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

February 2, 2009

Mr. David A. Christian
President and Chief Nuclear Officer
Dominion Nuclear Connecticut, Inc.
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: MILLSTONE POWER STATION, UNIT 3 - REQUEST FOR ADDITIONAL INFORMATION REGARDING THE SPENT FUEL POOL CRITICIALITY AMENDMENT REQUEST (TAC NO. MD8251)

Dear Mr. Christian:

By letter dated July 13, 2007 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML072000386), Dominion Nuclear Connecticut, Inc. (DNC) submitted a license amendment request (LAR) for a stretch power uprate (SPU) of Millstone Power Station, Unit 3 (MPS3). Included in a supplement dated July 13, 2007 (ADAMS Accession No. ML072000281), was a request to amend the MPS3 spent fuel pool (SFP) storage requirements. By letter dated March 5, 2008 (ADAMS Accession No. ML080660108), DNC separated the MPS3 SFP storage requirements request from the MPS3 SPU request.

By letter dated August 8, 2008, the Nuclear Regulatory Commission (NRC) staff requested additional information (ADAMS Accession No. ML082001097) regarding DNC's LAR. By letter dated September 30, 2008, DNC responded to the August 8, 2008, request (ADAMS Accession No. ML082770113). The NRC staff has reviewed the DNC response to this request for additional information and determined that additional information is required in order to complete the evaluation.

The enclosed questions were sent to Mr. William D. Bartron, of your staff, in draft form to ensure that the questions were understandable, the regulatory basis for the questions was clear, and to determine if the information was previously docketed. During a phone call with Mr. Bartron on January 30, 2009, it was agreed that you would provide a response by March 6, 2009. 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 me at (301) 415-1603.

Sincerely,

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

Docket No. 50-423

Enclosure:
Request for Additional Information

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REQUEST FOR ADDITIONAL INFORMATION

SPENT FUEL POOL CRITICALLITY

MILLSTONE POWER STATION UNIT 3

DOCKET NUMBER 50-423

Dominion Nuclear Connecticut, Inc. (DNC) submitted a license amendment request (LAR) for a stretch power uprate (SPU) of Millstone Power Station, Unit 3 (MPS3) dated July 13, 2007 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML072000386). Included in supplemental information to DNC's LAR was a request to amend the MPS3 spent fuel pool (SFP) storage requirements (ADAMS Accession No. ML072000281). The Technical Specification (TS) changes associated with the SFP are found in Attachment 3 of DNC's July 13, 2007, LAR. The technical justification for the SFP LAR is located in Attachment 2 of DNC's LAR supplemental information. The request to amend the MPS3 SFP storage requirements was separated from the SPU LAR by letter dated March 5, 2008 (ADAMS Accession No. ML080660108).

By letter dated August 8, 2008, the Nuclear Regulatory Commission (NRC) staff requested additional information (RAI) (ADAMS Accession No. ML082001097) regarding DNC's LAR. By letter dated September 30, 2008, DNC responded to the August 8, 2008, request (ADAMS Accession No. ML082770113).

The MPS3 SFP is divided into three regions. The storage racks in Regions I and II contain a permanently installed absorber: BORAL. The storage racks in Region III contain a permanently installed absorber: Boraflex. Boraflex is subject to known degradation mechanisms in SFP environments. Due to the degradation at MPS3, Boraflex is not credited for maintaining SFP sub-criticality requirements.

There are no proposed TS changes for Region I. Region I currently has two possible storage configurations: a 4-out-of-4 storage configuration in which the fuel assemblies must meet the burnup/enrichment requirements in TS Figure 3.9-1, and a repeating 3-out-of-4 storage configuration in which one cell in the 2x2 array must be empty, as shown in TS Figure 3.9-2. There is no additional limitation being imposed on Region I with respect to pre-SPU or post-SPU fuel.

Currently, Region II has one storage configuration: a 4-out-of-4 storage configuration in which the fuel assemblies must meet the burnup/enrichment requirements in TS Figure 3.9-3. The LAR proposes to change TS Figure 3.9-3 to incorporate decay time into the burnup/enrichment requirements. The decay time includes the decay of Plutonium – 241 (^{241}Pu) and the corresponding buildup of Americium – 241 (^{241}Am). There is no additional limitation being imposed on Region II with respect to pre-SPU or post-SPU fuel.

Enclosure

Currently, Region III has one storage configuration: a 4-out-of-4 storage configuration in which the fuel assemblies must meet the burnup/enrichment requirements in TS Figure 3.9-4. TS Figure 3.9-4 currently includes decay time in the burnup/enrichment requirements. The LAR proposes to change TS Figure 3.9-4 to limit it to pre-SPU fuel assemblies. Figure 3.9-5 is being proposed as an addition to include post-SPU fuel assemblies in Region III. Figure 3.9-5 will include decay time in the burnup/enrichment requirements.

