

U.S. Nuclear Regulatory Commission Public Meeting Summary

Title: Alternative Criteria for Postulating High-Energy Pipe Break Locations

Meeting Identifier: 20210207

Date of Meeting: March 1, 2021, 1:00 – 5:00 pm EST

Location: Webinar

Type of Meeting: Category 2

Purpose of the Meeting: The purpose of the meeting was for the NRC staff to discuss its approach to developing alternative criteria for postulating pipe break locations in high-energy piping systems and the corresponding technical basis.

Summary:

Mark Yoo, from the U.S. Nuclear Regulatory Commission (NRC) Office of Nuclear Regulatory Research (RES) staff, opened the webinar meeting at 1:00 pm EST on March 1, 2021. The meeting was also attended by other RES and Office of Nuclear Reactor Regulation (NRR) staff. The meeting discussed strategies to develop alternative criteria and associated guidance for postulating pipe break locations in piping systems and the corresponding technical basis. The NRC, Electric Power Research Institute (EPRI), vendors, and industry representatives participated in the meeting. A list of meeting participants is included in the Appendix.

The agenda and all meeting presentations are available in the NRC's Agencywide Documents Access and Management System (ADAMS) under Accession Numbers [ML21050A345](#) and [ML21057A162](#), respectively.

Mark Yoo, RES, began the meeting presenting a summary of the June 2019 public meeting, which was the precursor for this March 2021 public meeting. This presentation also summarized the NRC Technical Letter Report (ADAMS Accession No. [ML19144A089](#)) that was issued in May 2019 and contains background and history of the current High Energy Line Break (HELB) guidance contained in Branch Technical Position (BTP) 3-4.

Nathan Glunt and Gary Stevens, EPRI, provided a presentation on EPRI's HELB activities that have occurred since the last (June 2019) HELB public meeting. This presentation also discussed the next steps that EPRI is planning regarding HELB.

Robert Tregoning, RES, presented on the NRC strategies to developing alternative HELB acceptance criteria and the associated technical basis, including a summary of the NRC actions on HELB following the last (June 2019) HELB public meeting. This presentation discussed the philosophy, considerations, and initial ideas on developing the alternative HELB criteria and technical basis for both operating and newlight-water reactors (LWRs). Following this presentation, there was a discussion on evaluating applicable degradation mechanisms. Industry stakeholders, including EPRI, noted that American Society of Mechanical Engineers (ASME) Code, Section XI inspection programs and other plant programs address in-service failure mechanisms for piping systems. The NRC staff agreed that ASME Section XI inspections, as well as pre-service inspections, aging management programs, and operating

experience, can be credited to demonstrated that these applicable degradation mechanisms will be addressed.

Chakrapani Basavaraju, NRR, presented on the current NRC HELB guidelines and the potential alternative approaches and technical considerations for operating LWRs. Following this presentation, the NRC and industry stakeholders engaged in active discussions regarding the NRC presentations on HELB related to operating LWRs. Some industry stakeholders indicated that revising the HELB fatigue criteria would be the biggest benefit to operating reactors. Other industry stakeholders also discussed leveraging ASME Code, Section XI inspections and licensees' aging management programs to address applicable aging degradation mechanisms relevant to HELB. Additional topics that were discussed included evaluating ASME Code Class 1 piping systems that do not have cumulative usage factor (CUF) calculations (e.g., B31.1). There was also a brief discussion that moderate energy line failures may be more significant from a flooding perspective because the pipes could leak for a substantial time period prior to detection.

Renee Li, NRR, presented on the current HELB guidelines and lessons learned and the potential alternative approaches and technical considerations for new LWRs. Following this presentation, the NRC and industry stakeholders engaged in an active discussion regarding the NRC presentations related to HELB for new LWRs. Various stakeholders provided input that supported re-evaluating each of the BTP 3-4 criteria. Other topics that were discussed included various piping configurations of new reactors, including use of lock-ring joints and flanged connections; leveraging other ASME activities (e.g., ASME Section XI, Division 2 (Reliability and Integrity Management, or RIM) activities); complications in conducting probabilistic analyses and the associated burden; and materials and component integrity issues related to advanced non-LWRs.

During these discussions, the NRC referenced two reports that were recently issued related to materials and component integrity of advanced non-LWRs. These reports are listed below:

- TLR-RES/DE/CIB-2019-01, "Advanced Non-Light Water Reactors Materials and Operational Experience," March 2019 (ADAMS Accession No. [ML18353B121](#)).
- "Technical Gap Assessment for Materials and Component Integrity Issues for Molten Salt Reactors," March 2019 (ADAMS Accession No. [ML19077A137](#)).

No members of the general public attended this meeting or addressed the NRC staff during the public comment portion of the agenda.

The following action items were identified during the meeting:

1. NRC to evaluate the possibility of a phased approach in revising the current HELB guidance in BTP 3-4. A phased approach would begin with revised CUF criteria first (for operating reactors).
2. EPRI to evaluate the possibility on conducting a pilot plant project that includes a licensee HELB submittal to the NRC. The initial submittal would request a relaxation in the CUF = 0.1 criteria.

3. NRC to provide information related to recent HELB submittals by licensees to identify the motivation for these submittals and if revisions to the existing guidance should address the requests made in such submittals.
4. NRC to consider other piping configurations applicable to new reactors (e.g., proprietary bolted connections, flange connections).
5. NRC and EPRI Advanced Nuclear Technology (ANT) to inform advanced non-LWR vendors and designers about these efforts so that their feedback can be considered, as appropriate.

The meeting was adjourned at 5:00 pm EST.

APPENDIX

U.S. Nuclear Regulatory Commission Category 2 Virtual Public Meeting on Alternative Criteria for Postulating High-Energy Pipe Break Locations

March 1, 2021, 1:00 – 5:00 pm EST

Participant List

Full Name	Affiliation
Marc Albert	EPRI
Chakrapani Basavaraju	NRC
Michael Benson	NRC
Michael Breach	NRC
John Broussard	Dominion Engineering, Inc.
Angie Buford	NRC
Markus Burkardt	Dominion Engineering, Inc.
Gregoire Corradi	EDF
Daniel Diefendorf	NuScale
Giovanni Facco	NRC
Nathan Glunt	EPRI
Consuelo Guzman-Leong	LPI, Inc.
Zachary Harper	Westinghouse
Terry Herrmann	STI
Michael Henshaw	Duke Energy
Kaihwa Hsu	NRC
Larry Hu	DTE Energy
Raj Iyengar	NRC
Yueh-Li Li	NRC
Timothy Lupold	NRC
Kamal Manoly	NRC
Damijan Markovic	EDF
Ashley Marlowe	Duke Energy
Chris McCoy	Framatome
Ching Ng	NRC
Larry Nicholson	Certrec
Derek Noel	NuScale
Tim Nowicki	Westinghouse
Benjamin Sears	U.S. Navy
Gary Stevens	EPRI
Robert Tregoning	NRC
Alexander Tsirigotis	NRC
Cindy Williams	BWXT
Sarah Wood	DTE Energy
Mark Yoo	NRC