



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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November 22, 2017

MEMORANDUM TO: George A. Wilson, Director
Division of Materials and License Renewal
Office of Nuclear Reactor Regulation

FROM: Brian E. Thomas, Director
Division of Engineering */RA/*
Office of Nuclear Regulatory Research

SUBJECT: IMPENDING PUBLICATION OF TECHNICAL LETTER
REPORT, PNNL-26157, REV. 1, ENTITLED "SUMMARY
OF LITERATURE SEARCH OF RELIEF REQUESTS ON
ASME CODE, SECTION XI, VOLUMETRIC EXAMINATION
COVERAGE REQUIREMENTS FOR PIPING BUTT
WELDS"

The Office of Nuclear Regulatory Research (RES) has completed Pacific Northwest National Laboratory (PNNL) – 26157, Rev.1, Technical Letter Report (TLR) entitled "Summary of Literature Search of Relief Requests on ASME Code, Section XI, Volumetric Examination Coverage Requirements for Piping Butt Welds," (ADAMS Accession ML17318A120). This report documents work performed under Task 2, "Theoretical and Experimental Basis for Examination Coverage," in User Need Request (UNR) NRR-2013-009, "Evaluating the Reliability of Nondestructive Examinations of Vessels and Piping." This UNR focuses on assessing the reliability and effectiveness of nondestructive examination (NDE) methods used in nuclear power plants. Specifically, Task 2 assesses the ability of NDE techniques to detect flaws when part of a weld is unsuspectable.

The attached TLR documents the first phase of PNNL's work addressing Task 2 of the UNR. The "coverage" research began with a survey of relief requests to determine the predominant reasons for missed coverage. The TLR provides a summary of the survey results, including the identification of candidate weld configurations for the follow-on empirical and modeling studies. Highlights of the findings include:

- examination limitations for both PWRs and BWRs are related to both materials such as cast austenitic stainless steel (CASS), and geometry, such as tapers or transitions from nozzles, valves, elbows and other components;
- single-side qualifications for ultrasonic examinations of austenitic stainless steel welds would eliminate many relief requests;
- implementation of ASME Code, Section XI, Appendix VIII, Supplement 9 for qualification of ultrasonic examinations through CASS materials will significantly

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

improve the quality of inspections conducted through CASS, though in cases where configuration is the primary issue, implementation of Supplement 9 may not increase the coverage amount;

- use of phased array ultrasonic testing may result in increased coverage;
- incomplete examination coverage occurred more frequently for the Combustion Engineering reactor coolant pump dissimilar metal weld than for any other types of welds covered by ASME Code Case N-770-1, making this the first target configuration for empirical and modeling studies.

Inspections that do not achieve 100% coverage are very common during inservice inspections of nuclear power plants resulting in a large number of relief requests. This work will improve the staff's ability to determine the safety significance of partial inspections of different components. In cases where welds susceptible to degradation are uninspectable or partially inspectable, flaw tolerance evaluations may be performed to determine whether a flaw may be present that may challenge structural integrity. These flaw tolerance calculations may include predictions regarding how far a flaw emanating from an uninspectable region (if it existed) would have to grow into the inspectable region before it would be detected by ultrasonic testing. This work will also provide NRR with the technical basis to assess ASME Code actions addressing coverage issues such as Code Case N-711-1, "Alternative Examination Coverage Requirements for Examination Category B-F, B-J, C-F-1, C-F-2, and R-A Piping Welds, Section XI, Division 1," which was approved by the ASME Code on November 7, 2016.

Staff representatives from the Division of Materials and License Renewal in NRR reviewed a draft of this TLR, and the enclosed final TLR reflects the resolution of their comments. Nonetheless, please feel free to notify the responsible RES contact if you have any questions concerning the impending public release of this TLR.

If additional information is required, please contact Carol A. Nove of my staff at 301-415-2217 or can2@nrc.gov.

Enclosure:
As stated

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OFFICE	RES/DE/CIB	RES/DE/CIB	D:RES/DE
NAME	C. Nove	R. Iyengar	B. Thomas
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