BWR OWNERS' GROUP

J. A. Gray, Jr., Chairman
Tel: (914) 272-3372
Fax: (914) 272-3382
jgray4@entergy.com

Entergy Nuclear Northeast • 440 Hamilton Avenue • Mail Stop 12C • White Plains, NY, 10601-5029

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Rules and Directives Branch
Office of Administration
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001.

SUBJECT: **BWROG COMMENTS ON DRAFT REGULATORY GUIDE 1122, "AN APPROACH FOR DETERMINING THE TECHNICAL ADEQUACY OF PROBABILISTIC RISK ASSESSMENT RESULTS FOR RISK-INFORMED ACTIVITIES"**

The BWR Owners' Group (BWROG) appreciates the opportunity to comment on the subject draft Regulatory Guide. These comments were approved by a vote of both the BWROG Integrated Risk Informed Regulation Committee and the BWROG Primary Representatives.

The Draft Regulatory Guide is obviously the result of extensive work by all involved parties and can serve as methodology for the industry to make the transition from existing PRA's to PRA's, which are verified to be in compliance with the ASME Standard.

General comments and detailed specific comments are contained in Attachment 1. Many of the detailed comments include specific suggestions for text changes in the Regulatory Guide. The BWROG believes that the suggested changes will help clarify the intent and therefore reduce the potential for misinterpretation in the future.

The BWROG offers three significant comments in this cover letter to highlight them as the most significant to the industry. These three comments also are elaborated on in the Attachment.

1. Closure and the Use of the Self-Assessment Process

In the introduction to DG-1122, the purpose of the Guide is stated as follows:

> "This regulatory guide is being developed to describe one acceptable approach for determining that the quality of the PRA, *in toto* or for those parts that are used to support an application, are sufficient to provide confidence in the results such that they can be used in regulatory decision making for light-water reactors."

Template = ADM-013

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add - T. Clark (TRC4)
M. T. Drouin (MXD)

Further, DG-1122 provides a logic framework for making such a determination using NEI-00-02 that concludes with the following in Section 2.2, p. 16:

> "When the staff's regulatory positions contained in Appendix B [of DG-1122] are taken into account, this document [NEI-00-02] can be used to demonstrate that the PRA is adequate to support a risk-informed application."

Thus, in order to support a risk-informed regulatory application, the utility must submit documentation regarding the applicable PRA analysis sub-elements. This can be done by several methods, but the BWROG recommends that DG-1122 provide, as one option, for the utility to upgrade all of the sub-elements of their PRA to grade 3 or higher supported by an in-plant self assessment based on NEI 00-02 and the DG-1122 Appendix B modifications. This upgrade with its supporting documentation should then be accepted by the NRC as sufficient support for all subsequent application submittals without further documentation unless the utility chooses to make a subsequent base model upgrade. The associated focused peer review documentation would be established.

2. Requirements for Peer Review for PRA Maintenance and Upgrade

The BWROG believes that little benefit is obtained using a peer review over and above the accepted engineering practices used during the update of the PRA models as specified in both NEI-00-02 and Regulatory Guide 1.174 Revision 1. A focused review performed as needed for substantial modifications to the methodology as noted in NEI-00-02 is an appropriate mechanism to strengthen the technical adequacy of PRA elements of a PRA model without requiring the differentiation of PRA model changes between "upgrade" and "PRA maintenance". Note that there are PRA changes that do not fit either the "upgrade" or "maintenance" categories of Section 2 of the ASME standard.

In any event, DG-1122 is not clear on the conditions which require additional Peer Review of changes to the PRA and which changes can be subjected to self-assessment by the utility. The BWROG believes that if a peer review of a **PRA upgrade** (as defined in Section 2 of the ASME standard) is needed, it can be performed either under 1) the NEI 00-02 Peer Review Guidelines plus the Draft Guide Appendix B resolutions with the ASME Standard, or 2) directly against the ASME Standard per utility choice.

Except for focused peer review as described above, a PRA model that is changed due solely to plant changes (PRA maintenance) should not require a peer review. This is consistent with ASME Standard Sections 5 and 6, which state that additional peer review is required only for upgrades. Moreover, if the self-assessment process is sufficient to bridge the gap between the ASME standard and the NEI Peer Review process, then it should be sufficient for assuring quality PRA maintenance.

3. Definitions and Use of the terms Dominant, Risk Significant, and Key

Usage of the terms "dominant", "risk-significant", "key", "important" and others involved with characterizing the results of a PRA may not always be consistent with those of the ASME standard. There is considerable discussion in the industry about these terms. The BWROG strongly recommends that DG-1122 not attempt to independently define these terms outside of the ASME process. If the terms are being used to impart a qualitative significance to results or insights, the BWROG suggests not defining the terms as quantitative expectations. The BWROG understands that ASME is aware of this issue and is working on defining a resolution.

If you have any questions regarding these comments, please contact Greg Krueger (Exelon Nuclear), BWROG Integrated Risk Informed Regulation Committee Chairman at (610) 765-5973 or Rick Hill (GE) Project Manager at (408) 925-5388.

