Summary of ASME/ANS JCNRM Sub-committee on Standards Maintenance WG5 Part 5 PT Responses to Staff Comments on the American Society of Mechanical Engineers (ASME)/American Nuclear Society (ANS) Seismic Probabilistic Risk Assessment (PRA) Code Case[1]

The Table below provides the U.S. Nuclear Regulatory Commission (NRC) staff's comments on requirements in the Code Case and the response from the JCNRM WG responsible for Part 5 of the standard.

Only those requirements where the staff has an objection is provided. A discussion of the staff's concern (issue) and the staff proposed resolution is provided. The staff clarification or qualification to the requirement is indicated in the proposed staff resolution where new text is represented in bold typeface (i.e., **bold**) and deleted text is represented with a strikeout (i.e., ~~strikeout~~). The proposed staff resolutions represent the changes that would need to be made to the requirement (as written in the ASME/ANS standard) for the staff to have no objection are provided.

A fifth column has been added to the original NRC comment table. This column contains the Part 5 PT response to the NRC comments. Detailed responses from the JCNRM WG are only provided in those cases where the WG requests that NRC revise or withdraw the comment for the reasons stated.

NRC staff understand that the ASME/ANS Seismic PRA Code Case will not be revised or updated. However, the NRC expects the issues described in the Table to be:

- addressed in the next edition of the ASME/ANS Level1/Large Early Release Frequency (LERF) PRA standard,
- considered by a peer review team when a peer review of a licensee's seismic PRA is performed using the Code Case prior to the issuance of the next edition of the ASME/ANS Level1/LERF PRA standard,
- considered in a seismic PRA developed using the Code Case prior to the issuance of the next edition of the ASME/ANS Level1/LERF PRA standard

As a result, the WG focus is primarily related to the treatment of these comments in the next edition. Note that since the NRC comments are not final, and due to a lack of time, these resolutions may not be observed in the version of the new edition that goes out for review and comment ballot. They will, however, be addressed along with other comments received during the review and comment response period.

A general comment on the issue of ESTIMATE vs CALCULATE. We do not agree with the apparent mutually exclusive nature of the NRC position on this. NRC comments imply that to ESTIMATE means solely the use of "judgement or qualitative measures" and CALCULATE "involves a mathematical process." The latter is acceptable, but the former can be accomplished by either (that is, to ESTIMATE could involve a mathematical process). The use of ESTIMATE is appropriate when it may be acceptable to use either approach, and the analyst needs to decide which is appropriate to the specific situation, justify the decision, and be judged by the peer review. Our responses reflect this distinction. (Example: It is acceptable to ESTIMATE the fragility of offsite power, even if it is a significant contributor, since nothing will be gained by a CALCULATION.)

[1] The original NRC text on this page is in normal font. ASME/ANS Part 5 PT text addition is in italic.

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1	Section 5-1.3	The last paragraph of the section states that the internal events PRA model is the starting point "…to which must be added a number of structures, systems, and components (SSCs) not included in the model but that could fail due to the external hazard." Failure modes caused by the external hazard for SSCs existing in the internal events PRA should also be included.	The approach to any external hazard PRA typically uses as its starting point the internal-events PRA model to which must be added a number of structures, systems, and components (SSCs) not included in the model but that could fail due to the external hazard **and new failure modes caused by the external hazard for SSCs already present in the model**. Both the part of the internal-events model dealing with CDF and the part dealing with LERF are used as starting points.	OK
2	Section 5-1.6	The Part 5 Code Case does not include the language from Section 5-1.6 in ASME/ANS RA-Sb-2013, which discussed the usage of generic fragility information. Section 5-1.6 in ASME/ANS RA-Sb-2013 indicates that "(a) Analysts should apply caution in the use of generic fragilities and provide justification that the generic fragilities are applicable, and (b) Peer reviews should focus on the use of generic fragilities to ensure that their use is appropriate and justified. " These statements are important because they appropriately identify the scope of interest with respect to generic fragility for both the analysts and the peer-reviewers.	Include the language from Section 5-1.6 in ASME/ANS RA-Sb-2013.	As part of the implementation of the consistency issue on the introductory section of each Part (i.e., X-1), section 5-1.6 no longer exists. The long narratives, which did not constitute requirements, are being moved to non-mandatory appendices (NMA). If a comment is to be made, it should be to include these words in the NMA. **We request that NRC withdraw or revise this comment.**
3	Section 5-2, first sentence	The first sentence of the first paragraph in Section 5-2 states, "The technical requirements for seismic PRA … based on a wealth of experience of more than 30 years," while the same sentence in ASME/ANS RA-Sb-2013 states "…over the past 20 years." Given that the Nonmandatory Appendix 5-A is the basis for both statements, a there needs to be consistency regarding this chronology statement.	Make the code case chronically consistent with ASME/ANS RA-Sb-2013.	OK

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4	Section 5-2, third paragraph	Text was removed from Section 5-2 that helps set the context for the standard requirements.	Seismic PRA is an integrated activity requiring close interactions among specialists from different fields (e.g., seismic hazard analysis, systems analysis, and fragility evaluation). For this reason, it is important that all members of the seismic PRA team be cognizant of all of the SRs in this Part, not just those in their area of expertise, and understand the interactions required between the elements. **Although the methodology for seismic PRA and the supporting data have evolved and advanced over the past 30 years, the analysis still requires judgment and extrapolation beyond observed data. Therefore, the analyst is strongly urged to review published seismic PRA reports and to compare hislher plant-specific seismic PRA to the published studies of similar reactor types and system designs.** This understanding of the Standard **and other seismic PRAs** will promote consistency among similar PRAs and risk-informed applications and will also promote reasonableness in the numerical results and risk insights. The peer review is also directed in part toward this same objective.reasonableness in the numerical results and risk insights. The peer review is also directed in part toward this same objective.	Suggest removing the reference to a specific number of years... Suggest starting with "The analysis requires..." **We request that NRC revise this comment.**
5	Section 5-2.1, Bullet 1	The action verb "estimate" implies using judgement or qualitative measures which is inconsistent with the intent of the statement. The action verb "calculate" involves a mathematical process whereas the action verb "estimate" does not necessarily involve a calculation (e.g., quantification of a probability or frequency) and can be derived qualitatively.	1. ~~estimate~~ **calculate** the frequency of exceeding different levels of vibratory ground motion and	As this is a non-mandatory discussion, the verb is not being used as an action verb, does not have a CC-I or CC-II connotation, and so does not have to adhere to action verb rules. **We request that NRC withdraw this comment.** Note that this section has changed in the next edition to adhere to the objectives consistency issue.
6	Section 5-2.1	The first full paragraph of Section 5-2.1 states in part, "The requirements described in Part 5-2.1 address these objectives in detail. A probabilistic seismic hazard analysis (PSHA), which may directly incorporate site response analyses, is used to assess horizontal ground motions at the site." It does not seem appropriate to highlight a specific aspect of the PSHA, particularly in such an ambiguous manner.	The requirements described in Part 5-2.1 address these objectives in detail. A probabilistic seismic hazard analysis (PSHA)~~, which may directly incorporate site response analyses,~~ is used to assess horizontal ground motions at the site.	OK

