

NRC Comments on Parts 1 – 4 of the Combined Standard

The staff’s detailed comments on the combined standard are provided below. A discussion of the staff’s comments and the staff’s proposed resolution is provided. In the proposed staff resolution, the staff’s clarification or qualification to the requirement is indicated in either bolded text (i.e., **bold**) or strikeout text (i.e., ~~strikeout~~); that is, the necessary additions or deletions to the requirement (as written in the ASME standard) to resolve the staff’s concern are provided.

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PART 1			
1-1.3, 4 th paragraph	Clarify that “treatment of spurious operations” applies only to internal fire PRA	Clarification	“...associated with the treatment of spurious operations in a fire PRA. ”
1-1.3, Table 1-1.3.1	The identifying phrase “for internal fire” needs to be included in all three CCs for Attribute 1, as in CC II for clarification.	Clarification	Include the qualifier “for internal fire” in each parenthetical reference to the specifics of Attribute 1 for fire PRA across all CCs (as per CC II), as follows: CC-I - “... (and, for internal fire , at a fire area level) ...” CC-III - “... (and, for internal fire , for specific locations ...”
1-2.2	References in definitions intended to apply solely to fire PRA need to be added to the Reference list.	Clarification	Add fire PRA references to the Reference list. As an example (under <i>Fire Area</i>) - “ Regulatory Guide (RG) 1.189 [4] ” needs to be added to references in Part 1.
1-2.1	Incorrect definition for IPEEE.	Clarification	“ <i>IPEEE</i> : individual plant examination of for external events”
1-2.1	Incorrect definition for LCO.	Clarification	“ <i>LCO</i> – Limiting Condition of for Operation”
1-2.1	Incorrect definition for P&IDs.	Clarification	“ <i>P&IDs</i> : Piping and Instrumentation Drawings (or Process and Instrumentation Diagrams)”
Key assumption	Whether an assumption is considered “key” or not is dependent upon the decision under consideration.	Qualification	The change to the definition is being balloted.

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Key source of uncertainty	Whether a source of uncertainty is considered “key” or not is dependent upon the decision under consideration.	Qualification	The change to the definition is being balloted.
Section 1-3.3	Language can be confusing. In this section, the word “part” is used to mean a particular portion or piece of the PRA, and not meant to refer to a “part” of the standard. This distinction needs to be clarified.	Clarification	Use different wording for “part of the PRA” versus “part of the standard.” We understand that this is being addressed by the Cross-Cutting Team.
Figure 1-3.1-1	There are no links from Box 3 to the different parts of the standard; see above comment on Section 1.3.	Clarification	Modify the figure to show a loop that identifies which scope items are included and which parts of the combined standard need to be addressed. We understand that this is being addressed by the Cross-Cutting Team.
1-5.8, 5 th bullet	It is unclear what is to be documented from the peer review.	Clarification	“• record of the performance and results of the appropriated PRA reviews (consistent with the requirements of Section 1-6.6)”
1-6.1	<p>The purpose, as written, implies that it is solely an audit against the technical requirements. A major objective of the peer review is to ensure the “quality” (i.e., strengths and weaknesses) of the PRA; this goal is to be clearly understood by the peer review team.</p> <p>Another major objective is for the peer review to assess the appropriateness of the assumptions. This assessment need only focus on the assumptions that have the potential to affect the risk profile as discussed in Sections C.1.2.6 and C.3.3.2.</p>	Clarification	<p>“...The peer review shall assess the PRA to the extent necessary to determine if the methodology and its implementation meet the requirements of this Standard to determine the strengths and weaknesses in the PRA.</p> <p>Therefore, the peer review shall also assess the appropriateness of the assumptions by reviewing the screening criteria to determine that assumptions were not inappropriately screened out. The peer review need not assess....”</p>