Sincerely,

J. A. Gray, Jr.
BWR Owners' Group Chairman
Tel: (914) 272-3372
Fax: (914) 272-3382
jgray4@entergy.com

Attachment: BWROG Specific Comments

cc: K. S. Putnam, BWROG Vice Chairman
BWROG Primary Representatives
BWROG IRIR Committee
B. Bradley, NEI
T. G. Hurst, GE
R. A. Hill, GE
Alan Wang, NRC

ATTACHMENT

GENERAL COMMENTS ON DRAFT REGULATORY GUIDE DG-1122

1. Closure and the Use of the Self-Assessment Process

In the introduction to DG-1122 the following statement sums up the purpose of the Guide:

> "This regulatory guide is being developed to describe one acceptable approach for determining that the quality of the PRA, *in toto* or for those parts that are used to support an application, are sufficient to provide confidence in the results such that they can be used in regulatory decision making for light-water reactors."

Further, DG-1122 provides a logic framework for making such a determination using NEI-00-02 that concludes with the following in Section 2.2, p. 16:

> "When the staff's regulatory positions contained in Appendix B [of DG-1122] are taken into account, this document [NEI-00-02] can be used to demonstrate that the PRA is adequate to support a risk-informed application."

The utility must submit documentation regarding the PRA analysis sub-elements that support the proposed risk informed application. This can be done as follows:

1. Submit documentation, which shows that the applicable PRA sub-elements received a Grade 3 (ASME Capability Category II) ranking from a Peer Review or that a Grade 2 is sufficient for the element in question.
2. An in-plant self-assessment must have been performed on those sub-elements specified in Appendix B to verify that the Grade 3 meets the NEI 00-02 PRA sub-element requirements as amplified by Appendix B of DG-1122.
3. If applicable, submit documentation that verifies that any shortcomings of the sub-elements identified in the peer review have been corrected and the sub-element now meets grade 3 requirements (ASME Standard Capability Category II).

The BWROG recommends that DG-1122 provide, as one option, for the utility to upgrade all of the sub-elements of their PRA to grade 3 or higher supported by an in-plant self assessment based on NEI-00-02 and the DG-1122 Appendix B modifications.[1] This upgrade with its supporting documentation should then be accepted by the NRC as sufficient support for all subsequent application submittals without further documentation unless the utility chooses to make a subsequent base model upgrade. The associated focused peer review documentation would then be added.

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[1]It is recognized that if a Capability Category III is required for a particular SR, verification would then need to be made of that SR directly against the ASME standard and Appendix A.

2. Comparison of Peer Certification Grades and the ASME Standard's Capability Categories

In DG-1122, Table B-1, Item 3.3, it is stated that,

> "The NEI peer review process grades each PRA element from 1 to 4, while the ASME Standard uses Capability Categories I, II, and III. The Staff equates Grades 2, 3, and 4 as corresponding to Capability Categories I, II, and III, respectively".

The BWROG agrees with this equivalence and feels that this is an important determination. After self-assessment of the PRA against Appendix B of DG-1122 has been completed, this equality should be utilized in all applications of the PRA as described below. Where Capability Category I is deemed adequate support for an application, the corresponding NEI Peer Review grade 2 subelements should be accepted as equivalent to Capability Category I without further documentation. Capability Category II should be accepted as NEI grade 3 subject to Appendix B with documentation as discussed above. Only Capability Category III needs to be self-assessed directly against the ASME Standard and Appendix A should that capability category be required for any SR in an application.

A clarifying statement within the body of DG-1122 in section 4 should be added to identify this expectation.

3 Requirements for Peer Review for PRA Maintenance and Upgrade

The BWROG believes that little benefit is obtained using a peer review over and above the accepted engineering practices used during the update of the PRA models as specified in both NEI-00-02 and Regulatory Guide 1.174 Revision 1. This requirement is greater than the requirements of 10 CFR 50 Appendix B for safety related calculations and the additional benefit does not merit the additional burden. A focused review performed as needed for substantial modifications to the methodology as noted in NEI-00-02 may be an appropriate mechanism to strengthen the technical adequacy of PRA elements of a PRA model without requiring the differentiation of PRA model changes between "upgrade" and "PRA maintenance". Note that there are PRA changes that do not fit either the "upgrade" or "maintenance" categories of Section 2 of the ASME standard.

In any event, DG-1122 is not clear on the conditions which require additional Peer Review of changes to the PRA and which changes can be subjected to self-assessment by the utility. The BWROG believes that if a peer review of a **PRA upgrade** (as defined in Section 2 of the ASME standard) is necessary, it can be performed either under 1) the NEI 00-02 Peer Review Guidelines plus the Draft Guide Appendix B resolutions with the ASME Standard, or 2) directly against the ASME Standard per utility choice.

Except for focused peer review as described above, a PRA model that is changed due solely to plant changes (PRA maintenance) should not require a peer review. This is consistent with ASME Standard Sections 5 and 6, which state that additional peer review is required only for

upgrades. Moreover, if the self-assessment process is sufficient to bridge the gap between the ASME standard and the NEI Peer Review process, then it should be sufficient for assuring quality PRA maintenance.

A PRA model that is changed due solely to plant changes (**PRA maintenance**) should not require a peer review. This is consistent with ASME Standard Sections 5 and 6, which state that additional peer review is required only for upgrades. Moreover, if the self-assessment process is sufficient to bridge the gap between the ASME standard and the NEI Peer Review process, then it should hold true that it is sufficient for assuring quality **PRA maintenance**. Thus, NRC staff clarification 5.4 in Table A-1 on p. 40 requires revision to remove the peer review requirement statement regarding **PRA maintenance**. The Clarification under 1.1 Scope in Table B-1 on p.45 also needs to be revised by deleting the end of the last sentence beginning with the words "which require a peer review..." That phrase misstates Section 5 of the ASME Standard.

