



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 8, 2022

MEMORANDUM TO: Antonios Zoulis, Chief
PRA Oversight Branch
Division of Risk Assessment
Office of Nuclear Reactor Regulation

FROM: Siva P. Lingam, Project Manager */RA/*
Licensing Projects Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Reinaldo Rodriguez, Senior Reactor Analyst */RA/*
PRA Oversight Branch
Division of Risk Assessment
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF NOVEMBER 16, 2022, PUBLIC MEETING WITH
NUCLEAR ENERGY INSTITUTE, INDUSTRY, AND ELECTRIC POWER
RESEARCH INSTITUTE TO SHARE RISK INSIGHTS GAINED FROM
THE HIGH ENERGY ARCING FAULTS LIC-504 ASSESSMENT

On November 16, 2022, the U.S. Nuclear Regulatory Commission (NRC) staff held an observation public meeting with representatives from the Nuclear Energy Institute (NEI), Industry, and the Electric Power Research Institute (EPRI) to share and exchange the information pertaining to the NRC staff's results, including risk insights as a result of the staff's evaluation of safety significance of high energy arcing faults (HEAF) using the Office of Nuclear Reactor Regulation's Office Instruction LIC-504, "Integrated Risk-Informed Decision-making Process for Emergent Issues," as documented in the NRC HEAF Working Group's memorandum dated July 22, 2022 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML22200A272). A list of attendees is provided in Enclosure 1.

The slides presented for this public meeting are available in ADAMS under Accession No. ML22319A085. A list of the panel members representing the NRC, Constellation, and Duke-Energy is included in Enclosure 2. A list of presenters is included in Enclosure 3. The details of the meeting are discussed in Enclosure 4.

During the public comment period, members of public provided comments. Some of the significant comments pertained to: (a) LIC-504 team conclusion relating to risk significance of the issue, (b) accuracy of quantifications of the accident sequence precursor results of previous HEAF related events and conditions, (c) timing and the quality of the LIC-504 team's conclusion with respect to whether an immediate safety concern exists, and (d) adequacy of using results from the two reference plants can be considered as bounding the HEAF risks at US plants. In response to these questions, the NRC staff provided additional information and clarification, and committed to follow up as appropriate after evaluating the comments and questions.

No regulatory decisions or commitments were made at the meeting.

Please direct any inquiries to me at (301) 415-1564 or by e-mail at Siva.Lingam@nrc.gov, or Reinaldo Rodriguez at (404) 997-4498 or by e-mail at Reinaldo.Rodriguez@nrc.gov.

Enclosures:

1. List of Attendees
2. List of Panel Members
3. List of Presenters
4. Meeting Details

LIST OF ATTENDEES

NOVEMBER 16, 2022, PUBLIC MEETING WITH
NUCLEAR ENERGY INSTITUTE, INDUSTRY, AND
ELECTRIC POWER RESEARCH INSTITUTE
TO SHARE RISK INSIGHTS GAINED FROM THE
HIGH ENERGY ARCING FAULTS LIC-504 ASSESSMENT

Name	Affiliation
Christian Araguas	U.S. Nuclear Regulatory Commission (NRC)
Mike Franovich	NRC
Kenneth Hamburger	NRC
John Hanna	NRC
John Hughey	NRC
J.S. Hyslop	NRC
Meena Khanna	NRC
Michelle Kichline	NRC
Andrea Kock	NRC
Matthew Leech	NRC
Siva Lingam	NRC
Lauren Mayros	NRC
Shivani Mehta	NRC
Nick Melly	NRC
Andrew Mihalik	NRC
Ed Miller	NRC
Charles Moulton	NRC
Ching Ng	NRC
Lundy Pressley	NRC
Jay Robinson	NRC
Reinaldo Rodriguez	NRC
MarkHenry Salley	NRC
David Stroup	NRC
John Tappert	NRC
Gabe Taylor	NRC
Keith Tetter	NRC
Christopher Tyree	NRC
Shilp Vasavada	NRC
Sunil Weerakkody	NRC
Jennifer Whitman	NRC
Antonios Zoulis	NRC
Suzanne Loyd	Constellation
Kevin Lueshen	Constellation
Patricia Pringle	Constellation
Jeffrey Stone	Constellation

