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

May 11, 2016

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 FOR IMPLEMENTATION OF AN ALTERNATE REPAIR CRITERION ON THE STEAM GENERATOR TUBES (CAC NO. MF7435)

Dear Sir or Madam:

By letter dated March 3, 2016 (Agencywide Documents Access and Management System Accession No. ML16075A103), Entergy Nuclear Operations, Inc. (the licensee) submitted a license amendment for Palisades Nuclear Plant (PNP). The proposed amendment would revise the PNP technical specifications, as they apply to the Steam Generator (SG) Program. Specifically, the licensee requested to implement an alternate repair criteria that invokes a C – Star inspection length (C*), on a permanent basis for the cold-leg side of the SGs' tube sheet.

The U.S. Nuclear Regulatory Commission staff is reviewing the submittal and has determined that additional information identified in the enclosure to this letter is needed to complete its review. The draft copy of the request for additional information (RAI) was provided to Mr. James Miksa and Mr. Jeffrey Erickson of your staff via e-mail on April 18, 2016. A conference call to clarify the RAIs was held with Mr. Miksa and Mr. Erickson and other members of your staff on May 5, 2016. Following the clarification call, it was determined that changes were necessary to the draft RAIs. As such, RAI 2, RAI 3a, RAI 3b, and RAI 5 were revised for clarity. Based on our discussions we understand that a response to the RAI will be provided within 30 days of the date of this letter.

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 USE

THE C* ALTERNATE REPAIR CRITERION FOR STEAM GENERATORS

DOCKET NO. 50-255

By letter dated March 3, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16075A103), Entergy Nuclear Operations, Inc. (the licensee) submitted a license amendment for Palisades Nuclear Plant (PNP). The proposed amendment would revise the PNP technical specifications, as they apply to the Steam Generator (SG) Program. Specifically, the licensee requested to implement an alternate repair criteria that invokes a C – Star inspection length (C*), on a permanent basis for the cold-leg side of the SGs' tube sheet.

Based on its review of the amendment request, the U.S. Nuclear Regulatory Commission (NRC) staff has determined that additional information is required to complete the review. The requests for additional information below only pertain to the cold-leg; however, the licensee may want to consider revising the hot-leg requirements to prevent the TS from becoming overly complex.

RAI 1

In Section 5.1 of Attachment 1 (page 9), the tube-to-tubesheet (TTS) weld is described as a seal weld. As noted in Regulatory Issue Summary 2016-02, "Design Basis Issues Related to Tube-to-Tubesheet Joints in Pressurized-Water Reactor Steam Generators," dated March 23, 2016 (ADAMS Accession No. ML15169A543), the term "seal weld" does not always fully describe whether the weld was also qualified as a "structural weld." Please clarify whether the TTS welds in the PNP SGs are qualified as structural welds and whether this qualification was in accordance with the American Society of Mechanical Engineers Boiler and Pressure Vessel Code. If not, please discuss the design basis of the TTS joint to ensure structural integrity. Please discuss whether any of the qualification data for the TTS joint (if the joint is not a structural weld) is applicable to the C* methodology. If applicable, discuss its impact on your application for C*.

RAI 2

The proposed wording of TS Section 5.5.8c.2 addresses plugging tubes with flaws found within 12.5 inches below the bottom of the cold-leg expansion transition or top of the cold-leg tubesheet, whichever is lower. Since a flaw is generally regarded as a mark, fault, or other imperfection, this requirement would require tubes with non-service-induced flaws (e.g., manufacturing burnish marks or over expansions) to be plugged. Although the industry

may have different definitions for flaws in specific applications, those definitions are not part of the TS. Please clarify if plugging all non-service-induced flaws was your intent. If not, consider revising the TS for clarity.

RAI 3

When the NRC staff reviewed the H* alternate repair criteria, one of the concerns was that cracks could exist in the TTS welds. If H* was not applied to all tubes (i.e., if application of H* was optional, rather than mandatory), it was not clear to the NRC staff how the integrity of the TTS welds would be assured, since there was not a qualified inspection technique for the TTS welds. As a result, licensees that adopted H* applied it to all tubes in all of the steam generators at a given unit, rather than allowing an option that it may be applied.

a. Please discuss whether C* will be applied to all tubes on the cold-leg, rather than providing an option for it to be applied at PNP. The staff notes that if C* was approved but not implemented, any inspection program would have to consider the entire length of the tube within the tubesheet, not just the upper portion of the tube within the C* distance.

b. In the proposed TS 5.5.8d, periodic inspections are required to be performed from the TTS weld at the tube inlet (i.e., hot-leg), to the TTS weld at the tube outlet (i.e., cold-leg). During these inspections, if a crack were found between the C* depth and a TTS weld, TS 5.5.8d.3 requires an inspection for cracking in the next refueling outage, even though the tube with the crack would not require plugging in the current outage. Please discuss if TS 5.5.8d.3 is consistent with your proposed application of the C* alternate repair criteria. (The staff notes that licensees recently implementing similar alternate repair criteria to C*, have revised this section to limit inspection depth to that distance defined by the alternate repair criteria.)

c. In the proposed TS 5.5.8d.5, there is a 100 percent sampling of cold-leg tubes when and if C* is implemented. The NRC staff notes that licensees adopting alternate repair criteria similar to C* (e.g., H* and F*) typically used an inspection strategy that was less than a 100 percent sample on the cold-leg, based on their degradation assessment and their performance-based technical specification requirement to maintain tube integrity. Given past precedent, discuss whether you would still like to retain the 100 percent sampling requirement.

d. TS 5.5.8d states, "...requirements of d.1, d.2, and d.3, d.4, and d.5 below, ..." The staff notes that TS 5.5.8d contains an extra "and" between d.2 and d.3. Please discuss your plans to remove the redundant "and."

RAI 4

TS 5.6.8i references monitoring tubes for displacement. The word displacement could be misinterpreted to mean rotation or bending. The slippage of concern associated with implementation of C* is axial tube displacement. Was your intent to monitor and report all these displacements? If not, please clarify what you plan to monitor and report in the Steam Generator Tube Inspection Report.

RAI 5

The following questions pertain to Attachment 8 of the application, "Discussion of Applicability of H* Lessons Learned, If Applicable to the Palisades Nuclear Plant Cold Leg C* Analysis," LTR-SGMP-15-88, Rev. 1 NP-Attachment, dated February 23, 2016.

a. Table 1 (page 4) provides cold-leg C* distances, ranging from 12.79 inches to 13.67 inches, for various coefficient of thermal expansion (CTE) conditions. As part of the basis for not increasing the previously calculated C* inspection distance of 12.5 inches, you referenced the current practice at PNP of inspecting one inch greater than the 12.5 inch inspection distance. It is possible that the tubesheet has a plus one sigma CTE and the tube has a minus one sigma CTE. Given that surveillance requirements are intended to assure the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met, please explain why the C* inspection distance on the cold-leg is proposed at 12.5 inches, or provide a revised value supported by the analysis of Attachment 8 of the application (e.g. 13.67 inches). If the likelihood of having specific circumstances occur (e.g., a tube with a specific coefficient of thermal expansion and a tubesheet with a specific coefficient of thermal expansion, at a specific location in the tube bundle) is used as the basis for your response to this question, the staff would expect that all significant parameters would be evaluated quantitatively and probabilistically (e.g., tube pullout data) and an appropriately conservative estimate of C* distance would be determined (e.g., .95 probability with a 95 percent confidence interval).

b. On page 5, it is stated that the only potential leakage source is from postulated indications below the inspection distance, since indications detected within the C* distance must be plugged. Although this may be true most of the time, unexpected conditions could arise (e.g., missed indications or indications below the threshold of detectability within the C* region). Please discuss your plans to assess the indications detected within the C* distance to confirm that they do not pose an accident induced leakage concern.

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

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Request for Additional Information

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