PUBLIC MEETING ANNOUNCEMENT

TITLE: Notice of Nuclear Regulatory Commission-Office of Nuclear
                          Regulatory Research/Electric Power Research Institute (NRC-
                          RES/EPRI) Courses on Fire Probabilistic Risk Assessment

DATES,
& LOCATIONS: Module I – Probabilistic Risk Assessment
                          Monday, July 11th through Friday, July 15th, 2016
                          EPRI Offices, Charlotte, NC

                          Module II – Electrical Analysis
                          Monday, August 15th through Friday, August 19th, 2016
                          NRC Office, 3WFN, North Bethesda, MD

                          Module III – Fire Analysis
                          Monday, June 20th through Friday June 24th, 2016
                          NRC Office, 3WFN, North Bethesda, MD

                          Module IV – Human Reliability Analysis
                          Monday, July 11th through Friday, July 15th, 2016
                          EPRI Offices, Charlotte, NC

                          Module V – Advanced Fire Modeling
                          Monday, August 1st through Friday, August 5th, 2016
                          NRC Office, 3WFN, North Bethesda, MD

TIME: Monday – Thursday 8:00 AM -5:00 PM
                          Friday 8:00 AM – 12:00PM

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                          301-415-2403

PURPOSE: The U.S. Nuclear Regulatory Commission (NRC), Office of Nuclear
                          Regulatory Research (RES), in cooperation with the Electric Power
                          Research Institute (EPRI), will jointly sponsor a course on fire
                          probabilistic risk assessment (PRA). Since 2002, RES and EPRI,
                          under a Memorandum of Understanding (MOU) on Cooperative
                          Nuclear Safety Research, have been developing state-of-the-art
                          methods for conducting fire PRA. In September 2005, this work
                          produced "EPRI/NRC-RES Fire PRA Methodology for Nuclear
                          Power Facilities" (NUREG/CR-6850/EPRI 1011989), which is the
                          subject of this 2016 course. Training will also include discussions
                          relating to the fire PRA portion of the ASME/ANS PRA Standard[5] to
                          the methodology of NUREG/CR-6850 (EPRI 1011989).

                          Five modules cover the major technical areas of the fire PRA
                          methodology. This year's offerings will provide each module only
                          one time at either the NRC or EPRI offices. Participants may
                          attend as many modules as they wish during the year. Remember

both EPRI and NRC will host - so please note the date, location and be sure to read the course descriptions prior to registering. The complete description of each module is provided below with a link to the course website and registration.

Module 1: PRA - This module covers the technical tasks for development of the both system and operator response to a fire. Specifically, this module covers NUREG/CR-6850, EPRI 1011989 Volume 2, Sections 2, 4, 5, 7, 14, and 15. This module is suited for PRA practitioners responsible for the systems modeling aspects of the fire PRA. Specifically, participants in this module should possess the following knowledge:

- A general knowledge of PRA as applied to nuclear power plants, including typical approaches, modeling techniques (event trees, fault trees, interfaces between PRA and HRA), and the quantification of PRA models

- Some familiarity with plant systems typically found in nuclear power plants. A simplified, but reasonably realistic example of a few plant systems will be used to demonstrate the methodology.

- Some familiarity with piping and instrumentation diagrams (P&IDs) and their use in developing PRAs

Module 2: Electrical Analysis - This module covers technical tasks for analysis of fire induced circuit failures in support of fire PRA analysis. Specifically, this module covers NUREG/CR-6850, EPRI 1011989 Volume 2, Sections 3, 9, and 10. The electrical analysis module is geared toward PRA practitioners and fire safe shutdown analysts with a practical understanding of the concepts and methods of fire-induced circuit failure analysis within the context of fire PRA or Appendix R post-fire safe shutdown circuit failure assessments. Specifically, participants in this module should possess the following knowledge:

- General circuit design and operational control for typical plant equipment

- Basic circuit analysis techniques for identifying and classifying fire-induced circuit failure modes

- Working level knowledge of typical electrical drawings, including one-line diagrams, schematic diagrams, electrical block diagrams, wiring/connection diagrams, raceway layout drawings, instrument loop diagrams, etc.

- Cable and raceway, Appendix R post-fire safe shutdown, and fire PRA database structures and software

- Appendix R post-fire safe shutdown circuit analysis

- Progression of events stemming from the EPRI/NRC cable fire testing to characterize fire induced circuit failures (historical perspective)
- Emerging issues and challenges associated with the analysis of multiple spurious operations

Module 3: Fire Analysis - This module covers technical tasks involving plant partitioning, fire frequency analysis, and the development and analysis of fire scenarios from fire ignition to target impact and fire suppression. Specifically, this module covers NUREG/CR-6850, EPRI 1011989 Volume 2, Sections 1, 6, 8, and 11. This module is suited for PRA practitioners responsible for treating those aspects of the fire PRA specifically related to the fire growth and damage assessment tasks. Specifically, participants in this module should possess the following knowledge:

- A general understanding of the fire frequency calculation process as practiced in fire PRA,
- Knowledge of general fire protection features and systems as typically implemented at a NPP,
- A general understanding of how fire models are used in support of the fire PRA (a proficient level of fire modeling expertise is *not* required),
- A general understanding of fire behavior and the parameters most important to a fire growth and damage analysis (e.g., concepts such as fire spread, heat release rate (HRR), target response, and fire suppression and detection analyses).