4. Defining Full Scope PRA Attributes

The Draft Regulatory Guide implies, in Section 1.2, that any PRA not containing all of the elements of a full scope PRA is somehow deficient for applications when in fact many applications can be accomplished with less than a full scope PRA when supplemented, as needed, with deterministic arguments. This supplemental approach is accommodated by Regulatory Guide 1.174 Revision 1 (Sections 2.2.3.1 and 2.2.5). DG-1122 has been written to encompass future Standards and PRA scope when in fact endorsement of the ASME Standard involves only an internal events level 1 and simplified Level 2 models. This causes an incongruity between what is expected in the future compared with current PRA scope and regulatory guidance.

5. Definitions and Use of the terms Dominant, Risk Significant, and Key

Usage of the terms "dominant", "risk-significant", "key", "important" and others involved with characterizing the results of a PRA are not always consistent with those of the ASME standard. Although there is considerable discussion regarding the above terms, DG-1122 should consistently use terms in the same manner as that of the ASME Standard. Moreover, if the terms are being used to impart a qualitative significance to the results or insights, the BWROG would suggest using terms that do not elicit a quantitative expectation. We would suggest that upon resolution of the agreed upon definitions in the ASME standard, the DG-1122 terminology would be changed to match.

6. Use of Large Late Release as a Measure of Risk

The measure of large late release (LLR) is introduced in DG-1122 without adequate rationale for use of such a measure. The ASME Standard and regulatory documents such as RG 1.174 do not define nor use this measure for any current risk-informed applications. This term should be removed from DG-1122 until an agreed upon definition can be developed and PRA models correspondingly modified.

7. Use of Draft Guide-1122 during the "Trial Use" period

It is understood that DG-1122 will be issued for trial use in the near future. The BWROG anticipates that pilot plant applications will exercise DG-1122 during this trial use period, but use of the Draft Guide is not required for non-pilot risk-informed applications. Moreover, trial use should encompass both the NEI/Appendix B approach as well as direct use of the ASME standard. The latter is needed before full use of the ASME standard is imposed on the industry due to the potential for significant additional required resources to meet a literal interpretation of all of its requirements. For example, the definitions of HEP and HFE given in ASME standard Section 2 that include the terms "wrong action" and "inappropriate action" taken in conjunction with several Human Reliability Analysis supporting requirements such as HR-G2 would likely characterize most current PRA human reliability models as inadequate. The reality and significance of such potential impacts need to be assessed in the context of real applications and explicit models before the ASME standard is fully implemented.

8. Burden Impact of DG-1122

The impact of use of the Regulatory Guide in its current form on industry efforts to support risk informed applications could be considerable. There is some justification for such effort if future Rule changes are to be made that largely depend on risk arguments. However, many utilities may find themselves in the position of having to expend considerable additional effort to obtain the same plant specific risk-informed regulatory changes that have already been achieved by others. This additional effort would be simply due to a new demonstration of PRA technical adequacy. This additional burden does not appear to be justified in the context of a risk-informed process in which the PRA information serves a supporting role to engineering or deterministic arguments.

DETAILED COMMENTS ON THE MAIN BODY OF DG-1122

Note: Many of the Detailed Comments that follow include specific suggestions for text changes in the Regulatory Guide that, if implemented, would resolve the stated concern of the comment.

p. 3, Section B, Purposes of this Regulatory Guide:
Since one purpose of DG-1122 is to endorse guidance provided by standards setting organizations, recognition should be given that the ASME standard provides for the use of non-PRA supplementary analyses to support applications. Therefore, insert on page 4 after the last sentence of the section titled "Purposes of this Regulatory Guide" the following sentence: "Provisions are made and guidance is given in Section 3 of the ASME standard as well as in Regulatory Guide 1.174 Revision 1 (Sections 2.2.3.1 and 2.2.5) on the use of supplementary analysis for cases where some aspects of the PRA are not sufficient to support an application."

p. 4 Figure 1:
The box containing reference to Regulatory Guide 1.174 has been removed since the September 2002 revision. Since this is a cornerstone regulatory guide on risk-informed regulation, it should be maintained in such a relationship figure. Therefore, a box should be added for just Regulatory Guide 1.174 and tied in by arrows to all three major existing boxes; i.e., "Application", "Application specific Regulatory Guide", and "Generic Supporting Regulatory Guide". The alternative would be to include R. G. 1.174 as a sub-box to the major box "Generic Supporting Regulatory Guide" and change "Guide" to Guides".

p. 5, Section 1.1, first paragraph, third bullet:
"Types of initiating events" implies the particular selection of initiators such as turbine trip, MSIV closure, etc. as might be used in a specific PRA model. For this section that deals with PRA scope, the initiator choices at issue are the broader categories such as internal events, external events, etc. Thus, the word "types" should be replaced by "categories" in the third bullet to better connote this meaning.

p. 5, Section 1.1, Plant operating states, last sentence:
"The risk perspective" sometimes includes low power and shutdown conditions as well as full power operation but also may include only full power (or at-power) operation, depending on the application at hand. Therefore, the word "is" should be replaced by the phrase "may be based" in the last sentence.

p. 6, Section 1.2:
This paragraph implies that any PRA not containing all of the elements of a full scope PRA is somehow deficient for all applications when in fact many adequate applications can be accomplished with less than full scope PRAs supplemented as needed by deterministic arguments. Therefore, in the first sentence, replace the phrase "that are necessary for a PRA" with "for a full scope PRA". Delete the second sentence.

