



[7590-01-P]

NUCLEAR REGULATORY COMMISSION

[NRC-2019-0229]

Methodology for Modeling Transient Fires in Nuclear Power Plant Fire Probabilistic Risk Assessments

AGENCY: Nuclear Regulatory Commission.

ACTION: Draft NUREG; request for comment.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) is issuing for public comment a draft NUREG entitled, "Methodology for Modeling Transient Fires in Nuclear Power Plant Fire Probabilistic Risk Assessments" (NUREG-2233/EPRI 3002016054). This report is a joint product of the NRC and the Electric Power Research Institute (EPRI) collaborating under a memorandum of understanding for fire research. This report contains a methodology to increase the realism in the modeling of transient ignition sources in fire probabilistic risk assessment (FPRA). Additionally, the report develops a method for the detailed modeling of transient fires that includes fire growth and decay parameters, yields of minor products of combustion, heat of combustion, and the physical size and effective elevation of the fire.

DATES: Submit comments by **[INSERT DATE 45 DAYS FROM DATE OF 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 before this date.

ADDRESSES: You may submit comments by any of the following methods:

- **Federal Rulemaking Web Site:** Go to <https://www.regulations.gov> and search for Docket ID **NRC-2019-0229**. Address questions about Docket IDs in

Regulations.gov to Jennifer Borges; telephone: 301-287-9127; e-mail:

Jennifer.Borges@nrc.gov. For technical questions, contact the individuals 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: David W. Stroup, Office of Nuclear Regulatory Research, telephone: 301-415-1649, e-mail: David.Stroup@nrc.gov; or Nicholas Melly, Office of Nuclear Regulatory Research, telephone: 301-415-2392, e-mail: Nicholas.Melly@nrc.gov. Both are staff of the U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

SUPPLEMENTARY INFORMATION:

I. Obtaining Information and Submitting Comments

A. Obtaining Information

Please refer to Docket ID **NRC-2019-0229** 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 Web Site:** Go to <https://www.regulations.gov> and search for Docket ID **NRC-2019-0229**.

- **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 e-mail to pdr.resource@nrc.gov. The draft NUREG on "Methodology for Modeling Fire Growth and Suppression Response of Electrical Cabinet Fires in Nuclear Power Plants" is available in ADAMS under Accession No. ML19357A270.

- **NRC's PDR:** You may examine and purchase copies of public documents at the NRC's PDR, Room O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.

B. Submitting Comments

Please include Docket ID **NRC-2019-0229** 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.

II. Discussion

In 2005, the Electric Power Research Institute (EPRI) and the NRC's Office of Nuclear Regulatory Research (RES) issued a joint technical report titled, EPRI/NRC-RES, Fire PRA Methodology for Nuclear Power Facilities, EPRI 1011989, NUREG/CR-6850. This publication documented state-of-the-art methods, tools, and data for conducting a fire probabilistic risk assessment (FPRA) for a commercial nuclear power plant (NPP) application. Following this publication, many utilities developed FPRAs using the guidance in NUREG/CR-6850 to support risk informed applications, including the transition to an NFPA 805 licensing basis, among others. The results obtained from the FPRA models have suggested specific elements in the fire scenario analysis where improved methods and/or guidance could reduce conservatism and increase realism in the risk estimates. Consequently, over the past fifteen years, FPRA research covering the areas of fire ignition frequencies, fire modeling, human reliability analysis and spurious operations have been published. These research results have improved realism for the ignition sources identified in NUREG/CR-6850 except for transient combustibles. The research in this report addresses that gap.

The research documented in this report was developed by a working group that included members of both the regulator and the nuclear power industry and consisted of two phases. For the first phase, an extensive set of experiments measuring the heat release rate and other fire characteristics of transient fires was conducted to supplement the existing data in NUREG/CR-6850/EPRI 1011989. The test report for this set of experiments, NUREG-2232/EPRI 3002015997, "Heat Release Rate and Fire Characteristics of Fuels Representative of Typical Transient Fire Events in Nuclear Power Plants," contains details on all the fuel packages tested; the test method including selection of fuel packages and ignition sources; the methods used to process the collected test data; and the collected and derived data including heat release rate, fire

diameter, zones of influence, fire growth and decay parameters, and the combustion properties of the fuel packages. The test report is available from EPRI at <https://www.epri.com/#/pages/product/3002015997/>. The second phase, documented in this report, combined the data collected in the first phase with data from previous experimental programs, developed a methodology for weighting the combined dataset based on industry experience with transient fires, and used the weighted combined dataset to create improved probabilistic distributions for use in modeling transient fires in FPRA. Additionally, this report presents detailed guidance for modeling the time-dependence and defining the combustion characteristics of transient fires.

Dated at Rockville, Maryland, this 27th day of December 2019.

For the Nuclear Regulatory Commission.

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Division of Risk Analysis,
Office of Nuclear Regulatory Research.

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