



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

December 2, 2019

Vice President, Operations
Entergy Nuclear Operations, Inc.
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043-9530

SUBJECT: PALISADES NUCLEAR PLANT – REACTOR VESSEL MATERIAL
SURVEILLANCE CAPSULE WITHDRAWAL SCHEDULE
(EPID L-2019-LRO-0051)

Dear Sir or Madam:

By letter dated June 24, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19175A102), Entergy Nuclear Operations, Inc., (Entergy, the licensee) requested revision of the reactor vessel material surveillance capsule withdrawal schedule for Palisades Nuclear Plant (PNP), in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements," paragraph III.B.3.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the subject request and concludes, as set forth in the enclosed safety evaluation, that the modified surveillance capsule withdrawal schedule for Capsule W-80 for PNP is acceptable for implementation and satisfies the requirements of Appendix H to 10 CFR Part 50 for the current 60-year license term.

If you have any questions, please contact me at 301-415-2855 or via e-mail at Scott.Wall@nrc.gov.

Sincerely,

A handwritten signature in black ink that reads "Scott P Wall".

Scott P. Wall, Senior Project Manager
Plant Licensing Branch III
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-255

Enclosure:
Safety Evaluation

cc: Listserv



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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR REVISION TO REACTOR VESSEL MATERIAL

SURVEILLANCE CAPSULE REMOVAL SCHEDULES FOR

RENEWED FACILITY OPERATING LICENSE NO. DPR-20

ENERGY NUCLEAR OPERATIONS, INC.

PALISADES NUCLEAR PLANT

DOCKET NO. 50-255

1.0 INTRODUCTION

By letter dated June 24, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19175A102), Entergy Nuclear Operations, Inc., (Entergy, the licensee) requested revision of the reactor vessel material surveillance capsule withdrawal schedules for Palisades Nuclear Plant (PNP), in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements," III.B.3.

Specifically, the licensee proposed to withdraw Capsule W-80 (the fifth capsule) from PNP in accordance with American Society for Testing and Materials Standard Practice (ASTM) E 185-82, "Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels" (ASTM E 185-82 or Standard Practice).

2.0 REGULATORY EVALUATION

The regulations and guidance relevant to this request include:

Regulation 10 CFR 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements," states, in part, that:

The purpose of the reactor vessel material surveillance program required by this appendix is to monitor changes in the fracture toughness properties of ferritic materials in the reactor vessel beltline region of light water nuclear power reactors which result from exposure of these materials to neutron irradiation and the thermal environment. Under the program, fracture toughness test data are obtained from material specimens exposed in surveillance capsules, which are withdrawn periodically from the reactor vessel.

Regulation 10 CFR 50, Appendix H, III.B.1., states, in part:

The design of the surveillance program and the withdrawal schedule must meet the requirements of the edition of ASTM E 185 that is current on the issue date of the [American Society of Mechanical Engineers] ASME Code to which the reactor vessel was purchased. Later editions of ASTM E 185 may be used, but including only those editions through 1982.

Regulation 10 CFR 50, Appendix H, III.B.3., states:

A proposed withdrawal schedule must be submitted with a technical justification as specified in 10 CFR 50.4. The proposed schedule must be approved prior to implementation.

ASTM E 185-82 provides specific criteria for removal of surveillance capsules, specifically, the removal times and number of capsules that must be removed. Surveillance capsules must be removed after a certain amount of power operation has elapsed or at various times when the reactor vessel shell is projected to achieve certain levels of neutron fluence. The intent of the Standard Practice is to achieve a set of testing data over a range of neutron fluences for the reactor vessel that bounds the current life of the plant.

Administrative Letter 97-04, states, in part, that:

The Commission [U.S. Nuclear Regulatory Commission (NRC or Commission)] found that while 10 CFR Part 50, Appendix H, II.B.3, requires prior NRC approval for all withdrawal schedule changes, only certain changes require license amendments as the process to be followed for such approval. Specifically, those changes that do not conform to the ASTM standard referenced in Appendix H (ASTM E 185, Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels) will require approval by the license amendment process, whereas changes that conform to the ASTM standard require only staff verification of such conformance.

