

The NRC staff from the Office of Nuclear Reactor Regulation and the Office of Nuclear Regulatory Research have reviewed Revision 0e of FAQ 17-0012, "Incipient Detection for Fire Prevention and Suppression." During its review, the staff has identified several serious faults with the methodology that need to be satisfactorily addressed before the staff reconsiders this matter. These faults are identified below with supporting information. Detailed comments on the FAQ are provided in tabular form.

- Human Performance
  - FAQ credits human intervention for fire prevention/target suppression via a statistical approach with limited, possibly irrelevant data. Crediting human intervention with such an approach, rather than with more comprehensive HRA methods, leads to an incomplete, poorly quantified set of potential human responses.  
Note that Section 10 of NUREG-2180 provides an HRA approach for crediting human response to very early warning fire detection systems. In addition, Section 10.6.4 provides a general guide on how to use HRA methods for a de-energization strategy that is similar to this FAQ. Although the NUREG-2180 guidance is general in nature, it is still relevant to the FAQ even though plant-specific information would be required to perform the detailed HRA.
  - FAQ does not address HRA requirements for credited de-energization and suppression strategies. Crediting these strategies in the PRA without procedures, including communication requirements, and training is insufficient and does not provide the staff confidence that these strategies can be implemented.
- Use of NUREG-2180 beyond its scope and intended application
  - The FAQ 17-0012 uses the non-suppression methodology of NUREG-2180 to credit prevention. It is unclear to the staff how a methodology used to credit fire suppression (NUREG-2180) could be used to credit fire prevention (FAQ 17-0012) due to the added complications and additional time requirements of fire prevention actions as identified above. The staff suggests that a prevention method would be best served if it is separated from the non-suppression method presented in NUREG-2180.
- Misapplication of Appendix L
  - The FAQ appears to be using Appendix L of EPRI 1019189 (NUREG/CR-6850 Vol. 2) methodology outside and beyond its intended application. Appendix L is a target based approach since it incorporates fires from all sources which can fail the target set of interest; the FAQ appears to be applying it as a source based approach since it only considers damage to the source. The staff believes that a method like Appendix L may be beneficial, however Appendix L is not directly applicable as proposed in the FAQ.

- Technical justification missing
  - The technical justification for several of the assumption made in FAQ 17-0012 is inadequate.
    - Minimum incipient stage threshold changed from 30 minutes in NUREG-2180 to 1 hour in FAQ 17-0012. The change was based on a need for more time to implement an effective prevention strategy, rather than on actual fire event data from operating experience, and as such the staff has difficulty accepting this change to the threshold. In addition, this change contradicts industry's comment on draft NUREG-2180 where the 30 minute threshold was considered too long. If more operating experience is needed to justify this change, the staff suggests a data collection effort be performed per Appendix G of NUREG-2180.
    - The FAQ appears to assume that the ALARM will occur prior to the start of the fire. The test data may not support this and the FAQ does not provide justification for this assumption.
    - The FAQ appears to be unclear with regard to the incipient stage duration and the time available. These are two distinctly different, but related times (See Section 8 of NUREG-2180). For crediting VEWFD systems, time available is to be used. The FAQ should be clarified and made consistent.
    - The Main Control Room (MCR) non-suppression probability is applicable to a continuously occupied main control room. Since non-MCR spaces vary in size, configuration, and hazards, the use of the MCR non-suppression probability for area-wide applications is not justified in the proposed FAQ. This justification should be provided along with why it is appropriate to use in the proposed approach. This justification will likely need to include assumptions for human response.