November 16, 2012

Mr. Biff Bradley, Director
Risk Regulation
Nuclear Energy Institute
1771 I Street NW, Suite 400
Washington, DC 20006-3708

SUBJECT: U.S. NUCLEAR REGULATORY COMMISSION COMMENTS ON NUCLEAR ENERGY INSTITUTE 12-13, "EXTERNAL HAZARDS PRA PEER REVIEW PROCESS GUIDELINES" DATED AUGUST 2012

Dear Mr. Bradley:

By letter dated August 21, 2012, (Agencywide Documents Access and Management System Accession Number Package: ML122400044), the Nuclear Energy Institute (NEI), submitted to the Nuclear Regulatory Commission (NRC) NEI 12-13, "External Hazards PRA [Probabilistic Risk Assessment] Peer Review Process Guidelines." The NRC plans to endorse, with qualifications and comments, guidance related to performing PRA peer reviews for a number of hazards, including fire and external hazards, in a future revision of Regulatory Guide (RG) 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities."

As indicated in NEI 12-13, NEI plans to incorporate lessons learned from the initial exercising of this process by the industry into a Revision 1 of this guidance document. In support of developing this revision, enclosed with this letter are the significant NRC comments on NEI 12-13, with the intention that these comments can be addressed during the initial exercising of the process and when revising the guidance. The NRC also intends to continue to work with NEI and the industry during the initial use of the guidance to further the NRC confidence in the implementation of the guidance and to further improve the NEI 12-13 guidance and other similar PRA peer review process guidance for other hazards.

Please feel free to direct any questions about these comments to me at 301-415-2470.

Sincerely,

/RA/

Donald G. Harrison, Chief
Probabilistic Risk Assessment Licensing Branch
Division of Risk Assessment
Office of Nuclear Reactor Regulation

Enclosure:
As stated

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U.S. Nuclear Regulatory Commission Comments Regarding
NEI 12-13, "External Hazards PRA Peer Review Process Guidelines"
August 2012

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the Nuclear Energy Institute (NEI) guidance document, NEI 12-13, and identified a number of comments on this guidance. The main comments relate to four main issues that could impact the integrity and quality of the peer review process, which could also affect the confidence the NRC has in establishing the technical adequacy of licensee probabilistic risk assessments (PRAs) using this guidance. Each of these four issues is discussed below. In addition, based on interactions at public meetings related to performing seismic PRAs, an issue has been identified regarding the implementation of the peer review process for seismic PRAs that is not explicitly addressed in NEI 12-13, which is also discussed below as a fifth issue.

Issue 1: Peer Review Team Experience Requirements

An important aspect of an External Hazard PRA peer review process is the selection of the peer review team. Section 2.2 of NEI 12-13 gives detailed guidance on selection of External Hazard PRA Peer review team members and notes that the requirements in Section 1-6.2 of the PRA Standard (ASME/ANS RA-Sa-2009) must be met.

Section 2.2 of NEI 12-13 correctly notes that, in addition to the requirements in Section 1-6 of the PRA Standard, each Part of the PRA Standard includes additional requirements for peer review team member qualifications. However, NEI 12-13 also states that "the review team **should be** assembled to meet those requirements." Further, instead of listing **requirements** of the peer review team, NEI 12-13 lists **desired** attributes or experience **expectations**.

The peer review team requirements in the relevant parts of the PRA Standard are written using "**shall**" language and therefore must be fulfilled, not just should be fulfilled, for any External Hazards PRA peer review conducted based on the PRA Standard. The above are examples of several places in Section 2.2 of NEI 12-13 where the language may be interpreted as allowing relaxations in the experience requirements of the peer review team. Thus, in a number of places in Section 2.2 of NEI 12-13, the wording is not consistent with the requirements in the PRA Standard and the guidance in Regulatory Guidance (RG) 1.200, Revision 2. Therefore, the guidance needs to be revised to be consistent with the PRA Standard, as endorsed by RG 1.200.

Issue 2: Unreviewed Analysis Method

The outcome of the peer review process includes Facts and Observations (F&Os) describing important issues that impact the capability of the External Hazard PRA. Section 3.2 of NEI 12-13 states that the importance of each observation is classified as a Finding, Suggestion, Best Practice, or Unreviewed Analysis Method (UAM). An UAM is defined in the document as: "an observation regarding the use of methods that are new for which the review would exceed the

time and capability of the External Hazards PRA Peer Review Team. When an F&O is written with this classification, the method would need (to) be reviewed by a separate body of experts." However, an accompanying footnote states that "An External Events PRA expert panel to be formed by the industry will evaluate Unreviewed Analysis Method F&Os to assist utilities in dispositioning these items. As yet, the industry has not agreed to form such an expert panel."

