

**MRP** Materials Reliability Program \_\_\_\_\_ MRP 2021-014  
(via email)

Date: September 2021

To: Matthew Homiack, Materials Engineer, U.S. Nuclear Regulatory Commission,  
Office of Nuclear Regulatory Research, Division of Engineering, Reactor  
Engineering Branch

From: Craig Harrington, EPRI, MRP Project Manager

Subject: Transmittal of xLPR Welding Residual Stress Essential Parameters and Profile  
Selection

Reference: NRC-EPRI Cooperative Nuclear Safety Research Memorandum of Understanding Addendum titled “*xLPR Version 2 Code Documentation and Leak-Before-Break Applications*,” NRC Agencywide Documents Accession and Management System Number ML17040A146

Project 2.c, “Generalization Study,” of the referenced Addendum describes cooperative NRC and EPRI efforts to investigate probabilistic leak-before-break methodologies for demonstrating compliance with the requirements of Criterion 4, “Environmental and Dynamic Effects Design Bases,” of Appendix A, “General Design Criteria for Nuclear Power Plants,” to Title 10 of the *Code of Federal Regulations*, Part 50, “Domestic Licensing of Production and Utilization Facilities.” The attached document titled, “*xLPR Welding Residual Stress Essential Parameters and Profile Selection*,” supports the data collection activities for this project. This transmittal is intended to facilitate reference of the document in publicly available NRC and EPRI reports that document the resulting generalization study analyses.

The document, “xLPR Models Subgroup Report—Welding Residual Stresses, Version 1.0,” dated October 5, 2016, NRC Agencywide Documents Accession and Management Systems Accession No. ML16341B049, describes methods for the development of dissimilar metal weld residual stress (WRS) profiles for use in analyses executed using the Extremely Low Probability of Rupture (xLPR) probabilistic fracture mechanics code. It provides a library of WRS profiles for select dissimilar metal weld configuration, but that library only addresses a limited set of dissimilar metal weld configurations.

The attached document was developed by members of the original xLPR WRS Subgroup and defines essential parameters influencing the WRS profiles to provide practical guidance for the selection and application of WRS profiles in the existing library to a broader range of dissimilar metal weld configurations. It was provided to the NRC and EPRI project teams as a working

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document in October 2019 for use in defining suitable inputs for the range of analysis cases within the scope of the Generalization Study project.

If you should have any questions concerning this letter, please contact Craig Harrington, EPRI MRP Project Manager, at ([charrington@epri.com](mailto:charrington@epri.com)).

Sincerely,

Craig Harrington  
MRP Project Manager  
Electric Power Research Institute

Cc: