August 8, 2011

EA-11-047

Mr. David A. Heacock
President and Chief Nuclear Officer
Dominion Nuclear Connecticut, Inc.
Innsbrook Technical Center
5000 Dominion Blvd.
Glen Allen, VA 23060

SUBJECT: FINAL SIGNIFICANCE DETERMINATION FOR A WHITE FINDING, WITH ASSESSMENT FOLLOW-UP; NOTICE OF VIOLATION; AND RESULTS OF REGULATORY CONFERENCE [NRC SPECIAL INSPECTION REPORT NO. 05000336/2011010] – MILLSTONE POWER STATION UNIT 2

Dear Mr. Heacock:

This letter provides you the final significance determination for the preliminary White finding discussed in the U.S. Nuclear Regulatory Commission (NRC) letter dated May 27, 2011, as well as our assessment of the current performance of the Dominion Nuclear Connecticut, Inc. (Dominion) Millstone Power Station (Millstone) Unit 2. This updated assessment of Millstone Unit 2 supplements, but does not supersede, our annual assessment letter issued on March 4, 2011 (ML110620174)[1].

As described in the May 27, 2011 letter, the finding was identified during an NRC special inspection initiated on February 22, 2011. The finding involved the failure of Millstone Unit 2 personnel (including licensed Reactor Operators and Senior Reactor Operators) to carry out their assigned roles and responsibilities and to effectively manage reactivity during main turbine control valve testing on February 12, 2011, as well as the failure to have appropriate guidance in procedures to address multiple reactivity additions. This finding contributed to an unintended eight percent power increase during the test. The finding was presented at an exit meeting held at the conclusion of the special inspection on April 14, 2011, and is described in detail in the subject inspection report (NRC Inspection Report 05000336/2011008; ML111470484).

The May 27, 2011 letter also included an offer for Dominion to attend a regulatory conference (RC) or reply in writing to provide its position on the facts and assumptions the NRC used to arrive at the finding and its safety significance. At Dominion's request, a RC was held on July 19, 2011, at the NRC's Region I office in King of Prussia, Pennsylvania. During the RC, Dominion presented their observations on what occurred during the February 12, 2011 event, the results of their root cause assessment, and corrective actions being taken to prevent recurrence. Dominion also presented its views on the NRC's articulation of the finding and the criteria used to determine the significance of the finding (Inspection Manual Chapter (IMC) 0609, Appendix M, "Significance Determination Process Using Qualitative Criteria"), as

[1] Designation in parentheses refers to an Agency-wide Documents Access and Management System (ADAMS) accession number. Documents referenced in this letter are publicly-available using the accession number in ADAMS.

documented in the NRC special inspection report. Specifically, Dominion stated that it was difficult to ascertain which of the qualitative decision-making attributes, considered in IMC 0609 Appendix M, factored most significantly into the NRC's preliminary determination that the finding was of White significance. A copy of the Dominion presentation and a list of RC attendees are included in Enclosures 2 and 3 to this letter.

The NRC used a qualitative assessment tool (IMC 0609, Appendix M) to assess the significance of this finding due to the contribution of multiple human performance failures to this event, which were not easily modeled using quantitative risk assessment methods. The Appendix M assessment involved analysis of several factors including: review of six specific attributes of the finding (such as the impact the issue had on defense-in-depth, whether there was a reduction in safety margin, and the extent of condition); and consideration of any additional applicable circumstances. The relative weight of each of these inputs was determined by NRC management review.