p. 6, Table 1:
The grouping of the Technical Elements in the table is not consistent with their grouping in the text that follows. To be consistent with the text grouping, the Table 1 elements "Internal flood analysis", Internal fire analysis", and "External hazard analysis" should be separate entries under "Scope of Analysis" with their corresponding "Technical Elements" added to these new scope items as given in the DG-1122 text that follows the table.

p. 6, Success criteria analysis, fourth sentence:
Insert the word "computer" before the word "codes" for clarity.

p. 6, Section 1.2.1, Accident sequence development analysis, first sentence:
The word "chronologically" is not necessary and not always literally correct due to modeling expediencies. The phrase "progression of events" adequately captures the meaning. Therefore, delete the word "chronologically".

p. 6, Section 1.2.1, "Accident Sequence development analysis", second sentence:
Reference to "simulator exercises" in this manner represents an unnecessary level of requirement detail at this stage for the document at hand. Therefore, delete the phrase "and as practiced in simulator exercises" at end of next to last sentence on page 6.

p. 7, Section 1.2.1, "Quantification", third sentence:
In view of the confusion and inconsistencies in use of the word "important" in the context of the ASME standard (See first comment in Attachment 2), its use in DG-1122 should be avoided if at all possible or changed to risk significant if appropriate. Note that it is used in the third sentence of the subsection "Quantification" ("important accident sequences").

p. 7, Section 1.2.1, "Quantification", (last sentence):
In many cases it would be impracticable to obtain (except by extrapolation) a CDF value with no ("before") truncation. The last two sentences of the "Quantification" subsection should be deleted.

p. 7, Interpretation of results, second sentence:
The phrase "for both individual sequences and the model as a total" is confusing and doesn't appear to be needed. Therefore, delete the phrase from the second sentence.

p. 7, Section 1.2.1, Interpretation of Results, last sentence:
It may be difficult to assure that the combinations analyzed "fully account for interactions". Thus, the word "fully" should be deleted from the last sentence of the "Interpretation of Results subsection. The same comment is made for the same usage on pages 8, 9, 10.

p. 7, Section 1.2.2, Plant damage state analysis, second sentence:
See comment above on the use of the word "important" in the third sentence of the "Quantification" subsection.

p. 7, Section 1.2.2, Plant damage state analysis, second sentence:
The word "source term" sometimes has a very specific meaning rather than the more general meaning intended here. Therefore, replace "source term" with "radionuclide release."

p. 8, Source term analysis, fourth sentence:
The definition of "large early release" should be made consistent with the definition given in the ASME standard as modified by Table A-1 (page 26) of DG-1122.

p. 8, Source term analysis, third and last sentences:
There should be no references to "large late release". It is not a risk metric for risk-informed regulatory applications nor is that term used in the ASME standard. Therefore, delete the phrase "or a large late release" from the third sentence, and delete the last sentence of the "Source term analysis" section.

p. 8, Quantification, Section 1.2.2, second sentence:
As just above, delete the phrase "and the probability of a large late release" from the end of the second sentence of the "Quantification" subsection.

p. 8, Section 1.2.2, "Interpretation of Results", first and second sentences:
Many LERF and level 2 models are not amenable to specific importance calculations as specified in this subsection. Also, reference to large late release is again made. (See discussion above) Therefore, replace the first sentence under "Interpretation of results" with the following sentence:
"**Interpretation of results** entails examining results to identify the contributions of various events to the model estimation of LERF."
There is a typo in second sentence: Replace the isolated letter"o" with "on".

p. 9, Section 1.2.3, Flood evaluation analysis, third sentence:
All significant credits in the PRA model need to be justified. Spelling out this specific one (flood isolation) is inappropriate for this document. Therefore, delete the third sentence (begins with "Credit given...").

p. 9, Section 1.2.3, "Quantification Analysis":
Delete the word "Analysis" in subsection title for format consistency with Table 3.

p. 9, Section 1.2.3, Quantification analysis, fourth sentence:
Insert the words "appropriate boundary" before the word "characteristics" in the fourth sentence to be appropriately restrictive.

p. 9, Section 1.2.3, last subsection:
For format consistency and completeness, there should be a subsection titled "Interpretation of results" added just after subsection "Quantification analysis" of Section 1.2.3. A similar condition exists in Section 1.2.4.

p. 9, Section 1.2.4, Screening analysis, fifth sentence:
The definition of fire area implies that the barrier between an area and the next does not result in spread of a fire, therefore, it would be best to delete the fifth sentence (begins with "The potential for..).

p. 9, Section 1.2.4, Screening analysis, sixth sentence:
Walkdowns cannot verify all types of assumptions used in the screening analysis. To more accurately portray the goal of walkdowns, delete the sixth sentence (begins with "Assumptions used ...") and add the following sentence to the end of subsection "Screening analysis":
"Plant walkdowns are performed to verify the accuracy of the information where possible."

p. 9, Section 1.2.4, Fire initiation analysis, fourth sentence:
There is very limited, if any, plant-specific fire scenario experience for most plants. Therefore, the fourth sentence (begins with "The scenario frequencies...") should be modified to begin:
"The scenario frequencies reflect industry fire information tempered with plant-specific features quantified in a manner..."

p. 9, Section 1.2.4, Fire damage analysis, first two sentences:
DG-1122 should avoid using the term "risk significant" due to its specific use elsewhere and the confusion it is causing in the ASME standard language. Therefore, replace in the first sentence the phrase "sets of potentially risk significant" with the phrase "multiple mitigative systems and/or". Modify the second sentence to read:
"The analysis addresses components whose failure will cause an initiating event and affect the plant's ability to mitigate an initiating event either directly or indirectly such as through suppression system actuation."

