March 29, 2001

MEMORANDUM TO: David B. Matthews, Director,
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

FROM: Thomas L. King, Director /RA/
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Office of Nuclear Regulatory Research

SUBJECT: COMMENTS ON THE NEI RESPONSES TO STAFF QUESTIONS FOR NEI-00-02--NEI PRA CERTIFICATION PROCESS

The purpose of this memorandum is to forward our findings from the review of NEI's responses to NRC's request for additional information (RAI) for its "Probabilistic Risk Assessment Peer Review Process Guideline," NEI-00-02. NEI also revised its subtier criteria, as part of its response to staff's RAIs. We reviewed the NEI responses and our findings are summarized below. Detailed comments on the NEI's response are given in Attachment 1. We are also in the process of formalizing and forward to you comments on the revised subtier criteria.

RES has identified several benefits related to NEI's PRA Certification Process:

- It is a formalized review process and, as such, it should provide some level of consistency and objectivity.

- The grading process appears to be useful, because it gives a characterization of a PRA that can be easily communicated to the licensee and other stakeholders.

- On the basis of RES staff observations of how the certification is being performed, RES believes that the certification process can be of value in helping licensees understanding the strengths and weaknesses of their PRA.

- If RES's concerns on the certification are addressed, RES would agree that results from the NEI PRA certification could help the NRC focus its attention to important areas.

Although the NEI PRA Certification Process is a major step towards a consistent evaluation of PRAs across the industry, we do not believe that this process has reached a level of maturity that it would provide an adequate basis for determining the adequacy of PRAs for Option 2 applications. The following summarize our concerns.

- On the basis of the detailed comments on NEI's responses given in Attachment 1, RES's position is that many of the subtier criteria are not adequate for Option applications. In many instances the current subtier criteria would not provide reliable estimates of the risk importance of SSCs.

- The certification process appears to be a work-in-progress. NEI has recognized this fact in its responses to the staff's RAIs, but it maintains that: "This is not expected to affect the previous PRAs that have undergone a peer review because the anticipated changes are expected to be primarily related to efficiency, clarifications, and format." RES does not agree with NEI on this; we believe that lack of (and changes in the) subtier criteria reflect an evolution in the NEI PRA Certification Process and, therefore, an evolution in technical bases for grading PRA elements. It is rather likely that the different versions of the guidance that have been generated to date have resulted in significantly different evaluations of a PRA.

- The NEI PRA Peer Review process allow the use of compensating measures when a PRA subelement does not meet the criteria for a particular grade. From the examples of compensating measures provided in the response, RES staff did not develop a confidence that the acceptance of these measures will or have lead to correct subelement grading because they were related to documentation rather than the technical content. RES believes that the grading of a PRA element should be based solely on the subtier criteria which include minimum criteria to achieve that grade. If compensating measures are identified, these measures must be evaluated for each application and not just for the base PRA. Furthermore, the criteria for accepting the compensating measures will also be a function of the application.

- NEI indicated that the subtier criteria are *supplemental information* to be used in addition to the checklists provided in NEI 00-02 for establishing consistency from one peer review to another. It appears that peer reviewer expertise (e.g., the use of veteran members of PRA peer reviews) has more importance in the NEI certification process than the use of well established subtier criteria. RES believes that the participation of veteran members provide some level of assurance that a grade is assigned appropriately and consistently; however, they should be used *in addition to and not instead of* a coherent and comprehensive set of subtier criteria.

- Although NEI emphasizes the importance of PRA expertise, its peer review teams include individuals with limited PRA experience. RES believes that the use of peer reviewers with limited PRA experience generate additional concerns regarding the integrity and consistency of the NEI PRA certification results.

- A very important aspect of a peer review process is the documentation of its findings. It does not appear that the NEI PRA certification process requires documentation of the basis for assigning a grade for each specific subtier criteria and especially for assigning a Grade 3 which has been designated as the most appropriate grade for Option 2 applications. It appears that "Facts and Observations" are used to justify a low (Grade 2 or less) or a high (Grade 4), but not to consistently and clearly document the rationale or basis for giving a grade, and especially a Grade 3. Also, it does not appear that the peer review report documents the consensus building process (e.g., everyone on the

team believed that the criteria was applicable to the plant, all but one team member believed that the criteria was not applicable, etc.).

- It is does not appear that there is a systematic process for determining the applicability of subtier criteria to a particular plant (ensuring that same criteria will be applied from different peer review teams to PRAs of similar plants using the same modeling techniques).

- There are subelements in which no subtier criteria are specified for a Grade 2 and, sometimes, for a Grade 3. Lack of subtier criteria imply that any PRA would be assigned a Grade 2 (or a Grade 3) and, therefore, there is no differentiation between an acceptable and an unacceptable PRA for those particular subelements. It also implies that there is no difference between a Grade 2 and a Grade 3 PRA subelements. RES believes that lack of *minimum subtier* criteria in for all subelements and all grades that clearly differentiate among acceptable and unacceptable subelements and among the different grades is a major weakness of the NEI Certification Process.