For the Millstone Unit 2 issue, the NRC staff concluded that a number of factors led to the increased significance of the finding, including: 1) multiple human performance errors were committed by plant operators who play a vital role in maintaining defense-in-depth; 2) the operators' actions resulted in multiple positive reactivity additions to the reactor and reduced safety margin; 3) other Millstone Unit 2 operating crews also displayed some degraded performance during the post-event assessment; 4) the performance issues with the involved operating crew and the procedural deficiencies existed for an extended period of time prior to the event; and 5) Millstone's immediate response to the event, including recognizing that it occurred and entering it into the site's corrective action program, was delayed. The NRC also concluded that other factors lessened the significance of the finding, including: 1) fission product barriers were not compromised during the event; 2) although an automatic plant trip was inappropriately prevented by operator actions, one was not actually required to prevent fuel damage; and, 3) Dominion's root cause analysis was thorough and identified corrective actions that appear to address the underlying causal factors of the event.

After considering the information developed during the inspection, the information Dominion provided during the RC, and a qualitative assessment of the factors described above, the NRC determined that the inspection finding is of low to moderate safety significance, and is therefore appropriately characterized as White. The most significant factors in making this determination were the multiple, operator-induced positive reactivity additions that contributed to the unplanned reactor power increase and the impact on defense-in-depth associated with degraded human performance, and a lack of effective communication between operating crew members, which was exhibited during this event. You have 30 calendar days from the date of this letter to appeal the staff's determination of significance for the identified White finding. Such appeals will be considered to have merit only if they meet the criteria given in the IMC 0609, Attachment 2, "Process for Appealing NRC Characterization of Inspection Findings." An appeal must be sent in writing to the Regional Administrator, Region I, 475 Allendale Rd., King of Prussia, PA 19406. You are not required to respond to this letter. However, if you choose to respond, you should follow the instructions specified in the enclosed Notice when preparing your response.

As a result of our review of Millstone Unit 2 performance, including this White finding in the Initiating Events Cornerstone, we have assessed Millstone Unit 2 to be in the Regulatory Response column of the NRC Action Matrix. Therefore, we plan to conduct a supplemental inspection using Inspection Procedure 95001, "Inspection for One or Two White Inputs in a Strategic Performance Area," when Dominion staff notify us of their readiness for this inspection. This inspection is conducted to provide assurance that the root cause and contributing causes of risk significant performance issues are understood, the extent of condition is identified, and the corrective actions are sufficient to prevent recurrence.

The NRC has also determined that violations of NRC regulations occurred, as cited in the enclosed Notice of Violation (Notice). The violations involve failures by Millstone Unit 2 staff to: 1) correctly implement written procedures regarding their authorities and responsibilities for safe operation and shutdown; and, 2) develop written procedures related to the reactor protection system and for power operation and transients involving multiple reactivity additions. Details of the violations are provided in the attached Notice. In accordance with the NRC Enforcement Policy, the Notice is considered an escalated enforcement action because it is associated with a White finding.

At the July 19, 2011, RC, Dominion staff described the corrective actions Dominion has taken in response to the violations. These actions include: 1) initiation of a Prompt Issue Response Team within 12 hours of the event; 2) re-creation of the event on the Millstone Unit 2 simulator; 3) establishment, within 24 hours of the event, of senior station management oversight in the Millstone Unit 2 control room resulting in over 100 individual observations conducted in over 1000 man-hours; 4) suspension of crew qualifications for remedial training and assessment; 5) performance of a root cause evaluation by a team including three non-Dominion industry personnel; and, 6) implementation of a performance management program with ongoing evaluation of operator crew performance resulting in remediation, as warranted, and reinforcement of operator accountability.

The NRC has concluded that the information regarding the reason for the violations, the corrective actions taken and planned to correct the violations and prevent recurrence, and the date when full compliance was achieved is already addressed adequately on the docket in NRC Inspection Report 05000336/2011008, the information you presented at the RC (ML112000150), and this letter. Therefore, you are not required to respond to this letter unless the description therein does not accurately reflect your corrective actions or your position.

