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

January 20, 2015

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

SUBJECT: PALISADES NUCLEAR PLANT – REQUEST FOR ADDITIONAL INFORMATION REGARDING THE LICENSE AMENDMENT REQUEST TO IMPLEMENT 10 CFR 50.61a (TAC NO. MF4528)

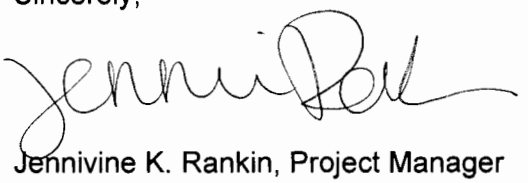
Dear Sir or Madam:

By letter dated July 29, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14211A520), Entergy Nuclear Operations, Inc. (ENO) submitted a license amendment request (LAR) for Palisades Nuclear Plant (PNP) to implement Title 10 of the Code *of Federal Regulations* (10 CFR) 50.61a, "Alternate Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock (PTS)," also referred to as the alternate PTS rule. PNP is expected to exceed the screening criteria of the PTS rule (10 CFR 50.61) in August 2017, prior to the expiration of its extended operating license (2031). Compliance with the requirements of 10 CFR 50.61a may be met as an alternative to 10 CFR 50.61.

The U.S. Nuclear Regulatory Commission staff is reviewing the submittal and has determined that additional information is needed to complete its review. The specific questions are found in the enclosed request for additional information (RAI). The draft questions were sent via electronic transmission on January 9, 2015, to Mr. Jeffrey Erickson, of your staff. The draft questions were sent to ensure that they were understandable, the regulatory basis was clear, and to determine if the information was previously docketed. A clarification telephone conference was held on January 16, 2015. As a result, modifications were made to RAI 1a and 2c, as reflected in the enclosed RAI. Based on our discussions we understand that a response to the RAIs will be provided by February 17, 2015.

If you have any questions, please contact me at Jennivine.Rankin@nrc.gov or (301) 415-1530.

Sincerely,



Jennivine K. Rankin, Project Manager
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Enclosure:
Request for Additional Information

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REQUEST FOR ADDITIONAL INFORMATION

ENTERGY NUCLEAR OPERATIONS, INC.

PALISADES NUCLEAR PLANT

LICENSE AMENDMENT REQUEST TO IMPLEMENT 10 CFR 50.61a

"ALTERNATE FRACTURE TOUGHNESS REQUIREMENTS FOR

PROTECTION AGAINST PRESSURIZED THERMAL SHOCK EVENTS"

DOCKET NO 50-255

By letter dated July 29, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14211A520), Entergy Nuclear Operations, Inc. (ENO) submitted a license amendment request (LAR) for Palisades Nuclear Plant (PNP) to implement Title 10 of the Code *of Federal Regulations* (10 CFR) 50.61a, "Alternate Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock (PTS)," also referred to as the alternate PTS rule. PNP is expected to exceed the screening criteria of the PTS rule (10 CFR 50.61) in August 2017, prior to the expiration of its extended operating license (2031). Compliance with the requirements of 10 CFR 50.61a may be met as an alternative to 10 CFR 50.61.

Based on its review of the amendment request, the U.S. Nuclear Regulatory Commission staff has determined that additional information is required to complete the review.

RAI 1

10 CFR 50.61a(c)(2) states, in part, the following:

> Each licensee shall perform an examination and an assessment of flaws in the reactor vessel beltline as required by paragraph (e) of this section. The licensee shall verify that the requirements of paragraphs (e), (e)(1), (e)(2), and (e)(3) of this section have been met.

Issue 1a

There is no discussion of the proximity of the indications in weld 2-112B to each other.

RAI 1a

Provide a discussion of the proximity of the indications, according to the directions in ASME Section XI, paragraph IWA-3300(b), to demonstrate how the indications in weld 2-112B were resolved.

Issue 1b

A plant-specific assessment of total plate flaws is shown in Table 8-11, "Alternate PTS Rule Allowable Number of Flaws in Plates and Forgings Scaled for Palisades" of the LAR enclosure.

In this table, all of the flaws detected during the February 2014 inservice inspection at PNP have been included, reflecting the assumption made by the licensee that all detected flaws lie in the plate rather than in the weld. The exact procedure used to determine the total plate area included in the inspection is not given. Specifically, it is not clear if the area of the weld has been included or excluded from the total plate area.

RAI 1b

Augment Table 8-10, "Inspection Length and Area for Palisades," or otherwise revise the documentation provided in the submittal, to clarify how the total plate area was calculated and whether it includes the area of the weld.