p. 10, first paragraph, last sentence (just before "Plant response analysis"):
Unrestricted inclusion of experiments is too broad. Some fire experiments may not be relevant or conducted properly. Therefore, deleting the phrases "experience from" should modify the last sentence of subsection "Fire damage analysis" and "as well as experiments".

p. 10, Section 1.2.4, Plant response analysis, first sentence:
For consistency with the comment given on page 9 under subsection "Fire damage analysis", replace the phrase "sets of" with the phrase "multiple mitigative systems and/or" in the first sentence of subsection "Plant response analysis".

p. 10, Section 1.2.4, Plant response Analysis:
To be consistent with the discussion under the other technical elements, a subsection titled "Quantification" should be inserted just before the sixth sentence (that begins with "In addition ..."). The text that begins with the sixth sentence appears to contain material that would be expected to be under a subsection titled "Quantification", but there is material missing that should precede that beginning with the sixth sentence.

p. 10, Section 1.2.5, Screening and bounding analysis", fourth sentence:
The clause numbered (2) should be reworded for clarity as follows:

"It can be shown using an analysis that the mean value of the frequency of occurrence of the design basis hazard considered in the plant design is less than 10^{-5}/year, ..."

p. 10, Section 1.2.5, Hazard analysis, last sentence:
The phrase "both aleatory and epistemic" should be deleted. That detail is not required for this document nor are those uncertainty terms mentioned in the discussion on any other technical element.

p. 11, Section 1.2.5, Level 1 model modification, next to last sentence:
This is the only place where "uncertainties in each step" are to be propagated through the process; sensitivity studies should be adequate if preferred. Moreover, it's not clear if uncertainty distributions would be available for "each step" in a seismic analysis. Therefore, delete the next to last sentence of section 1.2.5.

p. 11, Section 1.3 with Tables 2 and 3:
The purpose of this section and its precise relationship to the cited goals and purposes is not clear. In fact, the cited Section 1.2 does not appear to contain explicit goals and purposes. Was another section intended? Moreover, the contents of Tables 2 and 3 seem at times to be a rephrasing of the technical elements discussion given in the subsections to Section 1.2 and thus appear somewhat redundant. The purpose of Section 1.3 needs to be more clearly stated and the contents modified to support that purpose, or the section should be deleted.

p. 11, Section 1.3, first sentence:
This sentence taken together with the contents of Section 3 (Demonstrating the Technical Adequacy of a PRA Used to support a Regulatory Application) implies that submission of documentation that demonstrates that the technical characteristics of the PRA meet those outlined in DG-1122 without a peer review is sufficient for risk-informed applications. This inference is due largely to the cited sentence and the fact that no peer review requirement is stipulated in Section 3, and the cited potential for NRC review of something other than peer review results could be necessary as stated in the next to last sentence of Section 3.3.1 on page 20. (See also comment on that sentence given below.) In fact, the words "peer review" are not to be found in Section 3 except in the focused topic of "assessment of assumptions and approximations" given in Section 3.3.2. The only place that is inconsistent with this "documentation only" approach is the material of the third and fifth bullets of Section 4.3 titled Licensee Submittal Documentation" on page 21.

Therefore, if the NRC review of PRA documentation with no peer review approach is a valid option, it should be explicitly stated in Section 4. If that is not the intent, then the peer review requirement should be added somewhere in Section 1 and/or Section 3 with reference to Section 2 for specific peer review options.

p. 11, footnote 2:
This definition of "assumptions" is too broad in the documentation context (Section 1.2.6) that it is used. Therefore, replace footnote 2 with the following:
"Assumptions also include those decisions and judgements that were made that affect the course of the analysis."

p. 13, Table 2, Source Term Analysis, second bullet:
Delete the ending phrase "and on large late release (LLR)" for consistency with previous comment made on the material on page 8 of DG-1122.

p. 13, paragraph between Tables 2 and 3, second sentence:
For clarity, insert the phrase "are spatial in nature and" just before the phrase "have the ability" in the second sentence.

p. 14, Table 3, Fire Area Identification and Screening Analysis, second bullet:
There are sometimes mitigating components for which no credit is taken. Therefore, insert the word "credited" before the phrase "mitigating components".

p. 14, Table 3, Fire Growth and Damage Analysis, fourth bullet:
Delete at the end of the sentence the phrase "as well as experiments" as discussed in the comment made on material contained in the first paragraph on page 10 of DG-1122 under "Fire damage analysis".

p. 14, Table 3, Plant Response Analysis, fourth bullet:
As stated, the sentence is too broad and not consistent with the more focused guidance given in the fourth sentence of the "Plant response analysis" write-up in Section 1.2.4 on page 10. Therefore, modify fourth bullet write-up under "Plant Response Analysis" on page 14 to be consistent with that on page 10.

p. 15, Section 2:
For consistency of format the title of this section should be in first letter caps only (i.e. "Consensus PRA Standards and Industry PRA Programs"). See general outline of November draft of DG-1122 provided for convenience at the end of this Attachment.

p. 15, Section 2.1, second paragraph:
For accuracy and clarity, replace "PRAs" with "PRA standards" in the second paragraph of Section 2.1.

p. 16, Table 5, item 5, last dash:
"No conflicts of interest" as required of the peer review team in this statement is so absolute that if taken literally, it could mean many more potential qualified and legitimate peer reviewers would be disallowed than intended. Therefore, modify the last clause of item 5 by adding at the end of the statement the phrase "that may influence the outcome of the peer review".

