



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

March 1, 2016

LICENSEE: Entergy Nuclear Operations, Inc.

FACILITY: Palisades Nuclear Plant

SUBJECT: SUMMARY OF JANUARY 25, 2016, PRE-APPLICATION TELECONFERENCE MEETING WITH ENTERGY NUCLEAR OPERATIONS, INC., TO DISCUSS A FORTHCOMING LICENSE AMENDMENT REQUEST REGARDING STEAM GENERATOR COLD LEG ALTERNATE REPAIR CRITERIA AT PALISADES NUCLEAR PLANT (CAC NO. MF7060)

On January 25, 2016, a Category 1 public teleconference meeting was held between the U.S. Nuclear Regulatory Commission (NRC) and representatives of Entergy Nuclear Operations, Inc. (the licensee). The purpose of this pre-application meeting was to discuss a planned license amendment request (LAR) for an alternate repair criteria (ARC), named C-star (C*), which applies to the portion of the steam generator (SG) tubes within the tubesheet on the cold-leg side of the SGs at Palisades Nuclear Plant (Palisades). The meeting notice and agenda, dated January 4, 2016, is available in the Agencywide Documents Access and Management System (ADAMS) at Accession No. ML16004A224. A list of attendees is provided as an enclosure.

The licensee did not provide any meeting slides or handouts.

Background

By letter dated March 3, 2011 (ADAMS Accession No. ML110680342), the licensee submitted a LAR to revise the licensee's technical specifications (TS) and to revise the repair criteria for the portion of the SG tubes within the tubesheet on the cold-leg side of the SG. The proposed change would remove the requirement to inspect the lower portion of the SG tubes within the tubesheet on the cold-leg side, as flaws in this lower portion would be acceptable. By letter dated April 5, 2011 (ADAMS Accession No. ML110910558), the NRC requested supplemental information. Specifically, the NRC requested justification of the adequacy of the proposed LAR in light of the lessons learned from the H-star (H*) review, which is a similar ARC. The H* ARC applies to specific Westinghouse-designed SGs that have tubes that are hydraulically expanded into the tubesheet, whereas C* applies to Combustion Engineering (CE) SGs that have tubes that have been explosively expanded into the tubesheet using the CE "Expansion" process (such as the SGs used at Palisades). By letter dated April 29, 2011 (ADAMS Accession No. ML111090424), the licensee withdrew their request citing that it would take considerable effort to complete such an evaluation.

Summary

During the call, the licensee reviewed the following topics:

- CE Model 2530 replacement SG design, fabrication, and operating parameters.

- Details of the SG inspections performed at previous refueling outages including the number of tubes plugged, in-situ pressure tests, and sludge lancing results.
- Summary review of the C* analysis bases and summary of the resulting TS changes.

Additional meeting points of discussion and comments are summarized below:

Recent SG Inspection Results

- The licensee briefly reviewed the scope of their SG inspections in refueling outage 1R23 and 1R24. The scope included 100 percent inspection of the tubes with a bobbin coil. In addition, the licensee inspected 100 percent of the tubes at the top of the tubesheet on the hot-leg side of the SGs and a sampling of tubes on the cold-leg side of the SGs (rows 1 – 3), with a +Point™ coil. The licensee stated that no new degradation mechanisms were identified, no primary water stress corrosion cracking was detected, and no in-situ pressure testing was performed in either 1R23 or 1R24.
- There were 23 tubes plugged in 1R23 and 18 tubes plugged in 1R24.
- There was no predicted primary to secondary leakage in 1R23 or 1R24.
- Since 1R19, sludge lancing has been performed every other outage. The next time sludge lancing will occur is in 1R25.
- Palisades injects Zinc into the primary coolant, in part, to limit the susceptibility of the mill annealed Alloy 600 tubes to primary water stress corrosion cracking.

C*

- The licensee reviewed some of the basic parameters used in the C* analysis.
 - The hot-leg temperature at Palisades is 583 degrees Fahrenheit (°F) and the cold-leg temperature is 537°F. The C* ARC has been approved for other CE units. The NRC staff notes that all of these units have replaced their SGs or have permanently ceased power operations. The C* approach on the hot-leg assumes 0.1 gallons per minute primary-to-secondary leakage will occur during the most limiting design basis accident. This leakage value assumes all tubes in the hot-leg have a 100 percent through-wall, 360 degree circumferential flaw at just below the C* distance.
- The licensee highlighted four areas where lessons were learned from similar recently NRC approved amendments.
 - Effects of Material Property Variation – The calculated C* distance included a one-sigma variance (in the conservative direction) of the coefficient of thermal expansion of the tube and the tubesheet material. This sensitivity study was performed based on a similar study performed during development of the H* ARC for other operating reactors, which are similar to the proposed C* ARC amendment.
 - Divider Plate Cracking – The divider plate in CE SGs is bolted in place. As a result, divider plate cracking is not an issue for the Palisades SGs.
 - Effects of Cracking within the Portion of the Tube within the Tubesheet – The licensee discussed the structural integrity performance criterion (SIPC) and accident-induced leakage performance criterion (AILPC), and how the tube expansion distance required for meeting the AILPC was approximately 2.5 times longer than the distance required to meet the SIPC. The C* amendment equates structural integrity