- It appears that the major difference in the checklists between Grade 3 and Grade 4 is the use of word “should” vs. “shall”, which is not consistent with the distinctions defined for the two grades. As defined in the Scope, the distinctions between Grade 3 and Grade 4 are: 1) the level of details in modeling and analysis and 2) the quality of documentation. Grade 3 requires adequate modeling and documentation, whereas substantial detail and superior documentation are the standards for Grade 4. The use of word “should” in the criteria can lead to a situation where peer reviewers apply different subjective interpretations of the requirements. RES believes that it is reasonable to conclude that the grading of subelements for different PRAs *would be inconsistent* because of this approach. This conclusion is further supported in that different peer reviewers are used to review different PRAs

- A cursory check of the revised subtier criteria indicates that there are instances of redundant or contradictory criteria. In some cases, there are inconsistencies within the criteria for the same subelement. Examples are given in Attachment 2.

- Undefined terms are used in the criteria. For example, some criteria use the word *influence* with regard to CDF or LERF. Other criteria use the word *critical* when identifying systems that need to be modeled. No definition for these words are provided. Without specific criteria to define what constitutes acceptable (or unacceptable) influence, each reviewer will be left to decide for themselves what constitutes influence. Thus, how can one demonstrate that the review process has been consistently applied? Furthermore, even if one could demonstrate that the review process has been consistently applied, without specific criteria, how can the NRC judge the adequacy of the reviews?

The comments in Attachment 1 provide the basis for our concerns regarding the NEI PRA Certification Process. If you need additional information on this topic, please contact Mary Drouin (415-6675).

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ATTACHMENT 1

COMMENTS ON THE NEI RESPONSES TO STAFF'S
REQUEST FOR ADDITIONAL INFORMATION ON NEI-00-02

The following are the RES comments on NEI's response to NRC's request of additional information (RAIs) on the NEI PRA Certification Process–NEI-00-02.

Question 1

NEI responded to a general NRC staff observation that the use of PRA in a specific application must be of sufficient quality to support its use by the decision makers for that application. It appears that NEI agrees with this observation. It indicates that the use of four broad PRA categories to grade a PRA is just the first step in determining the appropriateness of the PRA for a specific application and that the responsibility for determining the appropriateness of the PRA for an application is left to the individual utilities. RES agrees with this comment; we note, however, that the certification process does not require the documentation of the basis for assigning a grade for each specific subtier criteria and especially for assigning a Grade 3 which has been designated as be the most appropriate grade for Option 2 applications. If the bases for assigning a grade is not well documented and is retained with the reviewers it will likely become vague and unclear over time, and the capability of a utility to determine the appropriateness of its PRA for different applications in the future will be diminished. RES believes that failure to consistently and clearly document the rationale or basis for each grade assigned (and especially for grade 3) is a major short-coming of the NEI peer review process.

Furthermore, RES staff believes that many criteria are not adequate for Option 2 applications. This position is based mainly by examining whether a subelement criterion that could have a major impact on the calculated RAW and Fussell-Vesely importance measures used in categorizing SSCs for Option 2 applications. RES believes that many criteria that could have a major impact are not required for Grade 3 category. An *example* is provided below:

SY-7 Inclusion of passive components that may impact CDF. The Grade 3 criteria indicate that passive failures "should" be included if they can "influence" CDF or LERF. However, the term "influence" is not clearly defined. Passive failures are typically of low probability and, therefore, may not have a major "influence" on the total CDF in terms of percentage (Fussell-Vesely importance). However, the RAW for such a component could be very high and thus the component could be of high safety significance (e.g., a common suction pipe failure). RES staff believes that SY-7 should be stated; "Critical passive components...*shall be included ...".* Furthermore the word "influence" should be defined in numeric terms with respect to percent contribution to CDF and LERF and RAW importance.

Question 2

NEI notes that individual subelements of a PRA could be graded below Grade 3 and still be appropriate for some Option 2 applications. It is noted that, as recognized in the NEI response to question #1, a higher grade may also be required for specific application. With respect to the Grade 2, for many subelements no subtier criteria are given (blank entries), which means no criteria have to be met in order to achieve a Grade 2 or includes "may" statements indicating

less rigor is required. RES believes that *minimum criteria* should be specified for each grade. An *example* is provided below:

> In AS-7, "All relevant systems are credited for each function," The terms "may" are used for Grade 2, and "should" for Grade 3. RES believes that the term "shall" is needed for both Grades 2 and 3. but allow for conservative modeling (i.e., not crediting some systems) for Grade 2 since conservative results may be acceptable for most Grade 2 applications. "May" implies that failing to credit systems such as CRD, main feedwater, or the PCS which are needed to mitigate an accident and are identified in abnormal and emergency procedures is acceptable for Grade 2. However, such an approach will result in conservative results that can give considerably incorrect importance measures *leading to incorrect ranking* of SSCs.

<u>Question 3</u>

The provided response is a comment to an observation from the NRC staff that a review of the subtier criteria, although not requested by NEI, was an essential part of the review of the NEI peer review process. The response indicates that the subtier criteria are supplemental information to be used in addition to the checklists provided in NEI 00-02 for establishing consistency from one peer review to another. In addition, the use of veteran members of previous PRA peer reviews appears to have more emphasis in the NEI certification process than the subtier criteria. RES staff believes that *both* the expertise of the reviewers are well as well written criteria are needed to ensure integrity and consistency in the peer review process.

<u>Question 4</u>

The question was what is meant by the statement in NEI 00-04: "In general, the more applicable PRA information, the better" and what is the role of NEI 00-02 in this determination. The response indicates that the implementation of a PRA for an Option 2 application would be considered more favorably if the PRA met the appropriate guidelines in NEI 00-02. We concur with this statement with the caveat that the guidelines in NEI 00-02 need to reflect a consensus standard.

