



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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October 26, 2021

MEMORANDUM TO: Brian Smith, Director
Division of New and Renewed Licenses
Office of Nuclear Reactor Regulation

FROM: Louise Lund, Director *Louise Lund* Signed by Lund, Louise
Division of Engineering on 10/26/21
Office of Nuclear Regulatory Research

SUBJECT: IMPENDING PUBLICATION OF TECHNICAL LETTER
REPORT ENTITLED "FINAL ANALYSIS OF THE EPRI CASS
ROUND-ROBIN STUDY" (PNNL-32218) (UNR NRR-2013-009)

The Office of Nuclear Regulatory Research (RES) has completed Pacific Northwest National Laboratory (PNNL) -32218, Technical Letter Report (TLR) entitled "Final Analysis of the EPRI CASS Round-Robin Study," (ADAMS Accession ML21295A324). This report documents work performed under Task 5, "Detection and Characterization of Flaws" in User Need Request (UNR) NRR-2013-009, "Evaluating the Reliability of Nondestructive Examinations of Vessels and Piping." This UNR focused on assessing the reliability and effectiveness of nondestructive examination (NDE) methods used in nuclear power plants. Specifically, Task 5 addressed the ability of NDE techniques to detect and characterize flaws located at various through-wall depths in configurations and weldments common to the nuclear industry.

The attached TLR documents the details of PNNL's independent assessment of the Cast Austenitic Stainless Steel (CASS) Round-Robin Study (RRS) conducted by the Electric Power Research Institute (EPRI) to evaluate the detection performance of state-of-the-art ultrasonic methods applied to CASS weldments. The RRS provides important insights that will be used in the development of performance demonstration requirements in the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, Appendix VIII, Supplement 9, "Qualification Requirements for Cast Austenitic Piping Welds" (Supplement 9). This TLR is the second of two TLRs on the PNNL analysis of the RRS. Until January 2021, EPRI maintained the security of the mockups used for the RRS to facilitate additional blind studies. As such, RES developed an "interim" TLR (ML18331A093) to provide NRR with a high-level summary of PNNL's analysis results until such time as it was possible to divulge detailed information on the mockups and examination methods applied. EPRI released the specimen true-state information in January 2021, making it possible for PNNL to complete their analysis of the RRS and develop this final, detailed TLR on the RRS results.

CONTACT: Carol A. Nove, RES/DE/MEB
(301) 415-2217

PNNL's analysis methods differed from EPRI's in that each organization applied their unique perspective to the data analysis. PNNL relied on their extensive experience in analyzing results from previous NDE round-robin studies, and EPRI approached the analysis from a performance demonstration initiative perspective. In doing so, PNNL's focus was on detectability of flaw signals in the difficult to examine, coarse-grained CASS, and EPRI focused on flaw characterization (length- and depth-sizing).

The key conclusion of PNNL's analysis was that flaw detection in CASS materials is possible with a high probability of detection (>80%) and a low probability of false calls when the most appropriate, currently available techniques are used. This means using low-frequency, phased-array probes for examining thick-walled CASS piping welds and implementing proper inspector training to recognize flaw responses in CASS.

Supplement 9 has been "in the course of preparation" since Appendix VIII was initially established. While significant progress has been made in developing methods to inspect CASS weldments, to date the qualification requirements have not yet been established. PNNL used the results of the RRS combined with their deep knowledge of ultrasonic examination of CASS weldments to develop a proposed Supplement 9 (Appendix F of the TLR) for consideration at Section XI.

Staff representatives from the Division of New and Renewed Licenses in the Office of Nuclear Reactor Regulation (NRR) reviewed a draft of this TLR and found that it was of "high quality and contains sufficient detail and rigor to be used for code actions and as a reference in future NRR activities." Specifically, NRR will use the information contained in this TLR to inform their assessment of industry's development of all the facets of Supplement 9 requirements and the associated performance demonstration initiative qualification program. Further, NRR will use the results presented in this TLR to inform their regulatory decisions for relief requests, rulemaking and ASME Code actions.

RES has established an online quality survey to collect feedback from user offices on the usefulness of RES products and services. This survey can be found online at the hyperlink: [RES Quality Survey](#). I would appreciate the responsible manager completing this short survey within the next 10 working days to present your office's views of the delivered RES product. Please share any concerns with me or the Division of Engineering contact listed below, so that they may be addressed.

If you have any questions concerning the impending public release of this TLR or require additional information, please contact Carol A. Nove of my staff at 301-415-2217 or can2@nrc.gov.

Enclosure:
As stated

Impending Publication of Technical Letter Report Entitled, "Final Analysis of the EPRI Cass Round-Robin Study" DATE October 26, 2021

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OFFICE	RES/DE/CIB	RES	RES/DE	
NAME	CNove	CM SRuffin	SR LLund	LL
DATE	Oct 25, 2021	Oct 26, 2021	Oct 26, 2021	

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