

October 1, 2003

Mr. David A. Christian  
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SUBJECT: MILLSTONE POWER STATION, UNIT NO. 2 - CHANGES TO THE REACTOR  
PRESSURE VESSEL SURVEILLANCE CAPSULE WITHDRAWAL SCHEDULE  
(TAC NO. MB9149)

Dear Mr. Christian:

By letter dated June 3, 2003, Dominion Nuclear Connecticut, Inc. (DNC) submitted proposed changes to the Millstone Power Station, Unit No. 2 (MP2) reactor pressure vessel (RPV) surveillance capsule withdrawal schedule. The proposed changes were submitted pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix H, Section III.B.3, which requires that: (1) withdrawal schedules be submitted with a technical justification, as specified in 10 CFR 50.4, and (2) the proposed schedule must be approved by the U.S. Nuclear Regulatory Commission (NRC) prior to implementation.

The NRC staff has reviewed DNC's technical justification and finds that the proposed changes to the RPV surveillance capsule withdrawal schedule are consistent with the recommendations specified in American Society for Testing and Materials (ASTM) standard E185-82. Therefore, the proposed changes are acceptable and are approved. Accordingly, Table 4.6-9 in the MP2 Final Safety Analysis Report and Table 4.4-3 in the MP2 Technical Requirements Manual should be revised to reflect these approved changes.

The staff's Safety Evaluation is enclosed. If you have any questions or comments, please contact the MP2 Project Manager, Richard B. Ennis, at (301) 415-1420.

Sincerely,

/RA/

James W. Clifford, Chief, Section 2  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-336

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR CHANGES TO THE REACTOR PRESSURE VESSEL

SURVEILLANCE CAPSULE WITHDRAWAL SCHEDULE

DOMINION NUCLEAR CONNECTICUT, INC.

MILLSTONE POWER STATION, UNIT NO. 2

DOCKET NO. 50-336

1.0 INTRODUCTION

By letter dated June 3, 2003, Dominion Nuclear Connecticut, Inc. (DNC or the licensee) submitted proposed changes to the Millstone Power Station, Unit No. 2 (MP2) reactor pressure vessel (RPV) surveillance capsule withdrawal schedule. The proposed changes were submitted pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix H, Section III.B.3, which requires that: (1) withdrawal schedules be submitted with a technical justification, as specified in 10 CFR 50.4, and (2) the proposed schedule must be approved by the U.S. Nuclear Regulatory Commission (NRC) prior to implementation.

The MP2 RPV surveillance capsule withdrawal schedule is contained in Table 4.6-9 of the MP2 Final Safety Analysis Report (FSAR) and Table 4.4-3 of the MP2 Technical Requirements Manual (TRM). The current schedule for each capsule in Effective Full Power Years (EFPYs), as reflected in the FSAR and TRM, is as follows:

<b>Capsule</b>	<b>Withdrawal Schedule (EFPYs)</b>
W-97	3.0
W-97 (Flux Monitor)	10.0
W-104	10.0
W-284	17.0
W-263	24.0
W-277	32.0
W-83	Spare

The licensee has proposed to revise the RPV surveillance capsule withdrawal schedule to reflect that capsule W-83 was removed and evaluated after 15.3 EFPYs, contrary to the original plan to remove capsule W-284 at 17 EFPYs. In addition, DNC has proposed to designate capsule W-277 as the fourth capsule for removal at the end-of-life (EOL) period corresponding to the original 40-year license. Capsules W-263 and W-284 would be designated as spares for supplemental testing or license renewal activities. Therefore, the FSAR and TRM tables would be revised to reflect the following withdrawal schedule:

<b>Capsule</b>	<b>Withdrawal Schedule (EFPYs)</b>
W-97	3.0
W-97 (Flux Monitor)	10.0
W-104	10.0
W-83	15.3
W-277	EOL
W-263	Spare
W-284	Spare

## 2.0 REGULATORY EVALUATION

Nuclear power plant licensees are required by Appendix H to 10 CFR Part 50 to implement RPV surveillance programs to “monitor changes in the fracture toughness properties of ferritic materials in the reactor vessel beltline region... which result from the exposure of these materials to neutron irradiation and the thermal environment.” Section III.B.1 of Appendix H states that the design of the surveillance program and the withdrawal schedule must meet the requirements of the edition of the American Society for Testing and Materials (ASTM) E185, “Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels,” that is current on the issue date of the American Society of Mechanical Engineers (ASME) Code to which the RPV was purchased. The rule permits the use of later editions of ASTM E185, but including only those editions through 1982 (i.e., ASTM E185-82).

