[7590-01-P]

NUCLEAR REGULATORY COMMISSION

[NRC-2022-0096]

Modeling High Energy Arcing Fault Hazards and Zones of Influence

AGENCY: Nuclear Regulatory Commission.

ACTION: Draft research information letter reports; request for comment.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) is issuing for public comment two draft Research Information Letter reports, "Predicting High Energy Arcing Fault Zones of Influence for Aluminum Using a Modified Arc Flash Model, Evaluation of a modified model bias, uncertainty, parameter sensitivity and zone of influence estimation, Draft for public comment," and "Determining the Zone of Influence for High Energy Arcing Faults using Fire Dynamics Simulator, Draft for public comment."

DATES: Submit comments by **[INSERT DATE 30 DAYS AFTER PUBLICATION IN THE *FEDERAL REGISTER*]**. Comments received after this date will be considered if it is practical to do so, but the Commission is able to ensure consideration only for comments received on or before this date.

ADDRESSES: You may submit comments by any of the following methods; however, the NRC encourages electronic comment submission through the **Federal rulemaking website**:

- **Federal rulemaking website:** Go to https://www.regulations.gov and search for Docket ID **NRC-2022-0096**. Address questions about Docket IDs in Regulations.gov to Stacy Schumann; telephone: 301-415-0624; email: Stacy.Schumann@nrc.gov. For technical questions, contact the individual listed in the "For Further Information Contact" section of this document.

- **Mail comments to:** Office of Administration, Mail Stop: TWFN-7-A60M, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, ATTN: Program Management, Announcements and Editing Staff.

For additional direction on obtaining information and submitting comments, see "Obtaining Information and Submitting Comments" in the **SUPPLEMENTARY INFORMATION** section of this document.

FOR FURTHER INFORMATION CONTACT: Gabriel J. Taylor, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, telephone: 301-415-0781, email: Gabriel.Taylor@nrc.gov.

SUPPLEMENTARY INFORMATION:

I. Obtaining Information and Submitting Comments

A. Obtaining Information

Please refer to Docket ID **NRC-2022-0096** when contacting the NRC about the availability of information for this action. You may obtain publicly available information related to this action by any of the following methods:

- **Federal Rulemaking Website:** Go to https://www.regulations.gov and search for Docket ID **NRC-2022-0096**.
- **NRC's Agencywide Documents Access and Management System (ADAMS):** You may obtain publicly available documents online in the ADAMS Public Documents collection at https://www.nrc.gov/reading-rm/adams.html. To begin the search, select "Begin Web-based ADAMS Search." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by email to PDR.Resource@nrc.gov. The draft research information letter reports "Predicting High Energy Arcing Fault Zones of Influence for Aluminum Using a Modified Arc Flash Model, Evaluation of a modified model bias, uncertainty,

parameter sensitivity and zone of influence estimation, Draft for public comment" is available in ADAMS under Accession No. ML22095A236, and "Determining the Zone of Influence for High Energy Arcing Faults using Fire Dynamics Simulator, Draft for public comment," is available in ADAMS under Accession No. ML22095A237.

- **NRC's PDR**: You may examine and purchase copies of public documents, by appointment, at the NRC's PDR, Room P1 B35, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852. To make an appointment to visit the PDR, please send an email to PDR.Resource@nrc.gov or call 1-800-397-4209 or 301-415-4737, between 8:00 a.m. and 4:00 p.m. (ET), Monday through Friday, except Federal holidays.

B. Submitting Comments

The NRC encourages electronic comment submission through the **Federal rulemaking website** (https://www.regulations.gov). Please include Docket ID **NRC-2022-0096** in your comment submission.

The NRC cautions you not to include identifying or contact information that you do not want to be publicly disclosed in your comment submission. The NRC will post all comment submissions at https://www.regulations.gov as well as enter the comment submissions into ADAMS. The NRC does not routinely edit comment submissions to remove identifying or contact information.

If you are requesting or aggregating comments from other persons for submission to the NRC, then you should inform those persons not to include identifying or contact information that they do not want to be publicly disclosed in their comment submission. Your request should state that the NRC does not routinely edit comment submissions to remove such information before making the comment submissions

available to the public or entering the comment into ADAMS. All comments should reference the applicable report.

II. Discussion

The NRC Office of Nuclear Regulatory Research (RES) is advancing the understanding and state-of-practice for modeling High Energy Arcing Faults (HEAF) in fire Probabilistic Risk Assessment (PRA). One important aspect of this research is the ability to reliably predict the HEAF hazard for various scenarios important for nuclear safety. The high intensity and short duration of a HEAF has not been explicitly modeled in past fire PRA methodologies. As such, there was a need to advance HEAF modeling capabilities to reliably predict the scenario specific HEAF hazards to support refinements to the zones of influence (ZOI) used in fire PRA. The NRC worked with its collaborative research partners to develop two models to predict the HEAF hazard.

In the report titled, “Predicting High Energy Arcing Fault Zones of Influence for Aluminum Using a Modified Arc Flash Model, Evaluation of a modified model bias, uncertainty, parameter sensitivity and zone of influence estimation, Draft for public comment,” the NRC worked with Sandia National Laboratories to evaluate an existing base model. Differences between the base model and nuclear power plant fire PRA scenarios were identified. Modification of the base model established from existing literature and test data was used to minimize these differences. The modified model was evaluated against NRC datasets to understand the model prediction and relative uncertainties. Finally, a range of fire PRA ZOIs were developed based on the modified model and draft update HEAF PRA methodology. The results are expected to be used to inform an update to ZOIs used in fire PRA.

In the report titled, “Determining the Zone of Influence for High Energy Arcing Faults using Fire Dynamics Simulator, Draft for public comment,” the NRC worked with

the Electric Power Research Institute and the National Institute of Standards and Technology to adapt a computational fluid dynamic code known as the Fire Dynamics Simulator (FDS) to predict the HEAF hazard. This report documents (1) the development of the approach to use FDS to predict thermal exposures to targets from a HEAF, (2) validation of the model and (3) application of the model to estimate HEAF ZOI for a broad range of fire PRA HEAF scenarios.

The draft research information letter reports present the NRC-RES/Sandia National Laboratories (SNL) and NRC-RES/Electric Research Power Institute (EPRI) working groups efforts to predict realistic HEAF hazards. The two approaches to model HEAF hazards present complementary but diverse methods to estimating the hazard ZOI. For most scenarios the two approaches provide results that are consistent with each other. The NRC-SNL report can be viewed as a first order approximation providing a single value scenario specific ZOI estimate, while the NRC-RES/EPRI report provides additional geometric detail to the ZOI estimate.

Dated: May 9, 2022.

For the Nuclear Regulatory Commission.

/RA/

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