<u>Question 5</u>

The question was how the industry categorization guidelines and integrated decision making panel (IDP) process will be tied into the results and findings of the PRA peer review process. NEI provided a description of the how the peer review results will be incorporated into categorization process indicating that grades assigned along with peer review findings documented as facts and observations will be included in the guidance with the recommendation of using sensitivity studies to address the impact of the identified PRA limitations. This response appears to have addressed the question adequately.

<u>Question 6</u>

The question dealt with the issue of minimum requirements of a PRA, where NRC staff expressed the opinion that the subtier criteria for all high-level process related issues SHALL be

met for all grades, distinction between grades being related to the level of detail within a subelement, as done in the ASME PRA Standard.

In its response NEI stated that according to the peer reviews performed to date, there are gradations in the level of detail, scope, degree of rigor, and completeness in the PRAs and that the subtier criteria reflect these gradations but it requires the experience of the review team to assign a grade. As such, the NEI Peer Review process relies heavily to the makeup and experience of the peer review team. However, the peer review teams along with "veteran" members (who participated in several reviews) often include members with limited PRA review experience. The participation of veteran members provide some level of assurance that a grade is assigned appropriately and consistently. It should be used, however, *in addition to and not instead of* a clear set of subtier criteria.

Questions 7 through 10

The NRC provided four subtier criteria examples in support the arguments made Question 6, i.e., all three grades should be "shalls" with the difference between grades related to the level of detail or scope. NEI in general agreed with the staff and revised these specific subtier criteria; however, the revised criteria do not always provide a minimum set of criteria for each of the grades. For example, in AS-4, the criterion for Garde 2 states that "The level of detail, scope, and completeness may be less than for Grades 3 and 4." RES staff thinks that this statement is not useful since it does not identify specific minimum requirements for Grade 2.

Question 11

The question was addressing the use of "may," "should," and "shall" in the subtier criteria. In particular, it was mentioned that "should" means that the subtier criteria are expected to be met unless there are compensating actions or documentation to support deviations from the subtier criteria. This is more restrictive than the definition generally accepted in ASME standards that implies a recommended criteria but one that could be ignored without explanation. NEI was requested to provide the criteria for accepting compensating actions and to provide some examples.

The NEI response indicated that the use of "may" has been significantly reduced in the revised subtier criteria. A cursory review indicates that the use of "may" in Grade 3 criteria has been generally replace with "should." The use of "may" in the Grade 2 criteria has also been reduced and replaced with action statements (i.e., implied "shall" statements) in many locations. For example, DA-15 states that for a Grade 2, "the bases for the unique unavailability items are based on generic data, conservative estimates, or plant-specific data." This is good example of how the criteria for all grades should be stated.

The NEI response indicates the criteria used in accepting compensating measures is that the alternative measure produces a similar impact on the PRA, i.e., similar PRA results are to be expected for the base PRA and for applications. From the examples of compensating measures provided in the response that have been used in past peer reviews, RES staff did not develop a confidence that the acceptance of these compensating actions have lead to correct subelement grading. The examples suggest different methods of documentation and recognizing conservatisms would be sufficient compensating measures. The response also indicates that there may be compensatory actions taken by a specific utility to support specific

applications. The identified actions include justifying why a specific subelement criteria may not be required for the application and modifying the base model to meet the criteria. Neither one of these are compensating actions but are the logical steps that a utility should take when determining the acceptability of their PRA for a specific application.

Res staff believes that better documentation or recognitions of conservatisms would not be sufficient compensating measures; and that the grading of a PRA element should be based solely on the subtier criteria which must identify the minimum criteria to achieve that grade. RES also believes that utilities are better off using their resources to upgrade their PRAs to meet the minimum acceptance criteria rather than to argue over the acceptability of compensating measures. The peer review team can identify existing compensating measures, but the acceptability of the compensating measures should be evaluated for each application and not for the base PRA. Thus, the criteria for accepting the compensating measures will also be a function of the application. For example, inclusion of passive pipe failures in the system models would appear to be required for categorization of the pipes. However, most PRAs do not include pipe failures due to a perceived low failure rate. For ISI applications, an acceptable compensating action would be to use surrogate components in the evaluation.

For Option 2 applications in general, the criteria should address whether the SSC categorization would likely change due to the compensating measure. This can only be quantitatively assessed by performing a sensitivity study where the PRA subelement meets the subtier criteria deemed necessary for the application (i.e., modifying the PRA to meet the minimum subtier criteria). Other criteria (likely to be qualitative) may be difficult to justify.

Question 12

This question asked how the IDP would be made aware of compensating actions that could impact the categorization process. The NEI response indicated that a written description of how the PRA was changed to achieve the desired Grade for a specific application is necessary. The response seems to incorrectly imply (probably due to unclear wording) that an overall PRA grade is provided for an application. The RES staff believes that a description of the compensating actions taken for each PRA subelement that does not meet the minimum criteria for that application should be provided to the IDP. For an Option 2 application, this description must be sufficient for the IDP to determine how the SSC categorization is affected.

Question 13

The question was if “may” can be interpreted as nothing is required for that particular element, and if yes, provide a justification. NEI’s response indicates that, in fact, nothing is required but it did not provide justification for why it is not necessary to address a subelement. However, NEI indicated that changes were made to the subtier criteria to generally restrict the use of the word “may” to Grade 2 criteria. In addition, NEI indicated that Grade 3 criteria are the ones that apply to Option 2 implementation.