Module 4: HRA - This module covers technical tasks related to modeling human failure events (i.e., the failure of operator responses) in a fire context. This module will focus on the guidance provided in NUREG-1921, "EPRI/NRC-RES Fire Human Reliability Analysis Guidelines" which largely replaces the human reliability analysis (HRA) guidance provided in EPRI 1011989, NUREG/CR-6850, Volume 2, Section 12. This module is suited for HRA/PRA practitioners responsible for the HRA aspects of the fire PRA. Specifically, participants in this module should posses the following knowledge:

- A general knowledge of PRA as applied to nuclear power plants, including typical approaches, modeling techniques (event trees, fault trees, interfaces between PRA and HRA), and the quantification of PRA models
- Some familiarity with plant systems typically found in nuclear power plants. Simplified, but reasonably realistic examples of

plant systems that may be represented in PRAs and manipulated by operators will be used to demonstrate the methodology.

- Some familiarity with plant operations and operating procedures. Examples of HRA tasks, such as human failure event identification, will use typical operator actions and simplified examples of operating procedures to demonstrate the methodology.

- A general understanding of the typical influences on operator performance and how they are represented in HRA tasks such as human failure event definition and quantification.

Module 5: Advanced Fire Modeling – The module covers the fundamentals of fire science, as well as the guidance for the use of fire models to evaluate fire generated conditions that may impact the nuclear plants safety functions and/or impair operator's ability to safely shutdown the plant after a fire. This module will use the EPRI 1019195, NUREG-1934, "Nuclear Power Plant Fire Modeling Application Guide." This module is suited for fire modeling practitioners. It is recommended that the participants complete Module 3, Fire Analysis, prior to taking this Module. Specifically, participants in this module should possess the following knowledge:

- General knowledge of the fire dynamics

- General knowledge of the behavior of compartment fires; and

- General knowledge of basic engineering principles, specifically thermodynamics, heat transfer, and fluid mechanics

- General knowledge of mathematical computer fire models

Please note:

Printed notebooks will NOT be provided this year.

All participants in Module 5 must bring laptop computers suitable for running the basic fire modeling software to be discussed (the NRC FDT's, CFAST, FDS and MAGIC). Minimum requirements are (1) Windows 7 or higher operating system, (2) Microsoft .net framework version 4.0 or higher, and (3) Adobe Reader or Acrobat. It is critical that participants have software installation privileges (e.g., administrator privileges at log-in) so that the fire modeling software can be installed and/or updated if necessary. A software installation session will be conducted Monday from 2PM-5PM for participants in Module 5. Instructors will be present to verify installation and function for current versions of the fire modeling software.

While laptop computers are not required for participation in Modules 1-4, participants may wish to bring a laptop to follow along with the course materials electronically.

Slides and other required class material will be uploaded to the NRC website approximately 2 weeks prior to the training. It will be the participants' responsibility to download the material before the session. They can either print a hard copy or follow along on their laptops.

It is recommended that participants read appropriate sections of NUREG/CR-6850 (EPRI 1011989) corresponding to the selected training module prior to the course. This report may be downloaded from NRC's public website at the following address: http://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr6850/ or obtained from EPRI website at www.epri.com.

Those interested in attending this workshop must register on the EPRI website using the links below.

Module 1: PRA
Module 2: Electrical Analysis
Module 3: Fire Analysis
Module 4: HRA
Module 5: Advanced Fire Modeling

Course materials can be downloaded from the site below. Materials will be made available two weeks prior to the course.

http://www.nrc.gov/public-involve/conference-symposia/epri-fire-pra-course/epri-fire-pra-course-info.html

Registration for this workshop is required to ensure space availability. If you have any questions, you may contact Ms. Wright at 301-415-2403.

CATEGORY: This meeting is a Category 3 meeting*. The public is invited to participate in this meeting by providing comments and asking questions throughout the meeting. Please note this workshop is being conducted in a classroom format; registration is required to ensure space availability.

The NRC provides reasonable accommodation to individuals with disabilities where appropriate. If you need a reasonable accommodation to participate in this workshop, or need the workshop notice or agenda in another format (e.g., Braille, large print), please notify the NRC's meeting contact. Determinations on requests for reasonable accommodation will be made on a case-by-case basis.

*Meetings between the NRC technical staff and external stakeholders are open for interested members of the public, petitioners, interveners, or other parties to attend as observers pursuant to Commission policy statement, "Enhancing Public Participation in NRC Meetings," 67 *Federal Register* 36920, May 28, 2002.

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