Notwithstanding our final assessment of the finding and related violations, the NRC staff appreciates Dominion's feedback provided during the RC that the special inspection report, including the specific IMC 0609, Appendix M analysis table provided in Attachment 4 to that report, may not have succinctly communicated how the NRC preliminarily determined the finding's significance to be White. The NRC staff will consider Dominion's feedback in future communications on the bases for our significance determination of findings, particularly when they are evaluated using this qualitative assessment tool. The NRC staff recognizes that Dominion was identifying certain corrective actions in parallel with questions that were being raised by the NRC, and that these actions (such as disqualifying some, but not all, of the operating crew members) were implemented without NRC involvement. While this clarification is noteworthy, as discussed during the RC, Millstone management's response to the event (most significantly, that of the Shift Manager and other Senior Reactor Operators involved) was

not a primary factor in the NRC preliminary significance determination.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response, if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room located at NRC Headquarters in Rockville, MD, and from the NRC's Agency-wide Documents Access and Management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response, if you choose to provide one, should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Sincerely,

/RA/

William M. Dean
Regional Administrator

Docket No. 50-336
License No. DPR-65

Enclosures:
1. Notice of Violation
2. Regulatory Conference Agenda/List of Attendees (ML112000518)
3. Dominion Regulatory Conference Presentation (ML112000536)

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In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response, if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room located at NRC Headquarters in Rockville, MD, and from the NRC's Agency-wide Documents Access and Management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response, if you choose to provide one, should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

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Regional Administrator

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ENCLOSURE
NOTICE OF VIOLATION

Dominion Nuclear Connecticut, Inc.
Millstone Power Station Unit 2

Docket No. 50-336
License No. DPR-65
EA-2011-047

During an NRC special inspection conducted at the Dominion Nuclear Connecticut, Inc. (Dominion) Millstone Power Station (Millstone) Unit 2 between February 22, 2011, and April 14, 2011, for which an exit meeting was held on April 14, 2011, violations of NRC requirements were identified. In accordance with the NRC Enforcement Policy, the violations are listed below:

A. Millstone Unit 2 Technical Specification 6.8, "Procedures," states, in part, that written procedures shall be implemented covering the applicable procedures recommended in Appendix 'A' of Regulatory Guide (RG) 1.33, February 1978.

   RG 1.33, "Quality Assurance Program Requirements (Operation), Rev. 2, Feb. 1978, Appendix A, Paragraph 1, "Administrative Procedures," specifies safety-related activities that should be covered by written procedures, including authorities and responsibilities for safe operation and shutdown

   Contrary to the above, on February 12, 2011, during the conduct of main turbine control valve testing, Millstone Unit 2 operators failed to implement written procedures regarding their authorities and responsibilities for safe operation and shutdown, and thereby caused and/or exacerbated an unanticipated eight percent reactor power increase, as evidenced by the following examples:

   1. Dominion Procedure OP-AP-300, "Reactivity Management," states, in part, that the Reactor Operator (RO) will stop and question unexpected situations involving reactivity, criticality, power level, or core anomalies, and will meet the anomalous indication with conservative actions.

      However, on February 12, 2011, when the Millstone Unit 2 Balance of Plant (BOP) RO encountered an unexpected situation involving reactivity and power level, the BOP RO failed to either stop or to otherwise take conservative action. Specifically, when the BOP RO placed Millstone Unit 2 turbine first stage pressure in service and noted an increase in first stage pressure, the BOP RO incorrectly pressed the turbine load set INCREASE button instead of the DECREASE button. When the BOP RO identified that first stage pressure did not decrease, the BOP RO pressed the INCREASE button three more times, and then pressed the DECREASE button twice. The actions by the BOP RO resulted in a rapid, unintended rise in Millstone Unit 2 reactor power.

2. Dominion Procedure OP-AP-300, “Reactivity Management,” states, in part, that the Reactivity Senior Reactor Operator (SRO) reports to the Unit Supervisor, has no concurrent duties, directly monitors the reactivity change, and will provide peer checks for the RO for all reactivity manipulations.

   However, on February 12, 2011, the Millstone Unit 2 Reactivity SRO performed a concurrent duty and did not monitor reactivity changes. Specifically, when the SM directed the Reactivity SRO to withdraw a bank of control rods by four steps, the Reactivity SRO (who had been monitoring the RCS dilution) did not identify that an unanticipated reactor power increase was already occurring. The Reactivity SRO stopped monitoring the RCS dilution and withdrew the control rods, thereby adding additional positive reactivity and exacerbated the unanticipated power increase. Additionally, as reactor power increased toward the reactor protection system (RPS) Variable High Power Trip (VHT) setpoints, the Reactivity SRO (believing reactor power was increasing due to minor power fluctuations) reset the setpoints to higher values four times, thereby preventing an automatic reactor trip. The Reactivity SRO did not recognize the reactivity change and did not inform anyone on shift at the time of his actions to reset the VHT.

3. Dominion Procedure OP-AA-100, “Conduct of Operations,” in part, establishes the expectation that the Shift Manager (SM) will maintain a broad perspective of plant operations as the senior management representative on shift.

   Dominion Procedure OP-AP-300, “Reactivity Management,” Attachment 2, “Specific Reactivity Management Requirements,” states, in part, that adding positive reactivity is never an appropriate way to address unstable plant conditions, and that it is non-conservative to withdraw control rods in an attempt to restore primary coolant temperature during a transient.

   However, on February 12, 2011, the Millstone Unit 2 SM did not maintain a broad perspective of plant operations and the SM addressed unstable plant conditions by adding positive reactivity. Specifically, the SM failed to recognize that an unanticipated power increase was occurring. Upon noting that the turbine bypass valve had automatically closed (per design, in response to the power increase), the SM directed the Millstone Unit 2 Operator at the Controls (OATC) RO to re-open the valve. Additionally, upon noting that Reactor Coolant System (RCS) temperature was lowering (also due to the power increase), the SM directed the Millstone Unit 2 Reactivity SRO to withdraw a bank of control rods by four steps. These actions added positive reactivity and exacerbated the unanticipated reactor power increase.

4. Dominion Procedure OP-AP-300, “Reactivity Management,” states, in part, that an RO will stop and question unexpected situations involving reactivity, criticality, power level, or core anomalies, and will meet the anomalous indication with conservative actions.

   However, on February 12, 2011, the Millstone OATC RO, who was adding positive reactivity by diluting the Millstone Unit 2 reactor coolant system in preparation for the

main turbine control valve test, failed to meet an unexpected situation involving reactivity and power level with conservative action. Specifically, the OATC RO followed the direction of the SM to reopen the turbine bypass valve, thereby adding additional positive reactivity and exacerbated the unanticipated power increase.

5. Dominion Procedure OP-AA-100, "Conduct of Operations," states, in part, that the Unit Supervisor (US) will provide oversight of plant operations and ensure the plant is operated safely in accordance with procedures.

   Dominion Procedure OP-AP-300, "Reactivity Management," states, in part, that the US will direct reactivity changes and ensure reactivity manipulations are made in a deliberate, carefully controlled manner.

   However, on February 12, 2011, the Millstone Unit 2 US did not provide effective oversight of plant operations, and reactivity manipulations were made in a manner that was neither deliberate nor carefully controlled. Specifically, the US was focused on the conduct of main turbine control valve testing, and did not monitor and control the overall plant response to the unanticipated power increase. Additionally, the US did not question or object to the directions provided by the SM that added additional positive reactivity and exacerbated the unanticipated power increase.

6. Dominion Procedure OP-AP-300, "Reactivity Management," states, in part, that the Shift Technical Advisor (STA) will provide engineering expertise to shift operators, as required, during periods of significant reactivity changes.

   However, on February 12, 2011, the Millstone Unit 2 STA was peer checking the main turbine control valve test, and did not provide engineering expertise to shift operators during the unanticipated power increase.