Name	Affiliation
Jeffrey Ertman	Duke-Energy
Jack Lemmer	Duke-Energy
Jamie McCrory	Duke-Energy
Robert Rishel	Duke-Energy
Ashley Lindeman	Electric Power Research Institute (EPRI)
Ferrante Fernando	EPRI
Marko Randelovic	EPRI
Mark Woodby	EPRI
Victoria Anderson	Nuclear Energy Institute (NEI)
Thomas Basso	NEI
Andrew Mauer	NEI
Jennifer Uhle	NEI
Mark Hulet	Arizona Public Service Company
Larry Nicholson	NextEra
Joshua Ross	FirstEnergy
Kiang Zee	Wolf Creek Nuclear Operating Corporation
Greg Kvamme	Northern States Power Company - Minnesota
Raymond Burski	Florida Power & Light Company (Contractor)
Vish Patel	Southern Nuclear Operating Company
Ben Morse	Engineering Planning and Management, Inc. (EPM)
Mark Schairer	EPM
Michael Szkutak	EPM
Travis Weber	EPM
Francisco Joglar	Jensen Hughes
Dane Lovelace	Jensen Hughes
Victor Ontiveros	Jensen Hughes
Andy Ratchford	Jensen Hughes
Gregory Zucal	Jensen Hughes
Tom Collopy	United Nuclear Corporation
Charles Young	Retired (U.S. Navy)
David Lochbaum	Retired (Union of Concerned Scientists)
Jeff Mitman	Retired (NRC)
Paul Gunter	Beyond Nuclear
Roberto Herrero Santos	Consejo de Seguridad Nuclear (CSN), Spain
Juan Manuel Martin Valdepenas	CSN, Spain
Andrew Zach	U.S. Senate Environment and Public Works Committee

LIST OF PANEL MEMBERS
NOVEMBER 16, 2022, PUBLIC MEETING WITH
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HIGH ENERGY ARCING FAULTS LIC-504 ASSESSMENT

Name	Affiliation
Suzanne Loyd	Constellation
Robert Rishel	Duke-Energy
Reinaldo Rodriguez	U.S. Nuclear Regulatory Commission (NRC)
Sunil Weerakkody	NRC
Antonios Zoulis*	NRC

*Facilitator

LIST OF PRESENTERS

NOVEMBER 16, 2022, PUBLIC MEETING WITH
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Name	Affiliation
Mike Franovich	U.S. Nuclear Regulatory Commission (NRC)
Jack Lemmar	Duke-Energy
Suzanne Loyd	Constellation
Reinaldo Rodriguez	NRC
Sunil Weerakkody	NRC

MEETING DETAILS

NOVEMBER 16, 2022, PUBLIC MEETING WITH NUCLEAR ENERGY INSTITUTE, INDUSTRY, AND ELECTRIC POWER RESEARCH INSTITUTE TO SHARE RISK INSIGHTS GAINED FROM THE HIGH ENERGY ARCING FAULTS LIC-504 ASSESSMENT

Purpose

The purpose of this public meeting between the U.S. Nuclear Regulatory Commission (NRC) staff, and representatives from the Nuclear Energy Institute (NEI), Industry, and the Electric Power Research Institute (EPRI) was to share and exchange the information pertaining to the NRC staff's results, including risk insights as a result of the staff's evaluation of safety significance of high energy arcing faults (HEAF) using the Office of Nuclear Reactor Regulation's (NRR) Office Instruction LIC-504, "Integrated Risk-Informed Decision-making Process for Emergent Issues" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19253D401), as documented in the NRC HEAF Working Group's memorandum dated July 22, 2022 (ADAMS Accession No. ML22200A272).