Question 14

NEI responded to the following statements:

> When assigning grades to a subelement, and when the subelement criterion used the terms “may” and/or “should,” the peer reviewer will have to use subjective determinations in deciding whether there is conformance to the criterion. Thus, the grade of a subelement does not provide a clear characterization of the peer review analysis, but a potentially broad range of acceptability.

NEI recognized that a spectrum of PRA acceptability will exist which was characterized as “a desirable attribute and one that is to be expected.” In addition, it stated that “Detailed findings on a subelement basis (Fact and Observations (F&Os)) are developed for individual subelements to identify to the utility those areas of the PRA that could benefit from further enhancement.” The RES staff agrees that the F&Os benefit to the utility; however, the subjectivity in the determination of acceptable conformance to the criterion still exists because of the use of the terms “may” and “should.” The level of subjective determination will be reduced for the future by the modifications made to the subtier criteria to reduce the use of “may.” However, since a number of peer reviews have already been performed with the original criteria, these reviews, by necessity, contain more subjectivity as it relates to conformance to the subtier criteria.

NEI also explained where “should” is used it is “strongly expected to be in place and would be in place unless compensating actions or documentation is in place to support differences.” The RES staff’s views on this subject are given in previous comments. In summary, the RES staff believes that the adequacy of the compensating actions can vary from one application to another. Consideration of compensating actions should not be part of the grading of the base PRA.

Regarding Option 2, the NEI response implies that a Grade 3 PRA generally incorporates all subelement criteria, at least for those criteria that incorporate a “should,” unless compensating actions or documentation exist. To know whether a PRA could be used for Option 2 submittals, a review of all compensating actions or documentation supporting differences would be necessary, unless consensus criteria are used to determine the adequacy of the compensating actions or documentation. Currently, it is unclear whether written criteria, consensus or otherwise, will be used to judge the adequacy of the compensating actions.

Question 15

This question dealt with the fact that there are cases where the requirements across the categories are identical and, therefore, how the differentiation b is made in assigning a grade.

The response indicates that there are distinctions among the three grade levels and provided examples supporting this argument. In all examples given the criteria for Grade 2 are generally different than those for Grades 3 and 4, except for the example on subelement HR-13. The original version of HR-13 had only one criterion for all three Grades. NEI revised HR-13; however, this issue remains because there are other criteria, for example QU-6, that have identical requirements across categories.

Revision of subtier criteria, raise the issue how these modifications could impact the grade assigned on that subelement (and ultimately the PRA itself) for those PRAs which were reviewed using the original criteria. Also, for those subelements for which the current criteria are the same, the issue of what grade is assigned and how is the grade determination made remains. NEI did not give an adequate response to these, important for Option 2 applications, questions.

With respect to the criteria that are the same for Grades 3 and 4, NEI explained that the Peer Review Team is using two criteria to distinguish between Grades 3 and 4:

1) level of detail in the modeling of the specific features, and
2) nature of the documentation describing the approach and implementation.

NEI stated that "Substantial detail and superior documentation will lead to Grade 4 assignments, while adequate modeling and documentation will lead to Grade 3." While detail and documentation may provide a basis for distinguishing between Grades 3 and 4, the terms "substantial" versus "adequate" and "superior" versus "adequate" were not defined in the response. Thus, it is still unclear how the Peer Review Team makes the distinction between Grades 3 and 4.

We note that documentation is a separate criterion and it should not be part of the evaluation of the technical integrity of the PRA. There are PRAs with excellent documentation that have technically incorrect elements.

<u>Question 16</u>

The question dealt with the fact that there are instances with insufficient discussion in the guidance on technical quality to ensure an adequate analysis has been performed all PRA elements/subelements.

NEI responded by stating that the "Peer Review process is one that makes use of the collective experiences of the Team to implement ... a uniform measure of quality....." However, this response does not address the issue of *how* consistency is achieved in the interpretation of the general terms cited in the RAI. The explanation given (by addressing a specific example cited in the RAI) provided some clarification of what is considered to be reasonable. However, NEI did not provide criteria leading to unambiguous determination of what is meant by these general terms (e.g., "involve" or "reasonable.") For example, if the data source represents characterizations that are 10 years old, is that considered recent? What about data that are 5 years old? Or, should it be 3 years?

RES believes that, unless specific guidance is given on how to interpret these terms, different reviewers most likely will have different interpretations. To compensate this, the peer review documentation should have a section where each reviewer clearly identifies how arrived at his/her judgment and the results of each peer review should be reviewed to confirm that appropriate judgment was used, defeating the purpose of a peer review.

RES agrees with NEI that there is "spectrum of approaches" used in PRAs and believes that this reason necessitates the development of criteria for determining that the results obtained with one approach is "as good as" results obtained using another approach.

Question 17

The question dealt with how the applicability of different criteria to different plant modeling techniques was determined. The response indicates that the applicability of specific criteria are determined through team consensus and that once these criteria have been identified they are "applied consistently, and, therefore, they do not vary from plant to plant."

No mention was made in the response of whether the applicability of specific criteria to a particular plant is documented in the peer review report. Furthermore, there is no indication that the peer review report documents this consensus building process (e.g., everyone on the team believed that the criteria was applicable to the plant, all but one team member believed that the criteria was applicable, etc.). This is especially important for assigning a Grade 3 which is the grade appropriate for option 2.