3.0 TECHNICAL EVALUATION

3.1 Proposal for PNP

The submittal for PNP proposed to alter the current withdrawal schedule for Capsule W-80 from 31.96 to 35.2 effective full power years (EFPY) of operation from plant startup. As stated in the submittal, this corresponds to a neutron fluence of between 3.06×10^{19} neutrons per square centimeter (n/cm^2) and $3.65 \times 10^{19} n/cm^2$. The current capsule withdrawal schedule is from Final Safety Analysis Report (FSAR), Table 4-20, and is also presented in the submittal along with the proposed capsule withdrawal schedule.

3.2 NRC Staff Review

Surveillance capsules are withdrawn and tested periodically as designated in the withdrawal schedule. Appendix H requires that the proposed schedule be approved prior to implementation.

By letter dated September 28, 2006 (ADAMS Accession No. ML062710068), the NRC granted license renewal to PNP for a term expiring March 24, 2031, and extended the original 40-year license term to 60 years. Section XI.M31, "Reactor Vessel Surveillance" in NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," includes recommended changes to the surveillance capsule withdrawal schedule to address the period of extended operation. In NUREG-1871, "Safety Evaluation Report Related to the License Renewal of Palisades Nuclear Plant," January 2007 (ADAMS Accession No. ML062710074), the NRC staff accepted that 60 years of operation is equivalent to 42.37 EFPY.

ASTM E 185-82 defines "End of Life (EOL)" as the design lifetime in terms of years, EFPY, or neutron fluence. Table 1 in ASTM E 185-82 lists the minimum recommended number of surveillance capsules and their withdrawal schedule. Table 1, Note E, requires that the final surveillance capsule to be withdrawn should be withdrawn not less than once or greater than twice the limiting fluence value projected for the reactor vessel at the EOL. For PNP, 60-year design life corresponds to 42.37 EFPY of operation from plant startup.

For PNP, the submittal states that the maximum reactor vessel fluence at 42.37 EFPY is projected to be 3.429×10^{19} n/cm². The submittal proposes changing the withdrawal schedule for Capsule W-80 to 35.2 EFPY. The corresponding neutron fluence at this EFPY for this capsule would be 3.65×10^{19} n/cm², which is 1.06 times the peak 60-year neutron fluence. With this revised schedule, PNP Capsule W-80, is scheduled to be withdrawn not less than once nor greater than twice the EOL neutron peak fluence, consistent with ASTM E 185-82.

NRC Administrative Letter 97-04 informed licensees that changes to their facility reactor vessel material surveillance capsule withdrawal schedules, as specified in 10 CFR Part 50, Appendix H, that conform to the applicable ASTM standard requires only staff verification of such conformance. Based on the information in the application and NUREG-1871 for PNP, the NRC staff finds the licensee has demonstrated that its proposed withdrawal schedule fulfills the provisions in ASTM E 185-82 for the 60-year life of PNP.

4.0 CONCLUSION

Based on the above evaluation, the NRC staff concludes that the revised surveillance capsule withdrawal schedule for Capsule W-80 for PNP satisfies the requirements of ASTM E 185-82 as it relates to the current 60-year operating period. Therefore, the NRC staff concludes that the licensee's modified surveillance capsule withdrawal schedule for W-80 for PNP is acceptable for implementation and satisfies the requirements of 10 CFR Part 50, Appendix H, for the current 60-year license term.

Principal Contributor: Chia-Fu (Simon) Sheng, NRR

Date of issuance: December 2, 2019

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SURVEILLANCE CAPSULE WITHDRAWAL SCHEDULE
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DATE	11/18/19	11/18/19	10/31/19
OFFICE	NRR/DORL/LPL3/BC	NRR/DORL/LPL3/PM	
NAME	NSalgado	SWall	
DATE	12/02/19	12/02/19	

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