



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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September 24, 2019

MEMORANDUM TO: Joseph E. Donoghue, Acting Director
Division of Materials and License Renewal
Office of Nuclear Reactor Regulation

FROM: Louise Lund, Director */RA Raj Iyengar for/*
Division of Engineering
Office of Nuclear Regulatory Research

SUBJECT: IMPENDING PUBLICATION OF TECHNICAL LETTER
REPORT ENTITLED "BASELINE EVALUATION OF EDDY
CURRENT TESTING FOR PWSCC SUSCEPTIBLE MATERIALS"
(PNNL-29113) (UNR NRR-2013-009)

The Office of Nuclear Regulatory Research (RES) has completed a technical letter report entitled "Baseline Evaluation of Eddy Current Testing for PWSCC Susceptible Materials," (ADAMS Accession ML19267A240) under contract with Pacific Northwest National Laboratory. This Technical Letter Report (PNNL-29113) documents work performed under Task 3, Eddy Current Inspection – Inlays, Onlays, and Overlays, 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 methods used in nuclear power plants. Specifically, Task 3 on Eddy Current Inspection will provide the Office of Nuclear Reactor Regulation (NRR) with the technical basis to appropriately evaluate the adequacy of eddy current testing for detecting small surface breaking and near surface breaking defects in Primary Water Stress Corrosion Cracking (PWSCC) susceptible materials.

This technical letter report provides a summary of technical efforts focused on assessments of eddy current testing (ET) examinations to obtain baseline surface condition characterization of mockups being prepped for peening evaluations. The mockups contained butt welds and J-groove welds constructed from materials susceptible to PWSCC. The work focused on characterizing the surface conditions of these mockups and weld surfaces prior to and after peening. Further, this report addresses the need to better understand detection performance and sensitivity of ET techniques in the context of: supporting the development of a technical foundation regarding detection and sizing limits; developing effective ET qualification requirements; developing more effective alternate inspections or programs for evaluating PWSCC mitigation processes; and developing ET acceptance standards that can be referenced in the appropriate American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Codes and Standards (ASME Code) Section XI Code Case (N-770-X).

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This research showed that ET is capable of detecting small surface breaking and near surface breaking defects in PWSCC materials and is able to distinguish between actual cracks and surface blemishes such as scratches and gouges with appropriate analysis guidance. While conventional probe designs were not capable of coupling adequately to the toe of the J-groove welds, especially on the downhill sides, a specially designed flexible probe provided very promising results for this difficult to inspect region of the J-groove welds.

NRR is interested in better understanding detection performance and sensitivity of ET techniques to support the development of a technical foundation for detection and sizing limits, effective ET qualification requirements, alternate inspections or programs for evaluating PWSCC mitigation processes, and development of ET acceptance standards that can be referenced in the appropriate American Society of Mechanical Engineers Section XI Code Case (N-770-X). This work addresses NRR's expectations and will enable the Staff to confirm that a solid technical basis for conducting, interpreting and applying the results of eddy current examinations exists.

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.

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: <http://fusion.nrc.gov/res/team/OfficeWide/Lists/RES%20Product%20Quality%20Survey/overview.aspx>. I would appreciate the responsible manager or supervisor completing this short survey within the next 10 working days to present your office's views of the delivered RES product.

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

Enclosure:

As stated

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"BASELINE EVALUATION OF EDDY CURRENT TESTING FOR PWSCC
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