Given that the response indicates that the criteria are applied consistently (i.e., they will not vary from plant to plant), the following questions arise:

- Does the peer review report provide a discussion on the applicability of specific criteria to the plant being reviewed? If not, why not?
- Are the consensus discussions documented? If so, how? If not, why not?
- How does the process of determining the applicable criteria ensure that the same criteria would be identified by two different peer review teams as applicable for two similar plants using the same plant modeling techniques?

Question 18

This question is composed of two parts. The first part dealt with what NEI intends to do to address the compatibility of the NEI peer review guidelines and the ASME standard. NEI indicated that when the standard becomes available a process will need to be established to reconcile any areas where the two differ. This appears to be a reasonable response.

The second part dealt with the ability of NEI PRA Peer Review process to determine the quality of a PRA for Option 2 applications since there will not be a complete match of the NEI subtier criteria to the ASME Standard criteria . The NEI response indicates the utility would be required to address the differences and justify the PRA in view of the requirements in the Standard. While this response is a logical one, it highlights the problems and difficulties that exist because the NEI criteria were not generated by a consensus process. For each case that the criteria either do not match or do not exist (in the NEI guidelines) it would require an NRC review defeating the purpose of the NEI certification process of providing a "robust and appropriate means to address PRA quality for Option 2.

Question 19

The question dealt with the differences between the NEI Guidelines and the draft ASME Standard. In responding to this question, NEI stated that it would be premature to provide a detailed discussion of the differences between the NEI Guidelines and the draft ASME Standard now.

NEI, as part of its response to this question, provided a discussion on the treatment of AS-7 dealing with the identification of excessive conservatisms. The NEI response raises many concerns regarding the technical content of the discussion. For example, in the discussion on the determination of what is a relevant system it is indicated that such a determination depends on "Does the system influence success criteria used in the PRA?" RES staff believes that a system does not *influence* success criteria; rather, success criteria identify what systems (or parts of a system) must function to ensure that an undesired state (e.g., core damage) does not occur.

Another example is the second bullet in the list of items that help determine relevant systems. This bullet, as written: "Can a system by itself result in system success?" is, at a minimum, confusing. Was the intent of this bullet to ascertain whether the operation of a system by itself would result in functional success (e.g., removal of decay heat)?

Question 20

The response appears to be reasonable. The RES staff notes, however, that the IDPs should be focusing on the subelement grades and not the overall element grade.

Question 21

The response o this question dealing with an overall grade is assigned to an element, appears to be reasonable. Regarding the second part of the question of *what* criteria are used to ensure that the overall grades are evaluated which was answered, there is a remaining question of *how* the criteria would ensure consistency in the grading.

It is not certain that the criteria provided by NEI would ensure consistent grading. The first criterion, as written, would allow the assignment of a Grade 4 when one critical subelement had been assigned a grade of 3. If a grade of 4 could be given in this situation, the criterion should be reexamined to determine its validity. Furthermore, the third and fifth criteria consider the impact on applications. How can one assess the impact on all future applications during the review of the base PRA?

Question 22

The response to this question states that "An explicit definition of initiating event screening criteria has been included in the revised subtier criteria." However, the RES staff was not able to identify the referenced revision.

Question 23

NEI agreed with the comment, and stated that the subtier criteria for Grade 2 were revised to make them consistent with the check list requirements. The RES staff notes that, in many cases, *consistency was achieved by eliminating subelement criteria for Grade 2*. This implies that there are no minimum criteria for Grade 2. The RES staff believes that lack of minimum criteria for each grade is a major weakness of the NEI PRA Certification Process.

Question 24

The response appears to be reasonable.

Question 25

The question dealt with the determination of a “relevant” system. NEI provided criteria for identifying potential excessive conservatism in a PRA model. The RES staff is concerned with the validity of these criteria. Specifically, the criterion of requiring a system to not be on non-safety power does not seem to be appropriate.

This issue was also discussed in Question 19. Exclusion of relevant systems from the model could inappropriately bias the PRA results. For example, not including coolant injection systems such as CRD or condensate could artificially raise the importance of other coolant injection system components and, more importantly, miss the importance of CRD and condensate. Similarly, not including feedwater in a PWR PRA could increase the importance of AFW and miss the importance of feedwater. Therefore, there is a need to have clear criteria for including all relevant systems in a PRA used for Option 2 applications.

Question 26

The question dealt with time phased evaluation of SBO accidents. NEI response of: “It is the clear intent of the subtier criteria to examine the model for its use of time phased accident sequence evaluation for SBO accidents,”is encouraging. However, the continued use of the word “may” in the revised list of time phased events to be “included in a realistic assessment of the accident sequences and procedurally directed operator actions resulting for [sic] LOOP/SBO....” for Grade 3 continues to cause concern. Understanding how these events impact the development of important accident sequences and their subsequent quantification is necessary for Option 2 applications. After examining the issues included in the list and determining that they have no significant impact on results, one could then choose to not explicitly incorporate them into the PRA. This would provide flexibility in modeling while at the same time ensuring that results from the analysis are sufficiently realistic to support their intended use.

Another issue raised by examining the revised criterial for AS-13 is the removal of all criteria from the Risk Ranking (Grade 2) column. The removal of all criteria from this column means there are no time phased evaluation requirements for Grade 2. If no requirements exist, what assurance is there that the resulting ranking of components from a Grade 2 PRA is correct?

Question 27

The revised criteria effectively eliminate the use of inconsistent terminology, which was the concern in this question.