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1-6.3	As written, there does not appear to be a minimum set. The requirement as written provides "suggestions." A minimal set of items needs to be provided; the peer reviewers have flexibility in deciding on the scope and level of detail for each of the minimal items.	Clarification	"The peer review team shall use the requirements... of this Standard. For each PRA element, a set of review topics required for the peer review team are provided. Additional material for those Elements may be reviewed depending on the results obtained. These suggestions are not intended to be a minimum or comprehensive list of requirements. The judgment of the reviewer shall be used to determine the specific scope and depth of the review in each of each review topic for each PRA element. "
1-6.6.1	The specific SRs addressed in the peer review need to be documented. As written, it is not clear whether certain essential items are included in the documentation requirements that are necessary to accomplish the goal of the peer review.	Clarification	"(e) a discussion of the extent to which each PRA Element was reviewed, including a list of SRs that were reviewed "

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Appendix 1-A			
Global			
---	The word “significant” is used in many places throughout the Appendix. For example, the term “significant changes in scope or capability” is used to classify a change as a PRA upgrade, rather than a PRA maintenance. The term “significant change in risk insights” is used to indicate when a focused peer review is suggested even for what is nominally classified as a PRA maintenance. While what is meant by the former is clarified in the examples, what constitutes a “significant change in risk insights” needs to be defined and added to the defined terms in Section 1-2.	Clarification	Add to list of definitions -- “Significant change in risk insights: Whether a change is considered significant is dependent on the context in which the insights are used. A change in the risk insights is considered significant when it has the potential to change a decision being made using the PRA.”
---	An “internal review” is recommended in several places. This recommendation is made instead of an “outside” peer review. It needs to be made clear that this internal review is a type of “peer review” and should follow the process and requirements for the peer review requirements.	Clarification	“E. When performing an internal review, the objective is to assess that the change to the PRA was correctly performed. In performing this assessment, the reviewer should use as guidance those applicable requirements in the standard.”
1-A.1.1	As written, it could be inferred that a newly developed method would not be considered an upgrade.	Clarification	“. . . “new” should be interpreted as new to the subject PRA even though the methodology in question has been applied in other PRAs and includes newly developed methods that have been used in the base PRA by the analyst. It is not intended to imply a newly developed method. This interpretation . . . “
Table 1-A.1.1	This table is confusing and does not appear to add any value. How this table is to be used is not clear.	Clarification	Delete table

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1-A.1.3, Examples 8, 10, 17	It is assumed that a change to the base PRA that involves a calculation using the same computer code is a PRA maintenance type change rather than a PRA upgrade type change. This assumption would only be valid if the calculation does not involve any new assumptions and the same analyst is performing the calculation.	Clarification	“. . . . using the same computer code, given the calculation does not involve any new assumptions and the calculation is performed by the same analyst. ”
1-A.1.3, Example 18	Changing the definition of core damage without changing the thermal-hydraulic methodology may result in changed success criteria which could change the accident progression delineated by the accident sequences. It is not a foregone conclusion that this is a simple change to the PRA model. It needs to be reviewed to ensure that the resulting changes are appropriate.	Clarification	“Discussion and/or Alternative Recommendation: While this change may not be a “new methodology,” it could result in changing the success criteria with implications for the development of accident sequences, and potentially on the HRA (through timing), data, and quantification. If such changes have occurred, a focused peer review should be performed.”
1-A.1.3, Example 21	This assumes that the “important” human actions are of the same nature as the new ones being added and utilize the ASEP method in the exact same manner. This can not be assumed.	Clarification	“Rationale: If it can be shown that the previous “important” human actions fully utilized the ASEP method, and that any deficiencies by the analyst were corrected, then, if there is no significant impact on risk insights, this change falls into