- to the load required to prevent tube pullout from the tubesheet. If the method for determining leakage for C* was similar to W*, the amount of predicted primary-to-secondary accident induced leakage for C* would be much lower.
- The Differences between Explosive Expansion and Hydraulic Expansion – The explosive expansion joint is more resistant to pullout and leakage than the hydraulic expansion joint. The explosive expansion joint essentially does not leak with seven inches of sound expansion. The hydraulic expansion joint, however, exhibits primary-to-secondary leakage even with 16.5 inches of solid expansion.

Technical Specification Changes

- The inspection length of the proposed cold-leg C* LAR is the same as the hot-leg C* amendment approved by the NRC staff by letter dated May 31, 2007 (ADAMS Accession No. ML071420240). The licensee will add wording for the cold-leg C* amendment to the technical specifications under 5.5.8.c.2 and 5.5.8.d.5.
- The leakage from below the C* inspection depth will not be reported, since the C* methodology assumes 0.1 gallons per minute leakage from flaws below the C* depth and this value will not change from outage to outage.
- The licensee plans to submit the amendment request by March 15, 2016, and request approval by March 15, 2017.
- The licensee does not plan to include any reporting requirements related to tube slippage, normal operating leakage, or accident induced leakage.

NRC Questions

- The NRC staff asked the licensee if any changes were made to the leakage calculation methodology for the proposed cold-leg C* LAR. The licensee stated that there were no changes to the methodology used to calculate the leakage.
- The licensee clarified that they were not planning to monitor the tubes for slippage, as has been performed with other SG ARC license amendments (e.g., H*). After the call, the NRC staff informed the licensee that the licensee should reconsider tube slippage monitoring for any LAR.

Before the meeting adjourned, all meeting participants were given the opportunity to comment on any aspects of the meeting. Members of the public were in attendance via telephone conference and provided comments or asked questions of the NRC staff. The NRC staff addressed the comments related to the pre-application meeting.

No regulatory decisions or commitments were made during the meeting. The NRC staff received no meeting feedback forms.

Please direct any inquiries to me at 301-415-1530, or Jennivine.Rankin@nrc.gov.



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

Docket No. 50-255

Enclosure:
List of Attendees

cc w/encl: Distribution via Listserv

LIST OF ATTENDEES

JANUARY 25, 2016, PUBLIC MEETING WITH ENTERGY NUCLEAR OPERATIONS, INC.,
PALISADES NUCLEAR PLANT

NAME	ORGANIZATION
Jennie Rankin	NRR/DORL
Ken Karwoski	NRR/DE
Andrew Johnson	NRR/DE
Julie Boettcher	Region III
Jim Miksa	Entergy
Jeff Hardy	Entergy
Joe Jerz	Entergy
Dustin Daggett	Entergy
Tim Crocker	Entergy
Robert O'Quinn	Entergy
Jeff Erickson	Entergy
Bill Cullen	Westinghouse
Kenneth High	Michigan State Police
Bette Pierman	MSEF-SH
Greg Gothard	Michigan Department of Environmental Quality
Bruce Brown	The Sierra Club
Ruth Thomas	Public
Marv Lewis	Public
Jan Boudart	Public
Michael Keegan	Don't Waste Michigan

Please direct any inquiries to me at 301-415-1530, or Jennivine.Rankin@nrc.gov.

/RA/

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Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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List of Attendees

cc w/encl: Distribution via Listserv

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RidsNrrPMJRankin Resource
RidsNrrLAMHenderson Resource
RidsRgn3MailCenter Resource

ADAMS Accession Nos. Meeting Notice: ML16004A224 Meeting Summary: ML16035A425

OFFICE	DORL/LPL3-1/PM	DORL/LPL3-1/LA	DE/ESGB/BC	DORL/LPL3-1/BC	DORL/LPL3-1/PM
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DATE	02/08/16	02/05/16	02/29/16	03/01/16	03/01/16

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