Question 28

The revised criteria for TH-5, TH-6, and TH-7 have clarified most of the initial concerns regarding the appropriate use of generic to plant-specific calculations. However, in TH-7 Grade 4, the last criteria dealing with timing estimates for HRA appears to be inconsistent with

this clarification effort. This criterion addresses the use of “realistic” calculations but does not indicate whether the calculations are “generic” or “plant-specific.”

Regarding the issue of what criteria are used to judge the verification and validation (V&V) of codes used to perform analyses, the response indicates that it is the utility’s responsibility to do this. However, the guidance includes references to specific codes. The purpose of the references is not stated, implying that NEI has evaluated the adequacy of the V&V of the referenced codes and found it acceptable.

Question 29

The question deals with the use of screening criteria for eliminate failures from system models. NEI stated that “There are no screening criteria in the systems analysis for the elimination of components, component failure modes, and support systems.” However, it provided a list of criteria which were characterized as “adequate to address the breadth and depth of the base system models....”

However, none of these criteria deal specifically with the issue of screening. Thus, without specific screening criteria, how can the Peer Review process ensure consistency in the results among different Peer Review teams or different PRAs? Without specific criteria, different individuals may have different beliefs as to what constitutes acceptable screening (i.e., exclusion) of components, failure modes, or support systems.

Question 30

The question deals with the need of plant-specific data in Option 2 applications. NEI noted that use of plant-specific data has been emphasized by the Peer Review teams.

RES staff does not find NEI’s response to this question adequate. For example, using (as stated in the response) plant-specific data for the components that have relatively high F-V importance measures , does not provide an assurance that all important components for Option 2 applications are identified. Because, a component with a failure rate significantly higher than a generic failure rate could have a significantly higher Fussell-Vesely (F-V) importance. One would not know if the component failure rate was higher for a component until the data are collected, reviewed, and used to generate the plant-specific failure rates. Therefore, RAW importance should also be used to identify risk-significant components.

RES staff agrees with the discussion on “old” v.s. “new” data and the use of trending analysis provided in the response.

Question 31

The question deals with the use of up-to-date CCF data sources. NEI notes that use of the NRC sponsored common cause database is encouraged but it will be up-to the individual utility to decide the use of this or other data sources. And that a justification, including comparative studies, and sensitivity studies “would likely be desired to justify other [than the NRC sponsored] data sources for Grades 3 or 4.”

The fact that justification would *likely be desired*; but it is not *required* provides no assurance that such a justification will be sought by all Peer Review Teams. Without a requirement to justify the use of data other than the latest and best available, subtier criteria should be developed to ensure the use of data sources of sufficient quality to meet the intended needs of the analysis. Otherwise Option 2 submittals using other data sources will require a detailed review on this issue.

Question 32

While the response provides useful insights on how Peer Review Teams are dealing AC recovery data, the RES staff believes that the AC recovery criterion could be reworded to simply state that available and applicable data *shall* be used.

Question 33

The question deals with the criteria for grading the modeling of AC repair and recovery (subelement DA-15). NEI pointed out that modeling of repair and recovery modeling is an evolving methodology and therefore, specific criteria to sanction immature methodologies are not considered appropriate.

The RES staff agrees with NEI that the subtier criteria should not sanction immature methodologies and that the subtier criteria should not generally endorse any specific method (e.g., large event tree/small fault tree versus small event tree/large fault tree approaches). However. minimum requirements can be set for any PRA methodology to clearly state what is required from that methodology.

Question 34

Question 34 asked why all of the criteria for the application of a systematic process for each grade was not a “shall.” The response indicated that where similar words are used across Grade levels (i.e., should or shall are used for Grade 3 and 4, respectively), the expectations for Grade 4 systematic processes are substantially higher than would be expected for other Grade levels. Clearly differentiating the scope, rigor, and documentation requirements for each Grade by using “shalls” would remove a high level of variability that exist with the current criteria because of differences in interpretation of the current criteria. For example, the criteria for different grades could be expressed as follows:

Grade 2:	Shall do A		Shall do A (least scope/rigor)
Grade 3:	Shall do A and B	or	Shall do B (more scope/rigor)
Grade 4:	Shall do A, B, and C		Shall do C (most scope/rigor)

It is also noted that HR-9 indicates that procedures should be reviewed for a Grade 4 evaluation of post-accident human errors. This is not mentioned for a Grade 3 assessment, and a Grade 2 only requires to have a process for looking for human errors in other PRAs. The RES staff believes that any process for identifying human errors must examine a plant’s procedures.

Question 35

The question asked why plant-specific performance shaping factors for the time available for an action and the time required to take the action are not required in subelement HR-18 and to provide examples of what the Peer Review process would accept in place of plant-specific timing information.

NEI stated that the Grade 3 criteria for this subelement are that plant-specific timing information "should" be used and, therefore, there is a strong expectation that such information would be used. However, the response indicates that generic models could be used to determine the time available to take an action or could be based on estimates of the time available for similar plants if it can be shown that the plant responses and timings are similar. To prove the latter, the utility would have to determine the plant-specific timing and response. Thus, it would make sense to use that data in a plant-specific data to begin with. The RES staff believes that plant-specific HRA evaluations (as well as plant-specific data analysis, modeling of the as-built and as-operated plant) are required to provide a true characterization of SSC importance for use in Option 2 applications.

NEI provided some Facts and Observations of peer reviews performed related to the application of subtier criteria for HR-18. The RES staff notes that none of these Facts and Observations provide examples of alternatives to the use of plant-specific information. In fact several contain the observation that plant-specific calculations were required to determine the necessary timing information. Thus, past peer review teams seem to agree with the RES's position that plant-specific timing information is required for a Grade 3.

