



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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September 20, 2023

MEMORANDUM TO: Gerond A. George, Chief
Licensing Projects Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

FROM: Lois M. James, Senior Project Manager /RA/
Licensing Projects Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF TECHNICAL MEETING ON PROBABILISTIC
FRACTURE MECHANICS AND NONDESTRUCTIVE
EXAMINATION OF CAST AUSTENITIC STAINLESS STEEL

On August 22, 2023, the staff of U.S. Nuclear Commission (NRC) met with the staff of Electric Power Research Institute (EPRI) and Dominion Engineering, Inc. (DEI), EPRI's contractor, to discuss how EPRI is developing a code using probabilistic fracture mechanics (PFM) to predict flaw growth and stability for postulated flaws in cast austenitic stainless steel (CASS) piping. EPRI's work will be used to support development of a supplement to American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (BPV), Section XI, Appendix VIII, and alternatives to Section XI, IWB-2500 inspection requirements for CASS piping components and potential changes to IWB-3514 and IWB-3640 flaw acceptance and flaw evaluation procedures.

The meeting between the NRC staff and EPRI staff was a closed meeting due to the proprietary nature of the information and discussion (ADAMS Accession No. ML23240A708). The meeting began at 9:00 am and ended at 12:00 pm. There were thirteen NRC staff members, two EPRI members, and three industry members in support of EPRI. No member of the public was in attendance due to the proprietary nature of the meeting. The meeting began with introductions of the NRC staff, EPRI staff, and DEI staff.

The NRC and EPRI staff and contractors had a discussion on the Piping Integrity Probabilistic Evaluation for Reactors – Cast Austenitic Stainless Steel (PIPER-CASS). Specifically, the discussion focused on what it is, how it was developed, what are its limitations, and what is its future.

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The EPRI discussed the development of PFM code – PIPER-CASS, PFM evaluations for axial flaws, PFM evaluations for circumferential flaw, and research update on CASS nondestructive examination (NDE).

The EPRI staff explained that the PIPER-CASS is custom PFM software developed by EPRI under commercial quality assurance program. PIPER--CASS is tailored for evaluation of CASS to enhanced elastic-plastic fracture mechanics (EPFM) stability solver for degraded toughness materials like thermally aged CASS; to provide extended EPFM stability checks to part-through-wall flaws; and to provide greater flexibility when defining operating transients, with integrated thermal stress solver. Further, EPRI staff explained that PIPER-CASS was benchmarked against Extremely Low Probability of Rupture (xLPR), a PFM code for piping applications that was jointly developed by the NRC's Office of Nuclear Regulatory Research and EPRI.

The EPRI staff stated that they are in the process of opening a record number with the Task Group on Inspectability, ASME BPV Code Section XI, for a proposed draft code case for axial flaws. Further, the EPRI staff stated that they do not plan to submit a topical report regarding the PFM evaluations performed using the PIPER-CASS code to the NRC for review and approval.

The EPRI staff stated that they will be publishing a public technical report summarizing the PFM evaluation results in the fourth quarter of Calendar Year 2023

If you have any questions or comments, please contact me via e-mail at Lois.James@nrc.gov.

Docket No. 99902021

Enclosures:
List of Attendees

**U.S. Nuclear Regulatory Commission Public Meeting – Attendees List
August 22, 2023**

Title: Technical Meeting between the U.S. Nuclear Regulatory Commission (NRC) and Electric Power Research Institute (EPRI) to Discuss Probabilistic Fracture Mechanics (PFM) and Nondestructive Examination of Cast Austenitic Stainless Steel

Name	NRC Participants
Michael Benson	NRC
Mat Burton	NRC
Jay Collins	NRC
Stephen Cumblidge	NRC
David Dijamco	NRC
Lois M. James	NRC
Seung Min	NRC
Carol Nove	NRC
Eric Palmer	NRC
Cory Parker	NRC
David Rudland	NRC
Robert Tregoning	NRC
John Tsao	NRC
Dan Widrevitz	NRC

Name	EPRI Participants
Carl Latiolais	EPRI
Do Jun Shim	EPRI

Name	Dominion Engineering, Inc. (DEI) Participants
Kevin Fuhr	DEI
Glenn White	DEI
Matthew Wolfson	DEI

Public Participants
No member of the public was in attendance due to the proprietary nature of the meeting.

SUBJECT: SUMMARY OF TECHNICAL MEETING ON PROBABILISTIC FRACTURE MECHANICS AND NONDESTRUCTIVE EXAMINATION OF CAST AUSTENITIC STAINLESS STEEL DATED: SEPTEMBER 20, 2023

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ADAMS Accession Nos.:

ML23234A133 (pkg);
ML23234A136 (memo and summary);
ML23222A226 (meeting notice);
ML23237B394 (meeting slides – nonpublic)

***via eConcurrence**

NRR-106

OFFICE	NRR/DORL/LLPB/PM*	NRR/DORL/LLPB/LA*	NRR/DNRL/SL*	NRR/DNRL/NVIB/BC*
NAME	LJames	DHarrison	DRudland	ABuford
DATE	08/30/2023	09/05/2023	09/05/2023	09/18/2023
OFFICE	NRR/DNRL/NPHP/BC*	NRR/DORL/LLPB/BC*	NRR/DORL/LLPB/PM*	
NAME	MMitchell	GGeorge	LJames	
DATE	09/18/2023	09/19/2023	09/20/2023	

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