The current MPS3 TS 5.6.1.1 states, "The spent fuel storage racks are made up of 3 Regions which are designed and shall be maintained to ensure a K_{eff} less than or equal to 0.95 when flooded with unborated water." The current MPS3 TS 3.9.13 limiting condition of operation (LCO) states, "The Reactivity Condition of the Spent Fuel Pool shall be such that k_{eff} is less than or equal to 0.95 at all times." A previous MPS3 SFP license amendment, dated November 28, 2000 (ADAMS Accession No. ML003771974), demonstrated that k_{eff} was less than or equal to 0.95 with unborated water under nominal conditions and that k_{eff} was less than or equal to 0.95 with borated water under abnormal/accident conditions. Therefore, the MPS3 licensing basis is to maintain the SFP k_{eff} less than or equal to 0.95 at a 95 percent probability, 95 percent confidence level, if flooded with unborated water under nominal conditions and to maintain the SFP k_{eff} less than or equal to 0.95 at a 95 percent probability, 95 percent confidence level with borated water under abnormal/accident conditions.

The current LAR intends to maintain the MPS3 SFP k_{eff} less than or equal to 0.95 at a 95 percent probability, 95 percent confidence level, if flooded with unborated water under nominal conditions and to maintain the SFP k_{eff} less than or equal to 0.95 at a 95 percent probability, 95 percent confidence level with borated water under abnormal/accident conditions.

The NRC staff requests responses to the following questions in order to continue its review of the MPS3 SFP LAR. Questions 1 through 19 are contained in the August 8, 2008, letter.

RAI 20

In the response to RAI 1 regarding the axial burnup distribution modeling, it is stated that no racks were modeled. High density water was modeled in the space for the racks, grid spacers, etc. Demonstrate that this is a conservative modeling parameter for all fuel burnup levels that could be stored in the spent fuel pool.

RAI 21

In the response to RAI 1 - 3 regarding the axial burnup distribution modeling, it is stated that Profile 5 from NUREG/CR 6801, "Recommendations for Addressing Axial Burnup in PWR Burnup Credit Analyses," March 2003, was used. In NUREG/CR-6801, Figures 3 and 7 - 18 show various profile shapes at various burnup intervals. Additionally, Figures 19 – 30 statistically demonstrate the bounding profile for various burnup intervals. Demonstrate Profile 5 is bounding for all MPS3 fuel axial burnup profiles, in particular the 15-25 gigawatt day per metric ton uranium (GWd/MTU) range.

RAI 22

In the response to RAI 1 regarding the axial burnup distribution modeling, it is stated that neither the four or seven node case is more reactive. MPS3, therefore, concludes both models are sufficient. Additionally, in the comparison on page 3 of the RAI response, only two high burn-up levels were used and the Δk_{eff} results show a 0.00171 difference. Given the reserved analytical margin is 0.001, justify why this difference is acceptable. Provide additional justification for a four-node model, or perform your analysis with a more conservative model (e.g., more zones).

RAI 23
In the response to RAIs 5 and 6, it is stated that the PARAGON code and SCALE Version 5.1 were used for computational efficiency, rather than PHOENIX-P and SCALE Version 4.4. Provide a justification for the use of these codes based on technical sufficiency.

RAI 24
In the response to RAI 3, it is stated that the limiting axial burnup profile is chosen based on the relative burnup of the top two nodes. A comparison of the relative burnup in the top two nodes is not how the limiting profile was determined in NUREG/CR-6801, therefore the NRC staff is unsure how this method adequately determines the limiting profile. NUREG/CR-6801 Appendix A, Axial Discretization and Boundary Conditions, indicates that more than the top two nodes are important for determining the 'end effect.' NUREG/CR-6801 Appendix A indicates that the 'end effect' must consider the top third of the assembly. Additionally, NUREG/CR-6801 states, "...that often a very small secondary peak is observed at the other end of the fuel rod, due to the reduced burnup at that end as well." Provide additional justification to support your method or demonstrate, with justification, the limiting profile.

RAI 25

Section 4.5.2 of WCAP 16721-P, "Millstone Unit 3 Spent Fuel Pool Criticality Analysis," dated March 2007, states that three scenarios were analyzed in detail for the spent fuel assembly mishandling and dropped assembly events. Demonstrate the three scenarios analyzed bounds all mishandling and dropped assembly events. Additionally, the MPS3 Final Safety Analysis Report states that "SFP bulk water temperature corresponding to the maximum reactivity in the normal operating temperature range is used in the criticality analysis. The normal operating bulk water temperature range used in the criticality analysis is 32 °F to 160 °F, which bounds the actual normal operating temperature range." In WCAP 16721, it is stated that 68 °F was used for the criticality analysis and that is the most reactive temperature for Regions I and II. Demonstrate this is the most reactive temperature for Regions I and II.

If you have any questions, please contact me at (301) 415-1603.

Sincerely,

/ra/

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

Docket No. 50-423

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