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7	General Comments on the SHA Technical Element	The Code Case proposes definitions for the terms primary hazard and Secondary hazard. However, the Code Case only uses the term primary hazard in the definition of the term secondary hazard, which may not prompt a need to define the term primary hazard. The primary hazard described by the objectives in Section 5-2.1 seems to be the vibratory ground motion. However, in many instances, but not all, the text refers to secondary hazards from vibratory ground motions but not always. It is unclear whether there is a difference between the way vibratory ground motion is referred to or if these are intended to be synonymous. Consideration should be given to whether the definition be made more precise to the hazards, primary or secondary, that the Code Case intends to address. For example, does it intend to address tsunamis and seiches? If not, it should not be mentioned.	¢ Update the Definitions section for new terms that reflect current terminology (meaning may be somewhat different) ¢ Ensure consistent use of the term secondary hazards with the definition. ¢ To the extent possible express, which secondary seismic hazards are included or, alternatively, which are not. ¢ Define terms such as Ground Motion Prediction Equations.	OK
8	Table 5-2.1-1, HLR-SHA-A	The language of the high level requirement (HLR) HLR-SHA-A states, “The frequency of seismic ground motion at the site shall be based on a site-specific PSHA that represents the center, body, and range of the technically defensible interpretations. The level of analysis, as well as the level of updates when an existing study is the initial basis for the site-specific PSHA, shall be determined based on the intended application and on the technical viability of existing PSHA models.” This language is too vague. In particular, the frequency of the ground motion is a natural process. It is their calculation that is based on a PSHA.	**The basis for the calculation of** ~~T~~**t**he frequencies of **exceeding different levels of vibratory** seismic ground motion at the site shall be ~~based on a~~ site-specific PSHA that represents the center, body, and range of the technically defensible interpretations. The level of analysis, as well as the level of updates when an existing study is the initial basis for the site-specific PSHA, shall be determined based on the intended application and on the technical viability of existing PSHA models.	OK
9	Table 5-2.1-2, Note (1)	Note (1) of Table 5-2.1-2 provides references to NUREG/CR-6372 and NUREG-2117; however, the NRC has recently completed NUREG-2213, which supersedes both NUREG/CR-6372 and NUREG--2117. Publication of NUREG-2213 will occur prior to the publication of the next edition of the ASME/ANS PRA standard.	Revise the following language in Note (1) of Table 5-2.1-2: **NUREG-2213 [5-?]** ~~NUREG/CR=6372 [5-1] and NUREG-2117 [5-2]~~ **provides** ~~provide~~ the defined process for conducting a PSHA that produces a model that represents the center, body, and range of the technically defensible interpretations, as defined in **the** ~~those~~ **reference** ~~references~~. **NUREG-2213 [5-?]** ~~These references~~ **has** ~~have~~ identified and provided guidance for four levels of hazard analysis.	OK, if this NUREG is published at the time the Standard is balloted. **We request that NRC revise this comment to state the reference should be used if it is published before the ballot.**
10	Table 5-2.1-2, Note (1)	Note (1) of Table 5-2.1-2 states in part, “The appropriate level of the hazard analysis will depend on project-specific factors and should include considerations such as the safety significance of the nuclear power plant, the technical complexity and uncertainties in hazard inputs, regulatory oversight and requirements, and the availability of resources.” Although it is a note and not a requirement, citing the availability of resources as a means of determining the appropriate level of hazard analysis may be construed as a justification exclude consideration of a safety issue.	The appropriate level of the hazard analysis will depend on project-specific factors and should include considerations such as the safety significance of the nuclear power plant, the technical complexity and uncertainties in hazard inputs~~., regulatory oversight and requirements, and the availability of resources~~.	OK

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11	Table 5-2.1-2, Note (1)	Note (1) of Table 5-2.1-2 refers to Regulatory Guide (RG) 1.208 as providing an acceptable approach to establishing a lower-bound magnitude for use in the hazard analysis. However, the NRC staff has discouraged use of the damage parameter cumulative absolute velocity (CAV) filter in place of a lower-bound magnitude for the PSHA. Use of CAV has often been misapplied in PSHAs to improperly filter out larger magnitude events at larger source-to-site distances. Recently completed PSHAs for Near Term Task Force (NTTF) Recommendation 2.1 and combined operating license (COL) and early site permit (ESP) applications no longer use the CAV damage parameter in place of a lower-bound magnitude. NRC staff's related letter pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.54(f) specified use of *M*5 (moment magnitude 5) as an appropriate lower-bound magnitude.	Remove the following language in Note (1) of Table 5-2.1-2: ~~RG 1.208 [5-3] provides one acceptable approach to establishing a lower-bound magnitude for use in the hazard analysis.~~	OK
12	Table 5-2.1-2, SHA-A5	Regarding supporting requirement SHA-A5 in Table 5-2.1-2, the NRC staff has discouraged use of the damage parameter cumulative absolute velocity (CAV) filter in place of a lower-bound magnitude for the PSHA. Use of CAV has often been misapplied in PSHAs to improperly filter out larger magnitude events at larger source-to-site distances. Recently completed PSHAs for Near Term Task Force (NTTF) Recommendation 2.1 and combined operating license (COL) and early site permit (ESP) applications no longer use the CAV damage parameter in place of a lower-bound magnitude. NRC staff's related letter pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.54(f) specified use of *M*5 (moment magnitude 5) as an appropriate lower-bound magnitude.	JUSTIFY the specified lower-bound magnitude ~~(or probabilistically defined characterization of magnitudes based on a damage parameter)~~ for use in the hazard analysis, such that earthquakes of magnitudes less than this value are not expected to cause significant damage to the engineered structures or equipment.	OK
13	Table 5-2.1-3, SHA-B1	The term "subject matter experts/analysts" should be qualified (e.g., required trainings, certifications, etc.)	Add a note to Table 5-2.1-3 that references NUREG–2213 for the qualified meaning of this term.	OK
14	Table 5-2.1-3, SHA-B3	Sole use of term "attenuation" in conjunction with modeling ground motions is unnecessarily limiting.	ENSURE that the data and information are sufficient to characterize attributes important for modeling both regional **propagation** ~~attenuation~~ of ground motions and local site effects including their associated uncertainties.	OK
15	Table 5-2.1-3, SHA-B5	The current language requires a demonstration that the updated earthquake catalog has been reviewed if an existing PSHA is used. However, this does not include accounting for the impact of the updated earthquake catalog on the existing PSHA.	If an existing PSHA is used, DEMONSTRATE that an updated catalog of earthquakes ~~was reviewed in the evaluation to determine if~~ does not make the existing PSHA ~~remains~~ **un**viable.	OK

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16	Table 5-2.1-3, Note (1)	Note (1) of Table 5-2.1-3 references NUREG-2117; however, the NRC has recently completed NUREG-2213, which supersedes NUREG-2117. Publication of NUREG-2213 will occur prior to the publication of the next edition of the ASME/ANS PRA standard.	Revise the following language in Note (1) of Table 5-2.1-3: Guidelines as to when an existing study should be refined or replaced are provided in **NUREG-2213 [5-?]** ~~NUREG 2117 [5-2]~~.	OK, if this NUREG is published at the time the Standard is balloted. **We request that NRC revise this comment to state the reference should be used if it is published before the ballot.**
17	Table 5-2.1-4, Note (1)	Note (1) of Table 5-2.1-4 provides references to NUREG/CR-6372 and NUREG-2117; however, the NRC has recently completed NUREG-2213, which supersedes both NUREG/CR-6372 and NUREG-2117. Publication of NUREG-2213 will occur prior to the publication of the next edition of the ASME/ANS PRA standard.	Revise the following language in Note (1) of Table 5-2.1-4: **NUREG-2213 [5-?]** ~~NUREG/CR-6372 [5-1] and NUREG-2117 [5-2]~~ **provides** ~~provide~~ a structured approach for conducting the PSHA consistent with the level of analysis defined in HLR-SHA-A. **NUREG-2213 [5-?]** ~~These references~~ also provides provide a defined process for producing a seismic source model that represents the center, body, and range of the technically defensible interpretations.	OK, if this NUREG is published at the time the Standard is balloted. **We request that NRC revise this comment to state the reference should be used if it is published before the ballot.**
18	Table 5-2.1-5, SHA-D1	The ground motion characterization model needs to include the interface with site response analysis in terms of a reference soil or rock horizon, as defined by shear wave velocity, density, and damping values.	In the ground motion characterization model that determines the range of seismic vibratory ground motion that can occur at a site, INCLUDE *(a)* credible mechanisms governing estimates of vibratory ground motion that can occur at a site, *(b)* a review of available historical and instrumental seismicity data (including strong motion data) to assess and calibrate the model, and *(c)* applicable (existing and/or newly developed) ground motion prediction equations for the ground motion estimates**,**. ***(d)* reference soil or rock horizon (defined by shear wave velocity, density, and damping values).**	OK
19	Table 5-2.1-5, SHA-D3	The ground motion characterization model should include ground motion prediction equations (GMPEs) with alternative distance and magnitude scaling behaviors, not just a range of amplitudes.	ENSURE that uncertainties are included in the model that determine the range of seismic vibratory ground motion that can occur at a site **as well as alternative magnitude and distance scaling** ~~behaviors~~ in accordance with the level of analysis identified for HLR-SHA-A and the data and information in the update of the PSHA.	OK
20	Table 5-2.1-5, Note (1)	Note (1) of Table 5-2.1-5 provides references to NUREG/CR-6372 and NUREG-2117; however, the NRC has recently completed NUREG-2213, which supersedes both NUREG/CR-6372 and NUREG-2117. Publication of NUREG-2213 will occur prior to the publication of the next edition of the ASME/ANS PRA standard.	Revise the following language in Note (1) of Table 5-2.1-5: **NUREG-2213 [5-?]** ~~NUREG/CR-6372 [5-1] and NUREG-2117 [5-2]~~ **provides** ~~provide~~ a structured approach for conducting the PSHA consistent with the level of analysis defined in HLR-SHA-A. **NUREG-2213 [5-?]** ~~These references~~ also provides provide a defined process for producing a seismic source model that represents the center, body, and range of the technically defensible interpretations.	OK, if this NUREG is published at the time the Standard is balloted. **We request that NRC revise this comment to state the reference should be used if it is published before the ballot.**

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21	Table 5-2.1-6, SHA-E3	The term “ENSURE” is not the appropriate action verb.	**JUSTIFY** ~~ENSURE that~~ the approach used to incorporate the site response analysis into the hazard analysis ~~is justified~~**(e.g., sources of soils and rock material properties used in the analysis, uncertainties in site characterization and material properties, data to identify the depth to bedrock, appropriateness of one- two- or three-dimensional analysis in relation to the site stratigraphy)**.	OK
22	Table 5-2.1-7, Note (1)	The high level requirement talks about propagation of uncertainties, but the supporting requirements do not explicitly address attributes of the methods of uncertainty propagation. Additionally, the NRC has recently completed NUREG-2213, which supersedes both NUREG/CR-6372 and NUREG-2117. Publication of NUREG-2213 will occur prior to the publication of the next edition of the ASME/ANS PRA standard.	Revise the following language in Note (1) of Table 5-2.1-7: ~~NUREG/CR-6372 [5-1] and NUREG-2117 [5-2]~~ **NUREG-2213 [5-?]** ~~provide~~ **provides** a structured approach for conducting the PSHA consistent with the level of analysis defined in HLR-SHA-A**, including guidance on methods for propagation of uncertainties**.	OK, if this NUREG is published at the time the Standard is balloted. **We request that NRC revise this comment to state the reference should be used if it is published before the ballot.**
23	Table 5-2.1-9, Notes (1) and (2)	Notes (1) and (2) of Table 5-2.1-9 reference NUREG-2117; however, the NRC has recently completed NUREG-2213, which supersedes NUREG-2117. Publication of NUREG-2213 will occur prior to the publication of the next edition of the ASME/ANS PRA standard.	Revise the following language in Notes (1) and (2) of Table 5-2.1-9: (1) Guidelines as to when an existing study should be refined or replaced are provided in **NUREG-2213 [5-?]** ~~NUREG 2217 [5-2]~~, which also provides guidelines on the methodology that can be used to evaluate the model against available data, models, methods, and interpretations. (2) **NUREG-2213 [5-?]** ~~NUREG 2217 [5-2]~~ provides a structured approach for updating the PSHA consistent with the level of analysis defined in HLR-SHA-A.	OK, if this NUREG is published at the time the Standard is balloted. **We request that NRC revise this comment to state the reference should be used if it is published before the ballot.**
24	Table 5-2.1-10, SHA-I2	The supporting requirement uses the terms hazards and secondary hazard interchangeably, which is potentially confusing.	For those **secondary** hazards that are not screened out, INCLUDE their effect through assessment of the frequency of ~~hazard~~ occurrence and ~~the~~ magnitude**, when applicable,** of the secondary hazard.	OK
25	Table 5-2.1-10, Note (2)	The last sentence of Note (2) in Table 5-2.1-10 is vague and unnecessary.	The appropriate approach used to justify the basis and methodology used for screening out secondary hazards is hazard- and site-specific. ~~Justification may be based on available public literature and prior hazard studies.~~	OK
26	Table 5-2.1-11 Note (1)	Note (1) of Table 5-2.1-11 provides references to NUREG/CR-6372 and NUREG-2117; however, the NRC has recently completed NUREG-2213, which supersedes both NUREG/CR-6372 and NUREG-2117. Publication of NUREG-2213 will occur prior to the publication of the next edition of the ASME/ANS PRA standard.	Revise the following language in Note (1) of Table 5-2.1-11: **NUREG 2213 [5-?]** ~~NUREG/CR-6372 [5-1] and NUREG-2117 [5-2]~~ **provides** ~~provide~~ a structured approach for conducting the PSHA consistent with the level of analysis defined in HLR-SHA-A. **NUREG 2213 [5-?]** ~~These references~~ also provides provide a defined process for producing a seismic source model that represents the center, body, and range of the technically defensible interpretations.	OK, if this NUREG is published at the time the Standard is balloted. **We request that NRC revise this comment to state the reference should be used if it is published before the ballot.**

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27	Table 5-2.2-2, SFR-A1	The intent of supporting requirement SFR-A1 needs additional clarification.	Add a footnote to Table 5-2.2-2 that conveys the following: The fragility and the systems analysts should ensure consistency between the failure modes evaluated by each of them. The systems analyst defines the failure modes based on the PRA basic events. The seismic fragility analyst defines the failure mechanism induced by an earthquake to result in such a failure mode.	The intent of SFR-A1 is to ensure that a fragility assessment, whether by calculation or judgment, is provided for the SSCs defined by the systems analyst in the plants SEL and for the relevant failure modes associated to the basic events. It is understood that fragility curves relate to failure mechanisms which in turn lead to failure modes defined by the systems analyst. This distinction is discussed in the NMA. Further, the next revision of the standard revises the wording in SFR-E2 to be consistent with the term failure mechanism rather than failure mode. Another aspect of this SR is to ensure that a fragility is provided for the SSCs in the SEL as defined by the systems analyst. The NMA provides discussion on this interaction among fragility and PRA analysts as the project progresses. . Given that the NMA discusses the overall intent of this SR and distinguishes between failure mechanism and failure modes, **we request that NRC withdraw this comment.**
28	Table 5-2.2-2, SFR-A2	The information to be included should be such that it can justify the modeling of SSCs as correlated from a fragility perspective and not simply be relevant. Justification, more than the examples provided, will be necessary for any correlation other than 0 and 1. Additionally the phrase “fragility correlation” should be replaced with “fragility dependence”. Dependence between random variables characterize their interrelationship. Correlation (coefficient) is used to define the dependence structure between random variables. It is also lacking criteria for acceptability of a correlation model.	INCLUDE information ~~relevant to~~ **justifying the** modeling of fragility **dependency** ~~correlation~~ of SSCs (e.g., similarity of component construction and location, **and response spectra at the locations**) to support SPR-B4.	We disagree with the proposed staff resolution mainly because it doesn’t follow the definition of dependency provided in the Standard. Section 1-2.2 of the Standard defines dependency as a function being dependent or influenced by another event or occurrence. On the other hand, correlation relates to components sharing similar probability of failure given physical properties such as floor location, capacity among others. The intent of SFR-A2 aims to capture this correlation. On this basis, the term correlation suits the intent of this SR. The NMA discusses the difference between both terms correlation and dependency and how these are used in practice. We disagree with the use of “justifying” in lieu of “relevant”. The term relevant is more appropriate for this SR since this requirement focuses on the analyst providing the necessary data for the subsequent assessment of correlation. The examples proposed such as similarity in construction and response spectra are part of the discussion on the NMA regarding correlation. **We request that NRC withdraw this comment.**

