May 26, 2009

MEMORANDUM TO: Mark Salley, Chief
Fire Research Branch
Division of Risk Analysis
Office of Nuclear Regulatory Research

FROM: Kendra L. Hill, Reliability and Risk Engineer ***/RA/***
Fire Research Branch
Division of Risk Analysis
Office of Nuclear Regulatory Research

SUBJECT: NOTICE OF NUCLEAR REGULATORY COMMISSION-OFFICE OF NUCLEAR REGULATORY RESEARCH AND THE ELECTRIC POWER RESEARCH INSTITUTE (NRC-RES/EPRI) COURSE ON FIRE PROBABILISTIC RISK ASSESSMENT

DATE AND TIME: Session I:
Monday, June 22nd through Friday, June 26th, 2009

LOCATION: EPRI facilities at 3420 Hillview Ave, Palo Alto, CA.

DATE AND TIME: Session II:
Monday, October 12th through Friday, October 16th, 2009

LOCATION: Dominion Corporate Office at 5000 Dominion Blvd, Glen Allen,VA.

REGISTRATION: Session I:
http://guest.cvent.com/EVENTS/Info/Summary.aspx?i=317e70ff-3db6-4a0c-a834-6977abc2e4de

Session II:
http://guest.cvent.com/EVENTS/Info/Summary.aspx?e=d2c3a2eb-cd1f-4b97-a90e-4923459b50af

CONTACT: Kendra L. Hill, RES/DRA
301-251-3300

PURPOSE: The U.S. Nuclear Regulatory Commission (NRC) Office of Nuclear Regulatory Research (RES), in cooperation with the Electric Power Research Institute (EPRI), will hold a joint 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 conduct of fire PRA. In September 2005, this work produced the "EPRI/NRC-RES Fire PRA Methodology for Nuclear

Power Facilities," NUREG/CR-6850 (EPRI 1011989). The course covers this state-of-the-art methodology to perform fire PRAs.

Since 2005, RES and EPRI have jointly conducted five workshops on this methodology. Approximately 400 representatives from the industry and government, within and outside the US, have attended these workshops.

The 2009 Fire PRA Course/Seminar will be similar to the 2007 and 2008 courses that included in-depth technical presentations and hands-on sample problem(s) intended for the users and reviewers of this methodology. The course will be offered in four technical area modules to maximize transfer of the relevant technology to the users. The 2009 training will also include discussion of the latest fire PRA issues resolved in the NFPA 805 Frequently Asked Questions (FAQs). The structure of the course is described below:

Module 0: Fundamentals – This module covers principal elements for each technical area covered in the Fire PRA Course, i.e., PRA/HRA, Electrical Analysis, and Fire Analysis. This introductory module will assist in preparing the student to understand the in-depth fire PRA training module which follows. It is not intended to be a substitute for education and/or training in the subject matter. In addition, the sections under this module are designed for those students who are cross training, rather than for those participants that already possess the required knowledge for each in-depth module. For example, we recommend a Fire Protection Engineer (FPE) attend the section on principals of PRA/HRA prior to taking the PRA/HRA Module.

The following parallel sections will be offered on the 1st day:

Module 0a: Principals of PRA/HRA

Module 0b: Principals of Electrical Analysis

Module 0c: Principals of Fire Science and Modeling

In depth training continues in 2009 as described below in modules 1, 2, and 3.

Module 1: PRA/HRA - This module covers the technical tasks for the development of both the system and operator response to a fire. Specifically this module covers NUREG/CR-6850 (EPRI 1011989), Volume 2, Sections 2, 4, 5, 7, 12, 14, and 15. This module is suited for PRA practitioners responsible for the systems modeling and human reliability analysis (HRA) aspects of the FPRA. The course will be conducted with the assumption that students have the following prerequisite knowledge and skills:

- A general knowledge of PRA and HRA as applied to nuclear power plants, including typical approaches, modeling techniques

often applied (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

In 2009, this Module will cover two sections:

Module 1a: PRA – A 2-day module covering the system response to fire, specifically, EPRI 1011989, NUREG/CR-6850, Volume 2, Sections 2, 4, 5, 7, 14, and 15.

Module 1b: Fire HRA – A 1-day module covering the operator response to a fire, this module will start with the EPRI 1011989, NUREG/CR-6850, Volume 2, Section 12 and will expand into the EPRI/NRC-RES Fire HRA Guideline scheduled for public comment by June 2009.

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 circuit failure assessments. The course will be conducted with the assumption that students have the following prerequisite knowledge and skills:

- General circuit design and operational control for typical plant equipment
- Basic circuit analysis techniques for identifying and classifying fire-induced circuit failure modes
- Working 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, 10 CFR Part 50 Appendix R safe shutdown, and Fire PRA database structures and software
- Appendix R 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 FPRA specifically related to the fire growth and damage assessment tasks. The course will be conducted with the assumption that students have the following prerequisite knowledge and skills:

- A general understanding of the fire frequency calculation process as practiced in FPRA,
- Knowledge of general fire protection features and systems as typically implemented at a nuclear power plant (NPP),
- A general understanding of how fire models are used in support of the FPRA (a proficient level of fire model 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, fire heat release rate, target response, and fire suppression and detection analysis).

The course will be held in two sessions:

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Participants can attend only one of the in-depth modules per session as well as one of the fundamentals modules per session. Registration is required as space may be limited. Module and session requests will be accommodated to the extent possible.

Please note that computers are not needed for participation in this course. 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 should log on to http://guest.cvent.com/EVENTS/Info/Summary.aspx?e=0e8fc9d2-d93b-4336-875b-e42969d9334c to register or send an email to Kendra Hill at the NRC at Kendra.hill@nrc.gov. The email indicating your interest in this course must contain the following information: Name, work address, e-mail address, and phone number. Registration for this workshop is required to ensure space availability. If you have any questions, you may contact Ms. Hill at 301-251-3300.

PARTICIPANTS:	NRC/Contractor	EPRI/Contractor
	J.S. Hyslop	R. Kassawara
	S. Nowlen	B. Najafi
	M. Kazarians	F. Joglar
	J. LaChance	D. Funk
	F. Wyant	R. Anoba

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.

NRC CONTACT: J.S. Hyslop, phone (301) 251-7611 or e-mail js.hyslop@nrc.gov
EPRI CONTACT: R. Kassawara, phone (650) 855-2775 or e-mail rkassawa@epri.com
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