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1-A.1.3, Example 23	This assumes that the development of the new human error probabilities invokes the HRA method used previously in the same manner. This can not be assumed.	Clarification	“Discussion and/or Alternative Recommendation: . . . impact on human error probabilities. A focused peer review is advisable to ensure that the development of the new probabilities did not invoke a different application of the HRA method than previously used, and if so, it was appropriately performed and meets the applicable HRA requirements. ”
PART 2			
Clarifications provided on ASME Section 4 are not repeated. It is the staff’s understanding that the majority of the clarifications have been accepted by ASME and will be reflected in next revision of the combined standard, or are currently being balloted.			
SY-A22	There are no commonly used analysis methods for recovery in the sense of repair of equipment, other than use of actuarial data.	Qualification	“...is justified through an adequate analysis or examination of data collected in accordance with DA-C14 and estimated in accordance with DA-D8. (See DA-C14.)”
DA-C14	This SR provides a justification for crediting equipment repair (SY-A22). As written, it could be interpreted as allowing plant-specific data to be discounted in favor of industry data. In reality, for such components as pumps, plant-specific data is likely to be insufficient and a broader base is necessary.	Qualification	“...IDENTIFY instances of plant-specific experience and, when that is insufficient to estimate failure to repair consistent with DA-D8, applicable industry experience and for each repair, COLLECT....”
DA-D8	New requirement needed, DA-C14 was incomplete, only provided for data collection, not quantification of repair. (See SY-A22.)	Qualification	“ <u>Cat I, II, and III:</u> For each SSC for which repair is to be modeled, ESTIMATE, based on the data collected in DA-C14, the probability of failure to repair the SSC in time to prevent core damage as a function of the accident sequence in which the SSC failure appears. ”

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PART 3			
GLOBAL	In several places in the notes, the subsequent paragraph headings have the words "Discussion x" which need to be removed.	Editorial	Remove heading for consistency, e.g., 3-1.7.6-2(c), NOTE FSS-C1, "Discussion 2- To simplify ..."
3-1.2, last paragraph:	Notwithstanding subsequent clarification, the statement that "Accident sequences that are not associated with fires within the plant ..." can be misinterpreted to mean internal accidents other than fires.	Clarification	"Accident sequences that are not associated with fires external to (or not within) the plant ..."
3-1.7, last paragraph	Two examples (supposedly "below") are cited here for differentiation between CCs; there are no examples.	Clarification	Remove citation of two examples or else provide, whichever is the actual intent, i.e., "When necessary, the differentiation between Capability Categories is made in other associated SRs; two examples are stated below. " (Or else provide the examples)
Section 3-1.7.1	2 nd paragraph mistakenly references Table 1-1, which doesn't exist	Editorial	Replace "Table 1-1" with "Table 1-1.3-1"
Section 3-1.7.2 to 3-1.7.13			
ES-A4	The paranthetical "associated with the affected equipment" does not appear to add anything since the scope of the fire damaged equipment which could cause an initiator is specified.	Clarification	" INCLUDE additional equipment based on the consideration with other fire-induced loss of function failures could cause an initiating event associated with the affected equipment considering:"
PRM-C1	3 rd paragraph in the discussion: New basic events don't comprise new sequences, however contribute to CDF or LERF.	Clarification	"If a combination of three spurious operations could lead to the same sequence, and if this could result in new contributing sequences contributions to CDF or LERF, it may be appropriate to include the new basic events in the model."

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FSS-C4	CCI has no requirement that the severity factor reflect the conditions and assumptions of the specific fire scenarios, as in CCII and CCIII. Is the intent that CCI provide bounding estimates for the severity factor?	Qualification	Provide clarification regarding the severity factor in CCI, or change CCI to match CCII.
FSS-C4	The distinction between CCII and CCIII is not clear since both reflect the conditions and assumptions of the specific fire scenarios, and consequently, it is not clear how to implement CCII requirements differently than CCIII.	Clarification	Provide a discussion which distinguishes between CCII or CCIII, and, if necessary, adjust the SR in the two capability categories.
FSS-G6	In discussion note, editorial mistake made in specifying Capability Category II/II.	Editorial	Change to Capability Category II/III.
HRA-B2	Section 4.6 mistakenly is referenced.	Editorial	Replace "Section 4.6" with "Section 3-1.7.2."
3-1.7.7-2(a), NOTE IGN-A1	The wording in item (5) states "that the fire frequencies calculated are equivalent to those derived from the nuclear experience." This Note could be misinterpreted as implying that, rather than supplementing existing nuclear data, non-nuclear data may be used in lieu of nuclear data, which is in contradiction to the first sentence in the note.	Clarification	"... (5) if being used as a supplement to, rather than in lieu of, nuclear data, that the fire frequencies calculated are consistent with those derived from the nuclear experience ..."
UNC-A2	IGN-A8 is erroneously referenced for the treatment of uncertainty.	Clarification	Replace "IGN-A8" with "IGN-A10"