7. Dominion Procedure OP-AA-106, "Infrequently Conducted or Complex Evolutions," states, in part, that the Senior Operations Manager assigned to oversight of a test will ensure that the test is conducted in a manner that maximizes the margin of safety of the Unit.

   However, on February 12, 2011, the licensed SRO who was assigned to the Millstone Unit 2 control room to provide operations management oversight of the main turbine control valve test failed to ensure that the test was conducted in a manner that maximized the margin of safety of the Unit. Specifically, the SRO did not identify that the multiple positive reactivity additions made during the unanticipated reactor power increase were inappropriate during the event and did not take action to prevent their occurrence.

B. Millstone Unit 2 Technical Specification 6.8, "Procedures," states, in part, that written procedures shall be developed, covering the applicable procedures recommended in Appendix A of RG 1.33, February 1978.

   Contrary to the above, as of February 12, 2011, Millstone did not have adequate procedures developed that covered the applicable procedures recommended in

Appendix A of RG 1.33, February 1978, which caused and/or exacerbated an unanticipated eight percent reactor power increase during the conduct of main turbine control valve testing on February 12, 2011, as evidenced by the following examples:

1. RG 1.33, "Quality Assurance Program Requirements (Operation), Rev. 2, Feb. 1978, Appendix A, Paragraph 3, "Procedures for Startup, Operation, and Shutdown of Safety-Related PWR Systems," specifies safety-related activities that should be covered by written procedures, including, instructions for energizing, filling, venting, draining, startup, shutdown, and changing modes of operation, as appropriate, for the Reactor Control and Protection System.

   However, on February 12, 2011, Millstone Unit 2 had no procedural guidance that prohibited resetting the VHT setpoint under any unexpected transient conditions. As a result, during the unanticipated reactor power transient, as reactor power increased toward the RPS VHT setpoints, the Reactivity SRO (believing reactor power was increasing due to minor power fluctuations) reset the setpoints to higher values four times, thereby preventing an automatic reactor trip.

2. RG 1.33, "Quality Assurance Program Requirements (Operation), Rev. 2, Feb. 1978, Appendix A, Paragraph 6, "Procedures for Combating Emergencies and Other Significant Events," specifies safety-related activities that should be covered by written procedures, including other expected transients that may be applicable.

   However, on February 12, 2011, Millstone Unit 2 did not have a procedure for responding to multiple, concurrent, positive reactivity additions during power operations. Specifically, during the unplanned reactor power increase, Millstone Unit 2 operators implemented three additional positive reactivity additions (RCS dilution, re-opening a turbine bypass valve, and withdrawing control rods), and there was no procedural guidance regarding the concurrent execution of these activities.

These two violations are associated with a White SDP finding.

The NRC has concluded that information regarding the reason for the violations, the corrective actions taken and planned, and the date when full compliance was achieved is already adequately addressed on the docket in NRC Inspection Report 05000336/2011008 and in the information Dominion provided at a regulatory conference conducted on July 19, 2011 (ML112000150). Therefore, Dominion is not required to respond to this Notice of Violation (Notice). However, Dominion is required to submit a written statement or explanation pursuant to 10 CFR 2.201 if the description therein does not accurately reflect Dominion's corrective actions or its position. In that case, or if Dominion chooses to respond, clearly mark the response as a "Reply to a Notice of Violation; EA-2011-047," and send the response to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001 with a copy to the Regional Administrator, Region I, 475 Allendale Rd., King of Prussia, PA 19406, and a copy to the NRC Resident Inspector at Millstone Power Station, within 30 days of the date of the letter transmitting this Notice.

If Dominion contests this enforcement action, Dominion should also provide a copy of its response, with the basis for its denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.
If Dominion chooses to respond, its response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agency-wide Documents Access and management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. Therefore, to the extent possible, the response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

In accordance with 10 CFR 19.11, Dominion may be required to post this Notice within two working days of receipt.

Dated this 8th day of August, 2011