Question 36

The question dealt with what subtier criteria are used to judge the reasonableness of the PRA results. NEI mentioned several subelements that contain criteria related to the interpretation of the results. A review of these subelements indicate that in deed they specify that information on the results be provided. QU-31 has been modified and now includes a general statement that the reasonableness of the results should be checked. Consideration could be given to providing some specific criteria for that check.

Question 37

This question was related to QU-4 and asked "shouldn't the review of house event and disallowed maintenance (DAM) files be mandatory ?" NEI agreed with this view and stated that the PRA Peer Review team has recognized this consistently in past peer reviews. It also stated that "subtier criteria have been modified slightly to make these aspects of the review cleaner."

A review of the revised subtier criteria found that the statements cautioning that review and confirmation of the house and DAM files should (Grade 3) or shall (Grade 4) be performed under QU-4 have been retained unchanged . (Note that NEI has stated that Option 2 will use PRAs that are Grade 3 and above, so Grade 2 is not under consideration here.) An additional statement has been added under both Grades 3 and 4 in QU-8 and QU-15 stating: "A review of the House Evens (or Flag Files) should be performed to ensure sequences are not being inappropriately deleted." ('Should' is used for both grades.) The use of "should"in these added statements is puzzling since NEI agreed with the mandatory designation for these reviews

stated in the RAI. (The use of 'should' and 'shall' has been discussed extensively in a review of a response to an earlier question.)

Question 38

This question addressed QU-7 and had two parts. The first asked why the paragraph that begins "The RISKMAN...." is not found under the risk ranking application column (Grade 2). The second part asked why RISKMAN was singled out from other codes.

NEI noted, with regard to the first part of the question, that Option 2 will use PRAs that are Grade 3 and above, so no Grade 2 statement is needed. With respect to the second part, NEI noted that the statement actually says "The RISKMAN 'saved sequence' model or fault tree linked code cutset models....." and so does not single out RISKMAN.

In reviewing this response it should be noted that although in general Option 2 will use PRAs that are Grade 3 or above, the Grade discussion in the Subtier Criteria seems to allow for cases where a PRA is Grade 3 but some individual PRA subelements only meet Grade 2. Therefore limitations to Grade 2 should also be identified. Otherwise, the question appears to have been adequately answered.

Question 39

This question addressed QU-15 and notes that additional guidance and techniques on searching for sequences and cutsets that should be contributing, but may not be due to various errors, should be provided.

NEI's stated that the Peer Review Guideline is not meant to be a tutorial and a conscious effort has been made not to make the Guideline a tutorial on PRA methods and techniques. It also notes that QU-30 identifies that results evaluation and interpretation process should ensure that comparisons with similar plants identify any "missing" sequences, and that the uncertainty evaluation process should also look for modeling issues that should be part of the results of the plant being reviewed.

This response assumes that the PRA of the comparison plants is thorough and of high quality, but provides no assurance that this will actually be the case. Additional guidance, especially for less experienced review team members is needed. Some additional criteria on house event and DAM files have been added to QU-15, as noted above (See Question 37), but additional guidance is desirable.

Question 40

This question dealt with Table L2 (Table 5-9)and noted that there is insufficient discussion of the technical quality needed for the treatment of such items as system performance and human error in the LERF analysis. Such discussions are found in the Level 1 analysis but are not carried over to Level 2/LERF analysis criteria.

NEI agreed that the comment was worthwhile and that a more formal way of connecting the criteria in the SY and HR tables to the Level 2 analysis would be useful. The response notes that the subtier criteria have been updated to do this.

A review of the revised subtier criteria showed that in the L2 table criteria L2-11 now states that "system models and their documentation should be consistent with SY, DA and DE (Tables 5-4, 5-5, and 5-10)" while L2-12 now states that "Operator actions, the human error probabilities derived for PSA, and their documentation should be consistent with the subelement criteria cited in Table 5-6." While more detailed guidance would seem to be preferable, this response does, in a minimal way, appear to adequately address the question.

Question 41

This question also dealt with Table L2 (Table 5-9) and again noted that many of the requirements on issues such as results interpretation, quantification, and treatment of uncertainty or sensitivity, spelled out in Level 1 criteria are not stated for Level 2/LERF analysis.

NEI stated that the applicable Level 1 elements are expected to be reviewed as part of the Level 2 review process, and lists the AS, ST and QU tables which call out Level 2 explicitly for evaluation. The response also states that the Level 2/LERF criteria of the revised subtier criteria (Table 5-10) march through each of the elements to provide a convenient point to discuss applicability.

A review of the revised subtier criteria shows that a section on the interface of Level 2 criteria with the other criteria has been added. Also, there have been additions to a number of the L2 (Table 5-10) criteria, i.e., in L2-8, 11, 12, 17, and 26. It is also true that some references are made to Level 2 analysis in some criteria of the AS, ST and QU tables and that a careful treatment of all the L2 criteria would lead an experienced reviewer to consider many of the Level 2/LERF treatment issues that carry over from the Level 1 criteria. However, it would still be advantageous to provide more explicit guidance within the L2 Table on how some of these issues should be treated in the Level 2 analysis.

Question 42

This Question referred to L2-1 and noted an inconsistency for a Grade 2 PRA (risk ranking prioritization). NEI noted that the inconsistency referred to is the lack of criteria for Grade 2 in L2-1 and noted that it has been remedied in the revision. A review of the revised subtier criteria showed that a statement requiring a general description of the Level 2/LERF process has been added to L2-1 Grade 2. This response appears to be adequate.