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3-1.7.13	The objective of the uncertainty analysis is to identify and characterize the sources of uncertainty, so that when the PRA is used in an application, their impact on the results can be assessed.	Qualification	<p>“The objectives of the Uncertainty and Sensitivity Analysis (UNC) element are:</p> <ul style="list-style-type: none"> (a) to identify key sources of analysis uncertainty (b) to characterize these uncertainties, and (c) to assess their potential impact of these uncertainties on the CDF and LERF estimates. <p>This section provides the requirements aimed at ensuring that key uncertainties, i.e., those uncertainties that can affect the use of a FPRA’s results in a risk-informed decision-making process, are appropriately identified and characterized with their potential impacts on the results understood. “</p>
HLR-UNC-A	The definitions of key sources of uncertainty and key assumptions are more appropriate in the context of an application and not for the base PRA.	Qualification	<p>“The FPRA shall identify key sources of CDF and LERF uncertainties and; including key related assumptions and modeling approximations. These uncertainties shall be characterized such that their potential impacts on the results are understood.“</p>
UNC-A3	An evaluation of the sensitivity of the results to sources of uncertainty is not needed for the base case. This should be performed on an as needed basis for an application.	Qualification	Delete this requirement.
3 References	The references here do not contain the “3-“ prefix.	Editorial	Ensure consistency throughout Part 3 of the standard and the whole standard as well when numbering (or not numbering) references.

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PART 4			
General Comment	This Part is written differently from Parts 2 and 3. There is no identification of technical elements for each external event type. They can be inferred from the high level requirements. There is no statement of objectives for each of the HLRs.	Clarification	This should be considered in a future revision of the Standard.
General comment	This part uses the term XXXX-PRA systems model to represent the XXXX-PRA model. The internal events PRA model is generally used to assess the conditional CDF/LERF based on the damage caused by the hazard XXXX. In Part 3 the adaption of the internal events model is referred to as the plant response model and is developed for each fire scenario. The same could be done for the external events so that there is uniformity in terminology.	Clarification	This should be considered in a future revision of the standard.
4-1.6	2 nd paragraph, it is not clear how Section 1-3 would apply to an application using an SMA, except in Box 7.	Clarification	“ Although this Part. That is, these other types of analyses can also support a risk-informed application where appropriate (Box E, step 7). ”
4-1.8	The term Technical Elements is used differently from the way it's used in the other Parts. These “elements” are in fact a mixture of analysis types and hazard groups.	Clarification	“The requirements of this Part are organized by six “technical elements” (the term technical element is used here for ease while recognizing that the elements are actually a mixture of analysis types and hazard groups), that comprise. . . .”
Table 4-1.8.1.3-2(c) EXT-C4	The requirement is not written as a minimum in that either a realistic or demonstrably conservative analysis is acceptable. The Note explains what this means.	Clarification	“BASE the ... that are either realistic or demonstrably conservative as appropriate. This ...”

