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MEMORANDUM TO: APLB Files

FROM: Greg A. Casto, Chief /RA/
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Division of Risk Assessment
Office of Nuclear Reactor Regulation

SUBJECT: CLOSE-OUT OF FIRE PROBABILISTIC RISK ASSESSMENT
FREQUENTLY ASKED QUESTION 14-0007 ON TRANSIENT
FIRE FREQUENCY LIKELIHOOD

Background:

During industry peer reviews and Nuclear Regulatory Commission (NRC) staff review of Fire Probabilistic Risk Assessments (FPRAs) related to license amendment requests (LARs) to implement National Fire Protection Association "Performance-Based Standard for Fire Protection for Light-Water Reactor Electric Generating Plants" (NFPA 805, 10 CFR 50.48(c)), methods and approaches different from the accepted methods were encountered. NRC staff, the Nuclear Energy Institute (NEI), and representatives from the nuclear industry worked to identify these methods, approaches, and factors in current LARs (including but not limited to NFPA 805 LARs), and to address them through a frequently asked question (FAQ) process. This FAQ process is only one NRC process whereby a new FPRA method can be reviewed or developed.

NUREG/CR-6850, Electric Power Research Institute (EPRI) 1011989, "Fire PRA Methodology for Nuclear Power Facilities," (ADAMS Accession No. ML15167A401) established the process for assigning influence factors for transient fires and distributing transient fire ignition frequency within the PRA for a plant. NFPA 805 FAQ 12-0064, "Hot Work/Transition Fire Frequency Influence Factors," (ADAMS Accession No. ML12346A488) expanded the available influence factors and provided guidance for their implementation, but maintained from NUREG/CR-6850 that the transient fire frequency for general transients and transients caused by welding and cutting would be distributed evenly within the physical analysis units in the PRA.

Fire PRA FAQ 14-0007, "Transient Fire Frequency Likelihood," proposes an enhancement to the existing methodology to allow variations of the transient fire ignition frequencies for general transients and transients caused by welding and cutting within a physical analysis unit (PAU). This enhancement has arisen due to a recognition that these transient fire frequencies are affected by various characteristics of the plant within a PAU such as transient free zones, storage areas, and by certain physical barriers and obstructions.

Discussion and Conclusion:

The NRC staff and nuclear industry held a series of public meetings to discuss the resolution of FPRA FAQ 14-0007.

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This FAQ creates a new term, Transient Ignition Source Regions (TISRs). A TISR is smaller than a PAU and this enhancement of the existing methodology allows the transient fire ignition source frequency for ignition source bins for general transients and for transients caused by welding and cutting to vary within the PAU. *(Note that this FAQ does not apply to the fire ignition source bins for cable fires caused by welding and cutting.)* As a part of this task, influence factors W_{GT} , N_{GT} , W_{WC} , and N_{WC} formulas provided in NFPA 805 FAQ 12-0064 are revised for evaluating these transient fire ignition sources for TISRs. The fire ignition frequency of a PAU is conserved upon the division of a PAU into TISRs. Besides applying new influence factors in FPRA FAQ 14-0007, the scenario frequency must also be adjusted by the TISR area (see equation 10 in this FAQ). The implementation of this TISR area in the scenario frequency is important as it can impact the significance of the transient ignition frequencies for a TISR from the newer influence factors.

Finally, since a TISR does not confine the effects of a fire as a physical analysis unit, it should be noted that an ignition source may damage a target located in a different TISR. Also, since a single target may overlap several TISRs, a single target may be damaged from several sources from different TISRs. Thus, when applying the TISR for general transients and transients from welding and cutting, these impacts must be taken into account to develop the fire scenarios and evaluate the risk.

This guidance in FPRA FAQ 14-0007 is acceptable for use by licensees.

Enclosure:

FPRA FAQ 14-0007, "Transient Fire Frequency Likelihood"

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