As discussed in Section 1.0 of this Safety Evaluation (SE), 10 CFR Part 50, Appendix H, Section III.B.3, requires prior NRC approval of all withdrawal schedule changes. As discussed in NRC Administrative Letter 97-04, “NRC Staff Approval for Changes to 10 CFR Part 50, Appendix H, Reactor Vessel Surveillance Specimen Withdrawal Schedules,” dated September 30, 1997, changes to RPV surveillance capsule withdrawal schedules that do not conform to ASTM E185 require approval by the license amendment process, whereas changes that do conform to the ASTM standard require only staff verification of such conformance. DNC's submittal states that the proposed changes conform to ASTM E185-82 and, as such, a license amendment is not required. Therefore, DNC requested that the NRC provide verification of the conformance to the ASTM standard.

### 3.0 TECHNICAL EVALUATION

The licensee's submittal provided the following justification for the proposed withdrawal schedule changes:

The proposed schedule reflects the incorporation of the most recent surveillance capsule analysis provided by DNC's letter dated February 26, 2003. Capsule W-83, identified as a standby capsule, was removed based upon better agreement with ASTM E185-82 and utilization of a capsule with a higher lead factor.

Development of the new withdrawal schedule is based upon ASTM E185-82. Use of ASTM E185-82 was selected to meet the requirements of 10 CFR 50, Appendix H. Consideration is given to the predicted transition temperature shift and the reactor vessel inside surface. The maximum transition temperature of limiting material is between 100°F and 200°F. (Note: No beltline material is predicted to fall below 50 ft-lb at the 1/4 thickness (1/4t) location). Based on ASTM E185-82 requirements, removal of four (4) capsules is recommended.

Historically, the first capsule, W-97, was removed and evaluated after 3.0 EFPY. The results were documented in [Combustion Engineering Report] TR-N-MCM-008. The second capsule W-104 and supplemental dosimetry (W-97 Flux Monitor) were removed after 10 EFPY. The results are documented in [B&W Nuclear Service Company Report] BAW-2142. This information is currently contained in Table 4.6-9 of the FSAR and in Table 4.4-3 of the TRM. The most recent capsule evaluated (W-83) was the third capsule removed. Its removal was after 15.3 EFPY and is documented in [Westinghouse Report] WCAP-16012, consistent with the ASTM Standard recommendation of 15 EFPY.

In selection of the fourth capsule, it is beneficial to utilize the surveillance capsules with the highest lead factors earlier in life. Therefore, capsules W-263 or W-277 were considered given they both have projected lead factors of 1.31. Based upon the lead factor, the capsule will receive between one and two times the end-of-life vessel surface fluence at end-of-life, which is consistent with ASTM E185-82 recommendations. Consideration was then given to the capsule contents. Specifically, while both contain relevant materials, W-263 contains SRM or "standard reference material" while W-277 contains transverse charpy impact base material specimens from the limiting MP2 material. This standard reference material is not a limiting material associated with MP2. It provides additional information relative to neutron irradiation damage but it is also less useful in terms of specific damage for MP2 materials. Therefore, capsule W-277 was selected as the fourth capsule for removal. Capsules W-263 and W-284 will be identified as spare and available for supplemental testing or license renewal activities.

The NRC staff reviewed DNC's technical justification against the recommendations in the ASTM standard. Specifically, ASTM E185-82 Section 7.6.2 and Table 1, provide recommendations regarding the capsule withdrawal schedule. For a predicted temperature transition range of greater than 100 °F and less than, or equal to, 200 °F the ASTM standard recommends that: (1) a minimum of four capsules be removed, (2) the third capsule be removed at 15 EFPYs, (3) the fourth capsule be removed at EOL, and (4) the fourth capsule be chosen such that it will

receive an exposure of between one and two times the EOL vessel inside surface peak fluence. The staff finds that the proposed changes are consistent with the recommendations in ASTM E185-82.

#### 4.0 CONCLUSION

The NRC staff has reviewed DNC's technical justification and finds that the proposed changes to the RPV surveillance capsule withdrawal schedule are consistent with the recommendations specified in ASTM E185-82 as discussed in SE Section 3.0. Therefore, the proposed changes are acceptable and are approved. Accordingly, Table 4.6-9 in the MP2 FSAR and Table 4.4-3 in the MP2 TRM should be revised to reflect these approved changes.

Principal Contributors: A. Black  
R. Ennis

Date: October 1, 2003