Question 43

The question, which referred to L2-8, noted that while a list of issues/phenomena to be considered is provided, no guidance is given as to what constitutes an appropriate way to consider these issues. NEI noted that the burden of proof on the treatment of these phenomena is on the utility and also notes that clarifications on treatment have been added to the subtier criteria.

A review of the revised subtier criteria shows that L2-8 has been expanded to provide additional guidance on combination (or lack of) for phenomena as well as other guidance. The response appears to be adequate.

Question 44

This question referred to L2-9 and asked that additional guidance on appropriate inclusion of accident management actions in the PRA model be provided. The NEI response refers to L2-8 as identifying accident management actions.

A review of the revised subtier criteria noted that the L2-8 list of phenomena and issues has been expanded (See Question 43). However, the list of L2-8 mixes severe accident phenomena, failed systems, operational states and accident phenomena all in the same list. L2-9 simply states that "the phenomena that affects accident management actions and planning should be included." This does not meet the need of providing guidance on the appropriate inclusion of accident management actions in the PRA.

Question 45

This Question referred to L2-17 and asked that more guidance be provided as to how geometric details are to be used in the treatment of hydrogen phenomena in BWR Mark III and PWR ice condenser containments. NEI stated that additional guidance had been provided in the revised subtier criteria. A review of the revised subtier criteria showed that L2-17 had been expanded to provide appropriate guidance. The response appears to be adequate.

Question 46

This Question referred to L2-26 and noted an inconsistency for a Grade 2 PRA (risk ranking prioritization). NEI noted that the inconsistency referred to is the lack of criteria for Grade 2 in L2-26 and that it has been remedied in the revision. A review of the revised subtier criteria showed that a statement on documentation has been added to L2-26 Grade 2. This response appears to be adequate.

Question 47

Question 47 raised the issue that the peer review process has evolved over time and as a consequence the standard attained for more recent reviews is different than that set by the early efforts. This raises the question whether all reviews fulfill a consistent standard that would be appropriate for application to Option 2.

NEI responding to this question argued that the peer review process has been consistently applied to all plants that have undergone the process. The response touches on the history of the process by noting that first the BWROG guidelines were used since 1997, then NEI-00-02 guidelines were formulated and are "identical in content," (although some minor differences are listed). The response states that prior to the 1999 inclusion of the subtier criteria in a single document, the criteria were consistently transmitted through use of experienced PRA personnel in each review and by "re-used" reviewers in subsequent reviews. NEI concludes that "a consistent process has been applied in a uniform and reproducible manner and that the process applied to the first plant is no different than the process applied to the most recently reviewed plants."

This response does not appear to allay the concern raised in the question. It is credible that experienced reviewers can be expected to concentrate on similar concerns at a high level. However, it is difficult to see how the same detailed criteria can have been applied in the same detailed way to every plant reviewed if the criteria initially only existed in the reviewers head during the review. Clearly, the subtier criteria have undergone revision. The NEI argument seems to be that these revisions only consist of explicitly stating what was already implied in the previous criteria, and that the reviewers always applied the current criteria, even before they were documented, because of their expertise and consistency. This does not seem credible. In their response to Question 49 (see below) NEI notes that if there are changes to the subtier criteria as a result of the NRC guideline review effort, utilities with previously reviewed PRAs would have to address the changes and justify the PRA in view of the recommended changes. Suggested ways of justification are included in the response to Question 49, including conducting another "mini- peer review" to verify applicability. It would seem that such justification would also be needed for changes between initial reviews and the current subtier criteria.

Question 48

The concern of this question is similar to that of the previous one (Question 47), in this case that the previous peer review efforts have been completed without consistent guidance on what information will be provided to the integrated decision making panel (IDP) responsible for SSC classification under Option 2.

NEI stated that consistent guidance has been used because the needed information is contained in the PRA Peer Review Report presented to the utility and the peer review provides input to the utility's characterization of the PRA input quality. The response also refers to the IDP discussion in NEI-00-04.

The issues here are similar to that of Question 47, and the same concerns remain. It is very difficult to believe consistency was achieved throughout a process which was initially undocumented and has evolved over time.

Question 49

The concern of this question is how completed peer reviews will account for changes to the subtier criteria which may result from the NRC guideline review effort.

NEI stated that if there are changes in the review procedures or the basis for establishing grades or conclusions from that in the NEI-00-02, the utilities would be required , in preparing Option 2 applications, to address differences and justify the PRA in view of NRC recommended changes that arise from the NRC review effort. Suggested means of justification include (1) writing the basis for compliance with the Standard for those subelements not part of the peer review, or (2) undergoing a separate "mini-peer review" to verify the applicability of the Standard items in the PRA. The NEI response recommends that each plant be required to revisit those criteria and related grades where significant changes have resulted as a result of the NRC review.

This response appears to be adequate, assuming agreement can be reached on the definitions of such terms as "significant change." Such agreement may not be easily obtained. For

example, based on responses to Questions 47 and 48, which also relate to handling changes in the subtier criteria for previously reviewed plants, there is reason to believe that major differences exist between the NEI and NRC views as to what constitutes significant change. NEI apparently regards changes made so far in the evolution of the subtier criteria to be not significant, while the NRC reviewers may not share this view. Similar divergent views are likely to be encountered as to what constitutes a significant change in any future revision of the criteria.