p. 17, Section 2.2, team qualifications, third and fourth sentence:
As written the qualifications are more stringent than necessary for performing a competent review by always requiring direct experience in performing the work under review and the inference that the reviewers have experience in the methods used in all the PRA elements. If taken literally, such reviewers may be difficult to find. Therefore, modify the third and fourth sentences under "team qualifications" as follows:

Third sentence – Add the phrase "under review" to the end of the sentence (just after "PRA elements").
Fourth sentence – Insert the word "relevant" just after the word "includes", and delete the words "performing (not just reviewing)" that come just before the phrase "the work in the element".

p. 17, Section 2.2, peer review process, second sentence:
There is no "Regulatory Position 2.4" as cited. Suggest replacing "2.4" with "1.3" unless text revisions dictate another choice.

p. 17, Section 2.2, peer review process, sixth sentence:
It is the analyst that checks the model results with PRAs from other plants, not the peer reviewer. (See SR QU-D3 of the ASME standard.) The reviewer checks to see if such comparisons were made by the modelers. On occasion, the peer reviewer's experience with other plants could give him additional insights that he could apply to the review, but such a firsthand comparison is not his responsibility. Moreover, such comparisons may now be more difficult to make in light of the post 9/11 security measures affecting the flow of nuclear information. Therefore, delete the phrase "and for consistency with the results from PRAs for similar plants" at the end of the sixth sentence under "peer review process".

p. 18, Section 3.1, last paragraph, second sentence:
The sentence (beginning "These include not only...") as written is not clear, particularly the second clause. Thus, it would be helpful to rewrite the second sentence more clearly, perhaps including an example, using more than one sentence, and referencing the relevant part of Section 3 of the ASME standard. An alternative would be to delete the sentence since the thrust of the paragraph would still be maintained if reference to Section 3 of the ASME standard is added.

p. 18, Section 3.1:
A broader comment (than just above) relates to the fact that this section provides inadequate guidance for selecting parts of a PRA for use in an application nor does it deal with the process of determining the required capability categories for an application as discussed in Section 3 in the ASME standard. (Table A-1 endorses Section 3 of the standard without objection). This problem could be solved by appropriate reference to Section 3 of the ASME standard. In addition, it is assumed that even though a utility chooses to demonstrate base PRA model quality through use of NEI-00-02 and Appendix B, Section 3 of the ASME standard would still be used to identify relevant PRA parts and required capability categories for a specific application. If not, than more detail to guide an alternative approach needs to be given in Section 3.1 of DG-1122.

p. 19, second paragraph, fifth sentence:
For accuracy and clarity, insert the words "peer review" just before the word "programs" in the fifth sentence (that begins with "The different PRA standards...").

p. 19, Section 3.3, second paragraph, clause (b):
Since the phrase "consistent with industry practice" is difficult to define, it should be deleted since it adds nothing useful to the guidance.

p. 20, second paragraph (last paragraph of Section 3.3.1), second sentence:
The clause "review by the NRC staff will not be necessary" should be made more specific by inserting the object of potential NRC review that will not be necessary. Such detail is very important in providing adequate guidance to licensees for risk-informed submittals.

p. 20, Section 4:
For consistency of format the title of this section should be in first letter caps only (i.e., "Documentation and submittal"). See the general outline of the November draft of DG-1122 provided for convenience at the end of this attachment.

p. 20, Section 4.2, first paragraph, last sentence:
Reference to "Regulatory Position 2.4" is obviously not correct. Is "1.3" or "4.2" or something else intended? A general review of the final draft should be made of cited Regulatory Position numbers since at least two Regulatory Position citations were found to be in error due to organizational revisions of this guide.

p. 21, Section 4.3:
The title of this section (Licensee Submittal Documentation) is misleading in that it implies the scope covers all submittal documentation requirements while in reality it covers only that part dealing with PRA base model quality. Other documentation aspects such as discussed under Section 3.1 are not included in the major Section 4 titled "DOCUMENTATION AND SUBMITTAL". Documentation scope for an application should be made clear and concise as possible in this regulatory guide. Therefore, DG-1122 should be modified so that the entire documentation scope for an application appears in one section.

p. 21, Section 4.3, third bullet:
For specificity and clarity, the phrase "in the context of the application" should be added to the end of the third bullet paragraph.

p. 21, Section 4.3, last paragraph:
For clarity, the word "capability" should be inserted just before the word "categories" in the two places it is used.

p. 21, last paragraph, last sentence:
In the cited sentence, the phrase "less detailed categories" is ambiguous so that the purpose of the sentence is unclear. As stated, it could imply an a priori requirement to justify use of any ASME standard SR capability category less than category III for an application. Such an interpretation would be in direct conflict with the provisions of Section 3 of the ASME standard. Therefore, the last sentence should be modified to read as follows:

> "The licensee's documentation is to identify the use of the parts of the PRA that only meet lower numbered capability categories than specified for the application by the process outlined in Section 3 of the ASME standard, and the limitations this imposes."

DETAILED COMMENTS ON APPENDIX A TO DG-1122

p. 26, Table A-1, Accident sequence, dominant, Resolution:
The Clarification would essentially specify a single quantitative definition for the words "dominant', "significant", and "important". While the desire for uniformity and specificity is understood, this would be a difficult task since it would be essentially a backfit to a myriad of uses by different Standard authors with different intentions behind the uses of the words in question. Some of these considerations are discussed under the related "Issue" column in Table A-1 of DG-1122 itself.

