculating Fluid." At this time, the NRC staff has not issued a final safety evaluation (SE) for this topical report since the PWROG intends to submit Revision 1 to address several issues identified by the Advisory Committee on Reactor Safeguards and the NRC staff. The licensee may demonstrate that in-vessel downstream effects issues are resolved for MPS2 by showing that the licensee's plant conditions are bounded by the revised version of WCAP-16793 and the corresponding final NRC staff SE, and by addressing the conditions and limitations in the final SE. The licensee may also resolve this item by demonstrating, without reference to WCAP-16793 or the NRC staff SE, that in-vessel downstream effects have been addressed at MPS2. In any event, the licensee should report how it has addressed the in-vessel downstream effects issue within 90 days of issuance of the final NRC staff SE on WCAP-16793. The

NRC staff is developing a Regulatory Issue Summary to inform the industry of the staff's expectations and plans regarding resolution of this remaining aspect of Generic Safety Issue (GSI)-191, "Assessment of [Effect of] Debris Accumulation on PWR Sump Performance."

11. Please provide the results of the bench top testing to determine quantities of chemical precipitates formed. Also, please provide the results of the reduced-scale head loss testing that utilized the findings of the bench top tests.

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MILLSTONE POWER STATION, UNIT NO. 3

REQUEST FOR ADDITIONAL INFORMATION

SUPPLEMENTAL RESPONSES TO GENERIC LETTER (GL) 2004-02

DOCKET NO. 50-423

By letters dated March 4, and September 1, 2005, November 15, 2007, and February 29, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML050630559, ML052500378, ML073190553 and ML080650561, respectively), Dominion (DNC or the licensee) submitted responses to Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors," for Millstone Power Station, Units 2 and 3 (MPS2 and MPS3, respectively).

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's submittals and has the following questions regarding MPS3.

1. The licensee's strainer head loss testing, including chemical effects, was not complete at the time the February 2008 supplemental response was developed. To the extent it was not provided in the February 2008 submittal, please provide the information requested under item 3.f, "Head Loss and Vortexing," in the "Revised Content Guide for Generic Letter 2004-02 Supplemental Response," dated November 2007 (ADAMS Accession No. ML073110389). Specifically, please provide an update to the final head loss and vortexing evaluation based on completed testing.

2. Please provide results of a flashing evaluation for the strainer once the final head loss numbers have been determined.

3. Please provide information that shows that stirring of the tank used to test strainer performance did not adversely affect formation of the debris bed on the strainer during thin-bed testing. Although the NRC staff has found the debris preparation and introduction practices used at Atomic Energy of Canada Limited (AECL) to be generally adequate, the potential exists that stirring of the tank results in non-prototypical transport of fibrous debris shreds to the strainer during thin bed testing. These shreds could disturb the formation of fine debris into a bed and reduce the head losses recorded during testing.

4. The explanation for higher peak head loss that occurred during large-scale strainer performance testing stated that air was released from solution when head loss across the debris bed lowered the pressure in the debris bed below the static pressure of water on top of the debris bed. This air release apparently resulted in higher peaks in head loss. The explanation of this phenomenon is unclear. It is also unclear as to why this phenomenon would not occur during the reduced-scale testing since the head losses and submergence were similar. Please provide additional details and evaluation of the cause of the peak head loss that occurred during this testing.

5. During an NRC staff visit to the AECL test facility, the acceptance criterion for strainer head loss appeared to have been exceeded during a chemical effects reduced-scale test. Please provide information that demonstrates whether the results of this testing are applicable to the existing installation at MPS3, or show that the criterion was not exceeded.

6. The staff has been interacting with AECL and Dominion Energy Kewaunee, Inc., Dominion Nuclear Connecticut, Inc., and Virginia Electric and Power Company (collectively Dominion) regarding the current ongoing chemical effects testing for MPS3 and the other Dominion nuclear sites (RIG-89), which starts with a complete non-chemically laden debris bed of fibers and particulates. The NRC staff has noted that the non-chemical head losses (head loss prior to chemical additions) in the current chemical effects tests are significantly lower than for the similarly scaled debris loads in the previous non-chemical large scale and reduced scale tests. Please provide a comparison of the non-chemical head losses determined during the previous large- and reduced-scale testing to the non-chemical head losses obtained during the current chemical effects testing. Please provide justification for the final chemically laden head loss number used in the strainer evaluation considering that previous non-chemical head losses were significantly higher than the non-chemical head losses determined in association with the recent chemical testing.

