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Dominion®

February 16, 2017

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Serial No.	17-048
NRA/WDC	R0
Docket Nos.	50-336/423
License Nos.	DPR-65
	NPF-49

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNITS 2 AND 3
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING PROPOSED ALTERNATIVE REQUESTS RR-04-24 and IR-3-30 FOR ELIMINATION OF THE REACTOR PRESSURE VESSEL THREADS IN FLANGE EXAMINATION

By letter dated October 6, 2016, Dominion Nuclear Connecticut, Inc. (DNC) requested Nuclear Regulatory Commission (NRC) approval of Alternative Request RR-04-24, for Millstone Power Station Unit 2 (MPS2) and Alternative Request IR-3-30 for Millstone Power Station Unit 3 (MPS3). American Society of Mechanical Engineers (ASME) Code, Section XI requires a volumetric examination of Reactor Vessel – Threads in Flange to satisfy nondestructive examination requirements. DNC requested approval to eliminate the volumetric examination for the remainder of the fourth 10-year inservice inspection interval for MPS2 scheduled to end on March 31, 2020 and for the remainder of the third 10-year inservice inspection interval for MPS3 scheduled to end on April 22, 2019. In an email dated February 2, 2017, the NRC transmitted a request for additional information (RAI) related to the alternative requests. DNC agreed to respond to the RAI by March 2, 2017.

The attachment to this letter provides the response to the RAI for MPS2 and MPS3.

If you have any questions regarding this submittal, please contact Wanda Craft at (804) 273-4687.

Sincerely,

Mark D. Sartain
Vice President – Nuclear Engineering and Fleet Support

Attachment:

1. Response to Request for Additional Information Regarding Alternative Requests RR-04-24 and IR-3-30, Proposed Alternative to ASME Section XI for Elimination of Reactor Pressure Vessel Threads in Flange Examination

A047
NRR

Commitments made in this letter: None

cc: U.S. Nuclear Regulatory Commission
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ATTACHMENT

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING ALTERNATIVE REQUESTS RR-04-24 AND IR-3-30, PROPOSED ALTERNATIVE TO ASME SECTION XI FOR ELIMINATION OF REACTOR PRESSURE VESSEL THREADS IN FLANGE EXAMINATION

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RAI - 1

Table 2 of Attachments 1 and 2 of the submittal shows that most of the load comes from the preload on the bolt (bolt preload), which occurs at low temperature. However, the flaw tolerance evaluation only considers the fracture toughness (K_{IC}) at the upper shelf (operating temperature). The NRC staff requests the licensee to provide a comparison between the calculated Table 2 "Preload" values of K and the applicable allowable value for K for MPS2 and MPS3 at the head tensioning temperatures.

DNC Response

The fracture toughness (K1c) during head tensioning is based on the reference temperature for nil ductility transition (RTndt) of the vessel flange materials, the assumed flange temperature at the time of head tensioning, and the correlation for K1c provided in Figure A-4200-1 of ASME Code, Section XI. The RTndt of the vessel flange region is 10 degrees F as reported in FSAR Table 4.6-1 for MPS2 and minus 40 degrees F as reported in FSAR Table 5.3-2 for MPS3. Head tensioning for both units occurs at 70 degrees F or above. For MPS2, which bounds MPS3, the flange temperature during head tensioning is assumed as the procedural minimum of 70 degrees F, minus the temperature measurement uncertainty of 13 degrees F, or 57 degrees F. The flange temperature during head tensioning of 57 degrees F compared to the MPS2 RTndt of 10 degrees F, results in a margin of 47 degrees F.

For a T-RTndt of 47 degrees, ASME Code Figure A-4200-1 provides a K1c value of 86.3 ksi-√inch. This material fracture toughness is conservatively adjusted by dividing by √10, similar to the allowable value used for normal operating temperatures. Denoting Kmax as the maximum K value for preload conditions from Table 2, the requested comparison becomes:

$$\text{Kmax} < \frac{\text{K1c from ASME Figure A-4200-1}}{\sqrt{10}}$$

$$17.4 \text{ ksi-}\sqrt{\text{inch}} < \frac{86.3 \text{ ksi-}\sqrt{\text{inch}}}{\sqrt{10}}$$

$$17.4 \text{ ksi-}\sqrt{\text{inch}} < 27.3 \text{ ksi-}\sqrt{\text{inch}}$$

The comparison demonstrates that fracture toughness of the vessel flange materials during head tensioning is adequate to withstand the postulated flaws listed in Table 2.