

January 23, 2014

MEMORANDUM TO: Kevin Coyne, Chief
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Office of Nuclear Regulatory Research

FROM: Selim Sancaktar /RA/
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SUBJECT: COMPLETION OF CATEGORY 2 PUBLIC MEETING FOR A
TECHNICAL DISCUSSION ON PRA METHODS FOR
SEISMICALLY INDUCED FIRES AND FLOODS

On December 11th and 12th, a Category 2 public meeting was held in the form of a workshop with invited experienced technical PRA experts from inside and outside of the NRC, familiar with seismic and flooding aspects of PRA to solicit technical feasibility of PRA modeling of seismically induced fires and flood events. Attachment 1 provides the meeting attendees.

A public meeting notice was prepared issued in November 21, 2013, and was posted on the NRC's external (public) web page (ADAMS Accession No. ML13325B003). The Public Meeting Agenda was also issued as ML13325B019.

This public meeting was part of a lessons-learned activity that originated from NNTF Recommendation 3, which recommended "...as part of the longer term review, that the U.S. Nuclear Regulatory Commission (NRC) evaluate potential enhancements to the capability to prevent or mitigate seismically induced fires and floods." In SRM SECY 11 0137, the Commission directed the staff to initiate development of a probabilistic risk assessment (PRA) methodology to evaluate potential enhancements to plants' capability to prevent or mitigate seismically induced fires and floods as part of Tier 1 activities, while the broader evaluation (i.e., beyond the PRA methodology) of potential enhancements would remain a longer term Tier 3 activity.

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The public workshop was part of an effort of the PRA Branch of the Office of Nuclear Regulatory Research (RES) of the NRC and its contractor, Brookhaven National Laboratory (BNL), to carry out a scoping study on the technical feasibility of having a method (or a graded approach) for the risk analysis of Seismically-Induced Internal Fire, and Internal and External Flooding (SI-F&IEF). A report documenting this feasibility will be one of the inputs to generate a staff recommendation to the NRC's Commissioners.

The public workshop was organized by BNL in order to derive additional perspectives on seismically-induced fires and floods. Several people knowledgeable on related topics from the U.S- and Canadian-regulatory bodies (namely, the NRC and the Canadian Nuclear Safety Commission (CNSC)) and the nuclear industries in both countries specifically were invited to participate in the meeting. To maximize the usefulness of the workshop, an introductory list of topics for discussion was sent to the invitees in the form of 15 questions that BNL and NRC had prepared (Appendix A in Attachment 1). Their feedback was requested in the form of comments or preliminary responses to the questions to enhance the effectiveness of the workshop. Participants also were encouraged to raise any additional issues that they felt were relevant, but that were not covered in the questions.

The workshop format consisted of three short presentations, followed by interactive discussion among the participants. The discussion was broadly organized according to the preliminary questions (and the responses received prior to the workshop). The presentations are given in Attachment 2.

The following bullets capture main points of the discussion for path-forward:

1. Instead of focusing on a "PRA method" for analyzing SI-F&IEF risk, it may be more useful in the immediate future to focus on graded risk methods, along the lines of the example in the presentations. In keeping with this approach it would be useful to develop a robust method that efficiently screens out the SSCs that are not expected to contribute, or that are negligible contributors, to the NPP's risk due to SI-F&IEF scenarios. It may be possible to develop, using the experience of seasoned practitioners, generic lists of fire SSCs and flood SSCs that can be screened from SI-F&IEF risk analysis.
2. A pilot study that begins in 18 to 24 months may be useful to develop such a screening method as well as a method for dealing with those SSCs that are not screened out. That is, an approach would have to be formulated to estimate the SI-F&IEF risk that cannot be screened. A pilot study may be the most efficient way in terms of time and resources and may also give insights into assessing the value gained as a function of the resources invested.

3. Development of small groups of expert panels was also suggested. Meetings of a relatively small number of experts (between five and ten) were recommended to address specific areas identified as important for estimating SI-F&IEF risk. For example, a group of experts could discuss approaches for developing seismic-induced fire fragilities, another group could address methods for assessing seismic-induced flood fragilities, while yet another could deliberate, for example, on the “joint hazard curve” between a dam (or other source of external flooding, such as a tsunami) and a NPP. Screening of fire ignition source bins by an expert panel is another example, as is the expected operator response to fires/floods when the crew has to deal with many issues, including assuring the functionality of the safe shutdown equipment subsequent to an earthquake. The possibility of using an appropriate level of the Senior Seismic Hazard Analysis Committee (SSHAC) process, or some other kind of expert elicitation process, was discussed.
4. A number of participants also stressed that the focus should be on significant earthquakes that can impact the safe shutdown equipment, since analyses of SI-F&IEF scenarios that do not impact safe shut down equipment are not very useful (an exception may be multiple fire scenarios).
5. Current efforts should be focused on full power scenarios, which can already be quite complex, with possible consideration of the implications of SI-F&IEF for low power and shutdown states to be reserved for the future.

Enclosure:

1. Public Meeting Summary - ML14022A252
2. Public Meeting Presentations - ML14022A270

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