Background

As described in its August 21, 2021, memorandum (ADAMS Accession No. ML21237A360), the NRC has exited the Generic Issues Program for HEAFs and entered a regulatory process consistent with NRR Office Instruction LIC-504. The revised approach supports a more efficient resolution of the issue using a risk-informed process and aligns with the Be RiskSMART framework. The LIC-504 evaluation used the best available HEAF technical information, along with available plant information.

The NRC staff has reviewed additional information from the ongoing Office of Nuclear Regulatory Research testing, operating experience, and collaborative research with EPRI.

The NRC staff will continue to work with EPRI under the memorandum of understanding on Fire Research to advance the state of knowledge for evaluating HEAFs in probabilistic risk assessments (PRAs).

The NRC staff assessed if any longer-term regulatory actions are justified based on the detailed LIC-504 evaluation.

Results of NRC LIC-504 Evaluation

- The staff assessed whether there was a need for immediate regulatory action(s) and concluded that U.S. plants remain safe without the agency taking any prompt regulatory action(s).

- The staff investigated the differences in risk between the current HEAF PRA methodology and the new HEAF PRA methodology.
- The staff concluded that those plants with relatively long fault clearing times, and consequently larger zones of influence for bus ducts, could experience a significant increase in risk due to HEAFs.
- The staff evaluated various communication options that would enable the staff to share its insights with external stakeholders for licensee consideration to implement effective steps to further reduce and/or mitigate HEAF risks.
- The staff concluded that no further regulatory actions are required and recommended to issue an Information Notice sharing the operating experience and availability of the new HEAF risk assessment methodology for licensee consideration.

Meeting Details

The panel members provided the following presentations:

Suzanne Loyd of Constellation concluded her presentation with the following highlights:

- HEAF scenarios in fire PRA have always been considered a significant contributor to risk.
- HEAF events can be prevented or mitigated with routine maintenance of electrical equipment, operator training, and sharing of operating experience among licensees.
- Shields or barriers can be used to mitigate HEAF events.
- Use of improved draft methodology can provide more realistic representation of HEAF in fire PRA models.

Jack Lemmar of Duke Energy addressed the following topics:

- Importance of HEAFS
- Prevention of HEAFS
- Draft methodology application

Reinaldo Rodriguez of NRC/NRR presented the NRC staff's HEAF LIC-504 risk insights, one boiling water reactor and one pressurized water reactor plant visits, factors considered in LIC-504 implementation, and quoted the publicly available memorandum dated July 22, 2022, with working group recommendations (ADAMS Accession No. ML22201A000). Based on the evaluation of HEAF using LIC-504, the NRC staff concluded that there is no significant increase in total HEAF risk that warranted any additional regulatory actions. However, the NRC staff recommended to issue an Information Notice covering the LIC-504 quantitative and qualitative assessments, related operating experience, and the availability of the new HEAF PRA methodology for licensee consideration.

Sunil Weerakkody of NRC/NRR described the sources of operating experience, HEAF scenarios in fire PRA, and reducing risk with risk significant HEAF events that occur.

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KHamburger, RES	RGladney, NRR
JHughey, NRR	DJohnson, OEDO
JHyslop, NRR	LMcKown, OEDO

ADAMS Accession Nos.:

Packages: ML22325A300 and ML22319A085

Meeting Notice: ML22299A182

Meeting Slides: ML22319A075, ML22319A077, and ML22319A080

Meeting Summary: ML22333A007

***by e-mail**

OFFICE	NRR/DORL/LLPB/PM*	NRR/DRA/APOB/RA*	NRR/DORL/LLPB/LA*
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DATE	11/23/22	11/28/22	11/30/22
OFFICE	NRR/DRA/APOB/BC *	NRR/DORL/LLPB/BC (A)*	NRR/DORL/LLPB/PM*
NAME	AZoulis	JEvans	SLingam
DATE	11/30/22	12/8 /22	12/8/22

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