7. Please provide information that demonstrates that adequate net positive suction head (NPSH) margins are maintained throughout the post-loss of coolant accident mission time. If a time-based approach is taken, provide clear illustrations of the factors that result in the head loss values and the pump NPSH required, including an evaluation of the margin at each postulated condition.

8. Please clarify whether water holdup due to steam in the containment atmosphere was included in the minimum water level calculation, and, if not, please justify its omission.

9. For the minimum water level calculation at switchover, the supplemental response states that drainage from the refueling cavity is not credited. However, the NRC staff questions whether drainage from the refueling cavity is credited in the long term. In other words, if water from the recirculation sprays continues to drain into the cavity until it fills completely, would the results of the minimum water level calculation at switchover remain bounding, and how is this accomplished within the calculation? If not, then please describe the refueling cavity drain and the basis for assuming that debris blockage would not affect the flow of water through this drain during recirculation.

10. The results of the NPSH margin calculation, in the absence of the strainer or debris bed, should be clearly presented, such that the assumed pump operating states, pump flow rates, break size and pump configuration (i.e., cold leg recirculation or two-path recirculation) associated with the each analyzed case are specified.

11. The basic assumptions and methodology used in the analysis for computing the strainer flashing margins should be described in sufficient detail to show that the results are conservative. In particular, the response should address the technical basis for the 2450 gallons per minute (gpm) Recirculation Spray System (RSS) pump flow rate used in the flashing analysis. Discuss the basis for neglecting higher RSS pump flow rates that are

possible immediately after recirculation (i.e., 3150 gpm), for which the flashing margin could be negative.

12. Please provide the information requested under item 3.m, "Downstream effects – Components and Systems," in the "Revised Content Guide for Generic Letter 2004-02 Supplemental Response," dated November 2007.

13. The NRC staff considers in-vessel downstream effects to not be fully addressed at MPS3 as well as at other PWRs. MPS3's submittal refers to Revision 0 of the PWR Owners Group (PWROG) topical report WCAP-16793-NP, "Evaluation of Long-Term Cooling Considering Particulate, Fibrous, and Chemical Debris in the Recirculating Fluid." At this time, the NRC staff has not issued a final safety evaluation (SE) for this topical report since the PWROG intends to submit Revision 1 to address several issues identified by the Advisory Committee on Reactor Safeguards and the NRC staff. The licensee may demonstrate that in-vessel downstream effects issues are resolved for MPS3 by showing that the licensee's plant conditions are bounded by the revised version of WCAP-16793 and the corresponding final NRC staff SE, and by addressing the conditions and limitations in the final SE. The licensee may also resolve this item by demonstrating, without reference to WCAP-16793 or the staff SE, that in-vessel downstream effects have been addressed at MPS3. In any event, the licensee should report how it has addressed the in-vessel downstream effects issue within 90 days of issuance of the final NRC staff SE on WCAP-16793. The NRC staff is developing a Regulatory Issue Summary to inform the industry of the staff's expectations and plans regarding resolution of this remaining aspect of Generic Safety Issue (GSI)-191, "Assessment of [Effect of] Debris Accumulation on PWR Sump Performance."

14. Please provide the results of the bench-top testing to determine quantities of chemical precipitates formed. Please provide the results of the reduced-scale head loss testing that utilized the findings of the bench top tests.

SE, that in-vessel downstream effects have been addressed at MPS2 and MPS3. The specific issues raised in RAI question 10 for MPS2, and RAI question 13 for MPS3, should be addressed regardless of the approach the licensee chooses to take.

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Sincerely,
/ra/
Carleen J. Sanders, Project Manager
Plant Licensing Branch, 1-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-336 and 50-423
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