A detailed review was made of context of use of the subject three words in the ASME Standard. Of the 49 times the words are used, less than half (22) are used in a quantitative sense. Of these, some imply CDF as the "outcome" while other quantitative outcomes imply a different metric (e.g. system failure probability). Thus, while a given numerical criterion may be appropriate for CDF, it's not clear that the same would be applicable to another outcome.

Moreover, it should be noted that "significant" is used in the terms "risk significant" and "risk insignificant" in three SRs in the ASME Standard (IE-A4, IE-D2, and SC-B1). These two word terms are not defined in Section 2 of the Standard, but they have very specific meaning elsewhere in risk informed application guidance such as Maintenance Rule support guidance. It would be helpful to resolve and specify the meaning of these two terms in the Standard or delete their use.

The recommended quantitative definition for "dominant" etc. in the Clarification was applied to RISKMAN sequences in a BWR PRA used in the IPE. For sequences contributing to CDF, the top 11 sequences would have been considered "dominant" and would have accounted for 16% of the total CDF. This would suggest that the cutoff is too high but in the right ballpark. However, it's not at all clear if for different models (e.g., linked fault trees) that partition CDF differently, that the definition would always be appropriate, even for the CDF metric.

The numerical range of the proposed quantitative definition expressed as a percent change to the outcome due to a "dominant, significant, important" contributor is 0.5% to 5.0%, with roundoff considerations (equivalent to a change in the second significant figure of the outcome, depending if the significant figures are 9.9 or 1.0, respectively). This leads to an obvious but interesting anomaly with the criterion as stated. Consider two plants with almost identical values of CDF, such as 1.0E-06/yr and 9.9E-07/yr. The quantitative criterion for "dominant" in the first case would be a contribution of at least 5% to the outcome, but in the second case it would be 0.5%, an order of magnitude lower for almost identical outcomes.

Thus, one of the three following courses of action is recommended starting with the most desirable and progressing to the least:

1. Remove the quantitative aspect of the definition as a solid requirement and let it remain a judgement factor as currently given in Section 2 of the ASME Standard. It is unlikely that any particular distinction among the three words was meant since it appears they were largely used by different authors based on where they appear in the Standard.
2. Have the pertinent Standard authors insert any needed quantitative definitions directly in the particular SR where these terms are used and remove them from Section 2. (See SR SY-A14 as an example for such inclusion of quantitative guidance in an SR.) This approach (as well as number 1 above) has the advantage of removing the danger of a future revision to the Standard that incorporates any of these three terms by an author who overlooks their quantitative definition in Section 2.
3. Contact the pertinent Standard authors and see if they agree with the proposed quantitative definition or any other.

p. 26, Table A-1, Chapter 2, "unavailability":
A sampling of the use of the word "unavailability" in the ASME standard would indicate that the definition as stated in the standard is correct and should not include failure on demand. See for example Supporting Requirement DA-C12 of the ASME Standard. This is a matter of semantics and usage and should be checked with the relevant ASME Standard authors who used the term. Therefore, unless reversed by ASME standard authors, the cited Qualification should be deleted.

p. 27, Table A-1, 4.5 Tables, No Objection:
The high level requirement as stated in Table 4.4.2 of the ASME Standard differs from that in Table 4.5.2-2(b). They should be identical. The version in Table 4.5.2-2(b) is more appropriate for a high level requirement.

p. 31, Table A-1, Index SY-A19:
In some instances there can be adequate justification of an assumed failure probability for Capability Categories I and II without an explicit formal "engineering analysis". Therefore, replace the Cat I and Cat II resolution with "If a documented decision making process is not available for the assumed failure probability, ASSUME that the equipment/system fails with a probability of 1.0."

p. 43, Table A-1, Section 6.6.1, Clarification (l):
This documentation Clarification to confirm every SR capability category appears to make the peer review scope all encompassing in breath and depth, obviating the need for a minimal set of items to be reviewed as given in Section 6.3 of the ASME standard. It also minimizes the NRC endorsed use of judgment of the reviewer as provided in standard Section 6.3 by essentially requiring a 100% audit sample of every SR in Section 4 of the ASME standard. Moreover, items (f) and (g) under Section 6.6.1 should suffice in documenting conformance to SRs through a peer review process and also maintain the flexibility provided through use of reviewer judgment. Therefore, item (l) under Section 6.6.1 in Table A-1 should be deleted.

DETAILED COMMENTS ON APPENDIX B TO DG-1122

p. 44, INTRODUCTION, first paragraph:
This paragraph provides a good summary of the interaction between the NEI-00-02 guidance and the ASME Standard. However, it should be noted that while the NEI peer review process generally indicates the reviewed PRAs are consistent with the Grade 3, essentially all of the utility PRAs contain a number of Grade 2 and Grade 4 subelements.

p. 44, INTRODUCTION, second paragraph, second bullet:
In Table B-4 there are a number of instances where a "Clarification" would require additional effort, sometimes significant, to resolve the concern and thus would more accurately be described as a "Qualification". The following SRs in Table B-4 are examples where it is more appropriate to use the term Qualification instead of Clarification:

IE-A2, IE-A5, IE-A6, AS-B4, SY-A5, SY-A17, HR-D3, HR-D4, HR-H2

See also below the first comment for p. 49 regarding use of the verb "should" and the comment on the p. 45 Section 1.1 Clarification concerning peer review for PRA maintenance.

