

Category 3 Meeting Summary

U.S. Nuclear Regulatory Commission Public Meeting Summary

12/12/2017

Title: Development of Guidance for Probabilistic Fracture Mechanics (PFM)

Meeting Identifier:

Date of Meeting: 12/12/2017

Location: TWFN-8A1

Type of Meeting: Category 3

Purpose of the Meeting(s): The NRC will present progress on the Probabilistic Fracture Mechanics Guidance Development Research project. Specifically, the NRC will describe the project background and motivation, present the overall project plan and schedule, and discuss the contents of a new Technical Letter Report on "Increasing Confidence in Probabilistic Fracture Mechanics Analyses". EPRI will present industry perspectives on the development of PFM regulatory guidance for nuclear applications. The NRC also seeks to get informal public feedback on this research project

General Details: This meeting took place from 8:00AM to 11:20AM on 12/12/2017. Around 10 NRC staff were in attendance, with 13 external in-person participants and 28 additional participants on the phone bridgeline. Around 10 members of the public had the opportunity to ask questions or make comments. Kenneth Hamburger (NRC/RES) mediated the meeting.

The list of know participants is below:

Name	Organization
Markus Burkardt	Dominion Engineering Inc.
David Rudland	NRC
Do Jun Shim	Structural Integrity Associates
Dilip Dedhia	Structural Integrity Associates
Anees Udyawar	Westinghouse
David Gross	Dominion Engineering Inc.
David Alley	NRC
Marjorie Erickson	PEAI
Glenn White	Dominion Engineering Inc.

Name	Organization
Kenneth Hamburger	NRC
Mark Kirk	NRC
Raj Iyengar	NRC
Matthew Homiack	NRC
Remi Dingreville	Sandia National Lab
Nathan Palm	EPRI
Michael Benson	NRC
Aubrey Eckert-Gallup	Sandia National Lab
Robert Kurth	EMC ²
Cedric Sallaberry	EMC ²
Stephen Cumblidge	NRC
Christopher Casarez	Dominion Engineering Inc.
Robert Tregoning	NRC

28 phone participants, including Gary Stephens, Craig Harrington and Tony Cinson of EPRI; and Ron Gamble of Sartrex Corporation.

Summary of Presentations:

Opening remarks

Patrick Raynaud asked attendees in the room and on the phone to identify themselves, Kenneth Hamburger provided basic safety information and described the format of the public meeting. Raj Iyengar welcomed everyone on behalf of NRC/RES management, and provided brief background on the scope of the project and public meeting.

Presentation by David Rudland (NRC/NRR): ML17348A018

Dr. Rudland discussed how PFM fits into risk-informed decisionmaking. The Commission directed the NRC staff to move towards risk-informed performance based regulations in a Policy directive in 1995. The policy statement is mostly on risk-informed methods like PRA. RG-1.174 is used for risk-informed changes to the licensing basis for plants. Calculation of the risk is only one part of the process. How does PFM fit in the risk-informed decisionmaking process? Risk-informed licensing is trending upward, and a process to use PFM as a basis for relief requests is being developed.

Presentation #1 by Patrick Raynaud (NRC/RES): ML17348A039

Patrick Raynaud presented an overview of the PFM regulatory guidance development project.

Presentation #2 by Patrick Raynaud (NRC/RES): ML17348A034

Patrick Raynaud presented a detailed overview of the PFM TLR, chapter by chapter. The concept of separating aleatory and epistemic uncertainty was discussed at length, including the concept of a double sampling loop.

Presentation by Nathan Palm (EPRI): ML17348A043

Mr. Palm presented industry perspectives on the development of PFM regulatory guidance.

Public Participation Themes:

Nathan Palm (EPRI) asked about licensee submitting risk-informed PFM submittals. He asked if guidance is really needed. Are there one-off instances where PFM is used, or is PFM more consistently used across the US fleet? MR. Palm stated that there are challenges with NRC reviews of risk-informed application using PFM. The TLR mentioned a list of reports where such challenges were encountered, but since these were not officially submitted, EPRI does not have formal feedback on these applications, and does not know what the technical issues were. There have also been successes in PFM: vessel welds and flywheel inspections, BTP 5-3, 50.61 and 50.61a, VIPER code SE for BWRVIP-05, SRRA code for risk-informed piping inspections. The question was asked about whether the NRC had a copy of the SRRA code. Other questions included whether there is an expectation that the code be submitted. NRC replied that if the documentation is not provided, and the code is not provided either, then NRC is trying to review a black box, which has resulted in very challenging reviews.

Glenn White (DEI) reminded the audience that deterministic approaches also have problems related to excessive conservatism, even though they are in most cases easier to review than a PFM analysis.

Ron Gamble (Sartrex Corp) obtained confirmation that the NRC had prepared a TLR which is publicly available in ADAMS. He highlighted 2 areas of PFM success: pressurized thermal shock (PTS) for vessels, where industry was involved very early; and risk-informed inservice inspection, where industry developed the methods. He recommended the industry be involved early in the process of developing PFM guidance.

Mark Kirk (NRC) stated that in the case of PTS, the NRC was actively funding a research program, and also mentioned xLPR as a success of working with industry.

Gary Stevens (EPRI) asked whether the TLR would change since it was marked as draft. NRC responded that although they were not officially asking for comments, they would wait and see if

they received any stakeholder input in the month following the public meeting, and then decide whether to make some changes to the TLR.

DJ Shim (SIA) proposed that the draft guide (DG) should be tested against past regulatory successes in PFM. Regarding using xLPR for a pilot study, the comment that came back was that the DG should not be created such that all PFM codes and analyses become 12-year projects.

Mark Kirk (NRC) stated that the idea would be to scale the level of rigor with the consequences of the PFM application.

David Rudland (NRC) stated that the idea behind the development of guidance is to make things simpler and more predictable, rather than leave many open questions and result in regulatory uncertainty.

Nathan Palm (EPRI) highlighted that the level of QA required by 10 CFR 50 Appendix B can vary.

Glenn white (DEI) state that large number of QA documents implies a large budget.

Gary Stevens (EPRI) had several comments. The new guidance may set the bar too high and cause public perception issues if past applications can't meet the guidance. Regulatory guides can carry the weight of regulations, even if not designed to do so. Industry guidance with NRC input through an MOU may be less prone to becoming de-facto regulation. He asked whether the NRC can get where they want to go without a regulatory guide.

David Alley (NRC) stated that industry has communicated to NRC upper management that a regulatory guide would be useful.

David Rudland (NRC) stated that this topic should be put on the materials management meeting agenda.

Stephen Cumblidge (NRC) stated that a regulatory guide could help standardize current PFM processes and make reviews more consistent across reviewers.

Ron Gamble (Sartrex Corp) said industry should have been involved from the beginning, before writing a TLR. He called regulatory guide 'regulatory extortion'. He asked whether risk-informed inservice inspection is in compliance with the TLR principles. He stated that the TLR is too focused on computer codes, and not enough on empirical data.

Gary Stevens (EPRI) committed to collecting EPRI comments and sending them by email to Patrick Raynaud. HE stated that having a document to summarize PFM best practices would be useful, but could also restrict applications if the bar was set too high.

Action Items/Next Steps:

- EPRI to send written comments to NRC and NRC to respond to EPRI's comments

Attachments:

- Meeting agenda: ML17338B136
- Presentations: ML17348A018, ML17348A039, ML17348A034, ML17348A043
- PFM Technical Letter Report: ML17335A048