The UAM F&O category was added specifically in response to peer reviews of fire PRAs in which the peer review teams encountered cases where analysts applied their own, new methods in their fire PRA and the peer review teams were not addressing these approaches in a consistent manner. At a January 6, 2011, public meeting, the NRC staff met with NEI, consultants, and other members of the public to discuss the results of NRC's review of Revision 1 to NEI 07-12, "Fire Probabilistic Risk Assessment (FPRA) Peer Review Process Guidelines." At that meeting the NRC staff identified several items that need to be addressed in evaluating UAM F&Os. Since NEI 12-13 was developed based on NEI 07-12, some of the issues identified for UAMs in Revision 1 to NEI 07-12 are also likely relevant to NEI 12-13 and need to be addressed by the guidance.

The issue of analysis methods that are new, and for which the experience of the PRA practitioner community is limited or non-existent, is of special concern for the peer review of External Hazard PRA. With the exception of seismic hazard analysis, the experience for conducting actual PRAs of other external hazards is very narrow beyond conservative and/or screening analyses. The PRA Standard explicitly acknowledges this lack of collective experience in Parts 7, 8, and 9 and indicates that since the analysts may improvise their approach in performing these PRAs that the peer review is very important.

The lack of an industry expert panel to evaluate UAMs for external hazards is an important concern for the peer review of External Hazard PRAs. As the discussion above indicates, this was a concern for fire PRA peer review and is likely to be an even greater concern for External Hazard PRA peer reviews, since the methods of analysis for external hazards, with the exception of seismic hazards, may be unfamiliar and/or new to many PRA practitioners. Therefore, the External Hazard peer review team is even more likely than a fire PRA peer review team to encounter UAMs. Therefore, the industry needs to formally establish and implement the process for addressing UAMs identified in peer reviews. Further, similar to how risk-informed applications submitted to the NRC that rely on fire PRAs need to identify any UAMs used, licensees that use UAMs for external hazards need to identify the UAMs in risk-informed applications to the NRC so that the NRC staff can evaluate the acceptability of these new methods in the context of their applications.

In a related matter, expert judgment is most likely to be employed in PRAs addressing hazards associated with Parts 7, 8, and 9 of the PRA Standard. NEI 12 13 states that "Where expert judgment . . . has been used in a significant manner in the External Hazard PRA, the applicable portions of the PRA and associated documentation will also be reviewed for conformance to the expert judgment requirements of Section 1 4.3 of the PRA Standard as part of the overall review." If expert judgment is used in the PRA, it needs to be documented, and the staff considers its use to be significant. As such, the peer review team needs to evaluate the use of expert judgment when used in the PRA and determine if it is appropriate and adequate. Therefore, the words "in a significant manner" should be deleted from the guidance.

Issue 3: F&Os for SRs Assessed as Capability Category I

In NEI 12-13 there is a statement that it is expected that a "Finding" F&O is written for a supporting requirement (SR) assessed as "not met," regardless of whether the utility has requested a review against Capability Category I or II. Similar to the first issue the term **required** rather than **expected** needs to be used to avoid any ambiguity.

In addition, NEI 12-13 also states that if the host utility chooses to be reviewed against Capability Category I for a given SR, an F&O need not be written for those SRs if assessed as Capability Category I. However, almost all risk-informed applications require many SRs to be Capability Category II and evaluating only to Capability Category I would not provide any distinguishing capability for these applications. Further, since the NRC has stated that Capability Category II is the general goal for SRs in a PRA used for risk-informed applications, those SRs that receive a Capability Category I rating are likely to be important to the NRC's review of any application of an External Hazard PRA. Thus, a finding needs to be written for any SR receiving a Capability Category I, even if the licensee has stated that is all they are trying to achieve.