RAI 2

10 CFR 50.61a(c)(1) states, in part, the following:

> Each licensee shall have projected values of RT_{MAX-X} for each reactor vessel beltline material for the EOL fluence of the material. The assessment of RT_{MAX-X} values must use the calculation procedures given in paragraphs (f) and (g) of this section. The assessment must specify the bases for the projected value of RT_{MAX-X} for each reactor vessel beltline material, including the assumptions regarding future plant operation (e.g., core loading patterns, projected capacity factors); the copper (Cu), phosphorus (P), manganese (Mn), and nickel (Ni) contents; the reactor cold leg temperature (T_C); and the neutron flux and fluence values used in the calculation for each beltline material.

Issue 2a

Section 4, "Plant-Specific RV Material Properties and Dimensions" of the LAR enclosure states the following:

> Table 4-1 summarizes the best estimate copper, manganese, phosphorus, and nickel contents and $RT_{NDT(U)}$ values of the beltline and extended beltline materials for the Palisades RV. $RT_{NDT(U)}$ values for the Palisades RV plate materials were determined in accordance with the fracture toughness requirements in NUREG-0800, Revision 2, Branch Technical Position MTEB 5-3 (Reference 6); and the requirements of Subparagraph NB-2331 of Section III of the ASME B&PV Code (Reference 7). $RT_{NDT(U)}$ values for the weld materials are generic values for Linde 1092 and 124 weld fluxes per Reference 1.

Table 4-1, "Details of RT_{MAX-X} Calculation Inputs for Palisades" of the LAR does not clearly identify which plates used the methods of the Branch Technical Position (BTP) 5-3 and which plates followed the requirements of 10 CFR Part 50, Appendix G, as augmented by the criteria in Section III of the ASME Code.

RAI 2a

Document which method was used for each $RT_{NDT(u)}$ value in Table 4-1. Provide data demonstrating how each value of $RT_{NDT(u)}$ was calculated when a provision of BTP 5-3 was used.

Issue 2b

Table 5-1, "Maximum Neutron Fluence on the RV Clad-to-Base Metal Interface for Palisades at 42.1 EFPY" of the LAR, lists that the values for the intermediate and lower longitudinal (axial) welds in the vessel are the same, 2.161 x 10^{+19} neutron/cm^2 (E >1.0 MeV), which is 63% of the peak values for the adjacent intermediate and lower shell plates. The methodology for determining the maximum fluence at the axial welds relative to the maximum fluence in the adjacent plates is not discussed in the LAR.

RAI 2b

Provide a discussion of how the maximum fluence for each region and component in Table 5-1 was determined from the detailed fluence information contained in References 8 and 13 listed in Section 10 of the LAR enclosure. For clarity, illustrate the axial position of the active fuel and the azimuthal position of the peak fluence values for the adjacent intermediate and lower shell plates on Figure 4-1, "Identification and Location of Beltline Region Materials for the Palisades Reactor Vessel."

Issue 2c

Equations 5, 6, and 7 in 10 CFR 50.61a estimate ΔT_{30} as a function of various input values, including neutron flux. The licensee has provided most of these input values in Tables 4-1, 5-1 and Table 5-2, "RV Cold Leg Temperature per Operating Cycle for Palisades" of the LAR enclosure. The LAR lacks neutron flux values in Table 8-1, "RT_{MAX-AW} Calculation Results for Palisades at 42.1 EFPY," Table 8-2, "RT_{MAX-PL} Calculation Results for Palisades at 42.1 EFPY," and Table 8-3, "RT_{MAX-CW} Calculation Results for Palisades at 42.1 EFPY" for the calculation of RT_{MAX-X} for the materials listed in Table 4-1.

RAI 2c

Provide neutron flux values on a per cycle basis for the limiting material/region (W5214 intermediate shell longitudinal weld).

RAI 3

Section 3.0, "Background" of the LAR indicates that PNP reactor vessel fluence was recalculated based on actual reactor operation through fuel Cycle 22 and expected fluence based on projected operations through Cycle 26. This evaluation was documented in WCAP-15353 – Supplement 3 – NP, Revision 0, dated June 2013. The PNP alternate PTS rule evaluation is documented in WCAP-17628 – NP, Revision 1, "Alternate Pressurized Thermal Shock (PTS) Rule Evaluation for Palisades," dated June 2014. WCAP-17628-NP, Revision 1, for its reactor vessel neutron fluence values references WCAP-15353 – Supplement 2 – NP, Revision 0, "Palisades Reactor Pressure Vessel Fluence Evaluation," dated July 2011.

Please provide clarification for which supplement of WCAP-15353-NP is used in evaluating PNP's alternate fracture toughness requirements for protection against PTS.

If you have any questions, please contact me at Jennivine.Rankin@nrc.gov or (301) 415-1530.

Sincerely,

/RA/

Jennivine K. Rankin, Project Manager
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Enclosure:
Request for Additional Information

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