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Table 4-1.8.4.1.2-2(a) HA-A4	The criterion that the delineation and ranking of seismic-initiated sequences are not affected could be open-ended	Clarification	"... the delineation and ranking of significant accident sequences, that are seismic-initiated sequences, are not affected .. ."
Table 4-1.8.4.1.2-1 HLR-HA-G	The second two sentences in the statement of the requirement are examples of what is acceptable, and should be included in the SRs or in the Note. These thoughts appear to have been included in the Note.	Clarification	"For further use in seismic hazard analysis. Broad-band spectral challenge these uniform hazard spectral shapes. "
Table 4-1.8.4.1.2-2(g) HLR-HA-G	The second two sentences in the statement of the requirement are examples of what is acceptable, and should be included in the SRs or in the Note. These thoughts appear to have been included in the Note.	Clarification	"For further use in seismic hazard analysis. Broad-band spectral challenge these uniform hazard spectral shapes. "

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Table 4-1.8.4.1.2-2(g) Note HA-G1	<p>Spectral shapes used to evaluate in-structure SSC's must include the effects of amplification from both local site conditions and SSI.</p> <p>Based on IPEEE reviews, certain UHS shapes used for CEUS were not appropriate for the screening purpose.</p>	Clarification	<p>“NOTE HA-G1: The issue of which spectral shape should be used in the screening of structures, systems, and components (SSCs) and in quantification of SPRA results requires careful consideration. For screening purposes, the spectral shape used should have amplification factors, including effects from both local site conditions as well as soil-structure interaction, such that the demand resulting from the use of this shape is higher than that based on the design spectra. This will preclude premature screening of components and will avoid anomalies such as the screened components (e.g., surrogate elements) being the dominant risk contributing components. Additional discussion on this issue can be found in Ref. 22. In the quantification of fragilities and of final risk results, it is important to use as realistic a shape as possible. Semi-site specific shapes, such as those given in NUREG-0098, have been used in the past and are considered may be adequate for this purpose, provided that they are shown to be reasonably appropriate for the site [42]. The UHS is acceptable for this purpose if it can be shown that the UHS shape is appropriate for the site. unless evidence comes to light (e.g., within the technical literature) that these UHS do not reflect the spectral shape of the site-specific events.”</p>
Table 4-1.8.4.2.2-2(b) NOTE SA-B2	The discussion states “But, errors of commission must still be accounted for.” Errors of commission are not explicitly required in Part 2.	Clarification	... But, errors of commission must still be accounted for. ...

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Table 4-1.8.4.2.2-2(b) SA-B2a	This requirement does not specify what is being screened. It seems that this may be related to SA-B4 which specifically addresses screening of human failure events and non-seismic-failure basic events.	Clarification	"If any screening is performed (see SA-B4), PERFORM it ..."
Table 4-1.8.4.2.2-2(b) SA-B3	The distinction between categories is incorrectly formatted.	Clarification	Distinction should be between Cat II and Cat III
Table 4-1.8.4.2.2-2(b) SA-B5	The requirement is to EXAMINE, which will in itself have no effect on the model. If the intent is that the effects of relay chatter is to be included, the requirement should state so.	Clarification	<u>Cat I:</u> "EXAMINE . . . low-ruggedness relays. INCLUDE in the seismic PRA model, basic events representing the effects of chatter of relays when necessary. " <u>Cat II & III:</u> "EXAMINE . . . similar devices. INCLUDE in the seismic PRA model, basic events representing the effects of chatter of relays when necessary. "
Table 4-1.8.4.2.2-2(b) SA-B9	The requirement is to EXAMINE, which will in itself have no effect on the model. The discussion implies that a small-small-LOCA should be included in the PRA model unless a justification for its exclusion is provided.	Clarification	"EXAMINE ... the seismic-PRA model. INCLUDE the small-small-LOCA event in the model, unless its exclusion can be justified. "
Table 4-1.8.4.2.2-2(e) SA-E6	While it is good practice to use sensitivity studies to understand the importance of the assumptions, this may be deferred to when the seismic PRA is used to support an application.	Clarification	Consider deleting this requirement for the base PRA.
Appendix 4-D	The staff has no comment/position on Appendix 4-D. The staff neither agrees or disagrees with Appendix 4-D.	-----	-----