Issue 4: Peer Review of Part 6 of the PRA Standard: Requirements for Screening and Conservative Analysis of Other External Hazards At-Power

As noted in NEI 12-13, a PRA of a particular hazard is an integrated process that consists of three major technical elements: probabilistic hazard analysis, hazard-related fragility evaluation, and plant response analysis. The hazard assessment basically involves determining the likelihood of challenges of varying magnitudes for the hazard of concern. The fragility analysis involves determining the probability that a component or structure will fail given an external event of a given magnitude. The plant response model development is the development and quantification of the event tree and fault tree(s) needed to evaluate the risk associated with challenges due to the external hazards. Thus, the External Hazard peer review team reviewing a PRA for a given external event will need hazard and fragility expertise specific to the external event PRA being reviewed.

The above considerations apply to a peer review of Parts 5, 7, 8, and 9 of the PRA Standard. Part 6 of the PRA Standard, Requirements for Screening and Conservative Analysis of Other External Hazards At-Power, involves some additional understanding related to appropriate screening as well as bounding and conservative analysis.

NEI 12-13 acknowledges the difference between Part 6 and the other External Hazard Parts of the PRA Standard with the following statement:

> The screening process governed by Part 6 of the ASME/ANS PRA Standard is different than the External Hazards PRA in the other Parts. Since Part 6 includes HLRs [high level requirements], SRs, and Section 6.3 has screening process-specific requirements for peer review, it is clear that a peer review is expected to be performed for the screening process to satisfy the requirements of the ASME/ANS PRA Standard. To reduce the number of exceptions, footnotes, etc. in this guidance document related to a different process for screening, Appendix X contains the guidance for performing a peer review on the screening process of Part 6 of the PRA Standard.

However, Appendix X, or any other specific guidance on the peer review of Part 6 of the PRA Standard is missing from NEI 12-13.

Since the peer review of External Hazard PRAs that carry out analyses related to Part 6 of the PRA Standard requires somewhat different, or at least additional, guidance from what is in the current version of NEI 12-13, this additional guidance needs to be developed, used in the initial exercising of the peer review process, and incorporated into a subsequent version of NEI 12-13, before this peer review process guidance can be considered complete.

Issue 5: Peer Review Approach

During public meetings related to developing plant-specific seismic PRAs, some meeting participants indicated that the peer reviews should be performed in various phases of the development of the PRA. It is recognized that the unique and discrete aspects of seismic PRA (i.e., hazard analysis, fragility analysis, and event and fault tree modeling) lends itself to some form of sequencing of peer reviews. However, the approach for implementing the peer review process is not explicitly identified in the NEI 12-13 guidance and the current discussion in the guidance related to the timeline for performing a peer review (e.g., one week onsite) can be interpreted as not supporting the "in-process" approach without further elaboration on this approach. Recognizing that some members of the industry will seek to perform "in-process" peer reviews, the staff has identified the following comments to clarify the implementation of these approaches, specifically the "in-process" approach.

Regardless of the peer review being performed, "in-process" or all-at-once after the completion of the PRA, each approach has to meet:

1. the requirements for an independent peer review as stated in the PRA standard and as endorsed in RG 1.200, and
2. the process described in NEI 12-13.

For example, the process requires that findings are based on a consensus by the entire peer review team, and not based on a single peer review team member. Consequently, the team leader must ensure that for a finding to be formalized it has to be consensually established. Therefore, if an "in-process" approach has been chosen, the team leader may elect, for example, to complete an interim peer review of a specific aspect of the PRA, to hold the consensus session via telephone or e-mail and formalize the finding or the finding may remain as a draft finding until the end of the project when the peer review is finalized by holding team discussions and compiling and formalizing the findings. Therefore, for an "in-process" approach, a final review by the entire peer review team must occur after the completion of the PRA project. For this final review, the team would review any remaining pieces of the PRA not previously reviewed, perform an overall review to ensure the final results make sense, and confirm that findings from the "in-process" peer reviews are still appropriate or need to be revised or expanded based on licensee further PRA development. For example, a licensee may revise their seismic PRA subsequent to an "in-process" peer review of one area as they further develop the PRA that directly resolves an identified finding and/or changes an approach that was not previously reviewed by the peer reviewers. The final peer review would need to re-review these aspects, which may result in eliminating some previous findings and creating new findings on this area of the PRA. Consequently, for an "in-process" approach, the peer review is not considered

final until the final peer review has been performed and consensually established. Further, licensees that utilize an “in-process” peer review must assure that peer reviewers remain independent throughout the PRA development activity since the peer reviewers in the early interim peer reviews must still participate in the final peer review after the completion of the PRA and confirmed or revise earlier findings and provide new findings depending on the subsequent actions taken by the PRA analysts.