p. 44, NRC POSITION ON NEI 00-02, first paragraph, third sentence:
The draft Regulatory Guide states that NRC would have to revisit the stated positions in Appendix B before future uses of NEI-00-02. The purpose for this statement is not given nor the term "future" defined. If the actual consequence of that position is that no future peer reviews be allowed under NEI-00-02 and Appendix B, then it is particularly important that the "future" begin no sooner than when DG-1122 is released for general use rather than trial use. This is particularly true if future peer reviews under NEI-00-02 even for modest upgrades may no longer be allowed since at the outset, such a NEI-00-02 guided review could be much more practicable than using the ASME standard as it could build upon the previous NEI-00-02 base review until the provisions of the standard have had time to be digested by licensees. Therefore, the purpose of the cited sentence should be given, and the term "future review" should be defined to commence no sooner than the date of general release (as opposed to "trial" release) of DG-1122.

p. 45, Table B-1, Section 1.1, Scope:
The Clarification misstates the "guidance of Section 5 of the ASME PRA standard" by always requiring a peer review for PRA Maintenance. The ASME Standard requires no peer review for PRA Maintenance; only upgrades require such peer reviews. (See Section 5.5 of the Standard) The Clarification of Table A-1, Index 5.4 on p. 40 requires peer review for PRA Maintenance only "if the changes have significantly impacted the PRA results". Even this increase in peer review requirement over the Standard seems to impose an unnecessary burden, recognizing that PRA Maintenance seldom has much impact on model structure even if there were large changes in CDF (as noted on p. 40, Index 5.4). A case in point would be introduction of an aggressive on-line maintenance program, which should not require more than self-assessment to ensure quality of the resulting PRA model.

Frequent calls for peer review such as for all PRA Maintenance may well discourage such updates. In any case, the peer review requirements for PRA Maintenance should be no more stringent than the Clarification in Table A-1, Index 5.4 on p. 40. However, it is strongly recommended that the peer review requirement for PRA Maintenance be made consistent with the ASME Standard by deleting the cited Clarification in Table A-1, Index 5.4 on p. 40 and the Clarification in Table B-1, Section 1.1 Scope on p. 45. It is assumed that the use of the word "updates" rather than "upgrades" in the last sentence of the clarification is a typo. However, the arguments above are not affected by either choice.

Note: The preferred approach for a peer review of previously reviewed PRA models is that described in Section 3 of the General Comments above.

p. 46, Table B-1, Section 2.3, Clarification:
While not identical, the qualifications of Section 2.3 of NEI-00-02 appear to be similar to those of the ASME Standard. As stated, this is an open-ended requirement of questionable value and should either be deleted or its intended application clarified.

p. 48, sentence immediately preceding Table B-2:
The meanings of "specific aspects of this process" and "categories" are not clear. "Section B.2 of this regulatory guide" as cited in this sentence is incorrect?

p. 49, Table B-2, Self-Assessment Process, Section 2.C, Clarification:
The NRC requirement ("Clarification") that the ASME Standard requirements be used directly for Category III Supporting Requirements (in lieu of the NEI-00-02 guidance) is appropriate since Category III PRA elements have the potential of supporting relatively large risk increases and possibly with a minimum of deterministic support. However, to require that the same be done for Category I (approximately equivalent to NEI-00-02 Grade 2) appears unnecessary for the following reasons:

- There is general acceptance that ASME Standard Category I equates with NEI-00-02 Grade 2. (See Table B-1, 3.3 Grading, Clarification)
- In general, the comparisons at the Grade 3 level with Category II are fairly good. It is reasonable to expect that direct comparisons at the Grade 2 level would be comparable.
- Category I Supporting Requirements per Section 3 of the Standard would only be utilized to support very small changes in risk or for those portions of the PRA that play a minimal role in the application.
- A PRA with a significant number of Category I Supporting Requirements in any application would be supplemented by a number of deterministic arguments.
- Significant shortcomings at the Grade 2 level at the time of the industry peer review (NEI-00-02 guidance) would be reflected as "Facts and Observations" and appropriately addressed prior to an application (see p. 47, Table B-1, Section 1.4, second Clarification)

Thus, requiring a self-assessment of all Capability Category I elements against ASME Supporting Requirements in lieu of accepting a Grade 2 for corresponding NEI-00-02 subelements appears to be an unnecessary burden with limited benefit in assessing risk.

Therefore, replace the phrase "a grade other than a grade 3" with the words "Grade 4" and delete the parenthetical phrase "(i.e., a grade 1, 2, or 4)".

p. 50, Table B-3, "YES and clarifications included in action column", Clarification:
Clarification text under "COMMENT/RESOLUTION column, first sentence, needs a comma after the word "taken" in the first sentence to clarify the meaning.

p. 58, Table B-4, SY-B11:
The clarification cites the Appendix A clarification to SY-B11, but that clarification applies only to Capability Category I and is thus not relevant to Table B-4. (See SY-B11 in Table 4.4-4b of the ASME Standard.)

p. 63, Table B-4, DA-C14:
The text under "REGULATORY POSITION" appears to be in error. The phrase "clarification of DA-C14" should read "qualification of DA-C14".

p. 67, Table B-4, QU-D3:
The regulatory position should read "No objection; consistency with other PRA results is addressed in QU-11 and QU-31."

DG-1122 OUTLINE

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APPENDIX A
NRC REGULATORY POSITION ON ASME PRA STANDARD

INTRODUCTION
Table A-1 Staff Position on ASME RA-S-2002

APPENDIX B
NRC POSITION ON THE NEI PEER REVIEW PROCESS (NEI 00-02)

INTRODUCTION
NRC POSITION ON NEI-00-02 (Table B-1)
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