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29	Table 5-2.2-3, SFR-B1, CC I	The action verb ESTIMATE implies using judgement or qualitative measures which are inconsistent with the intent of the SR. The action verb CALCULATE involves a mathematical process whereas the action verb ESTIMATE does not necessarily involve a calculation (e.g., quantification of a probability or frequency) and can be derived qualitatively.	~~ESTIMATE~~ **CALCULATE an** ~~the~~ approximate **but conservative** seismic response~~s~~ ~~that~~ the risk-significant SSCs experience at failure using the input earthquake response spectra (from HLR-SHA-G) in three orthogonal directions.	The next revision of the standard uses ESTIMATE for CCI and CALCULATE for CCII. The NMA provides examples of what constitutes an "estimation" of seismic response in contrast to a "calculation". The use of the term "conservative" does not follow the rationale provided in the standard for distinguishing between CCI and CCII. Section 1-1.3.3 of the standard in Part 1 states that: "The intent of the delineation of the Capability Categories within the SRs is generally that the degree of scope and level of detail, the degree of plant-specificity, and the degree of realism increases from Capability Category I to Capability Category III. However, the Capability Categories are not based on the level of conservatism (i.e., tendency to overestimate risk due to simplifications in the PRA) in a particular aspect of the analysis." On this basis, we should not require conservatism in CCI. **We request that NRC withdraw or revise this comment.**
30	Table 5-2.2-3, SFR-B1, CC II	The action verb ESTIMATE implies using judgement or qualitative measures which are inconsistent with the intent of the SR. The action verb CALCULATE involves a mathematical process whereas the action verb ESTIMATE does not necessarily involve a calculation (e.g., quantification of a probability or frequency) and can be derived qualitatively.	~~ESTIMATE~~ **CALCULATE** the realistic seismic response that the risk-significant SSCs experience at failure using the input earthquake response spectra (from HLR-SHA-G) in three orthogonal directions.	OK. The next revision of the standard uses CALCUALTE for CCII.
31	Table 5-2.2-3, SFR-B1	The response evaluations for CC I and II are distinguished by the adjective "approximate" and "realistic". However, to a fragility analyst, "realistic is just another level of approximation. As this would directly affect the cost and resources, clarifications with examples should be provided.	Add a note or examples in the non-mandatory appendix to provide clarification.	OK. Examples are provided in the NMA.
32	Table 5-2.2-3, SFR-B4	The action verb ESTIMATE implies using judgement or qualitative measures which are inconsistent with the intent of the SR. The action verb CALCULATE involves a mathematical process whereas the action verb ESTIMATE does not necessarily involve a calculation (e.g., quantification of a probability or frequency) and can be derived qualitatively.	If median-centered response analysis is performed, ~~ESTIMATE~~ **CALCULATE** the median response (i.e., structural loads and floor response spectra) and variability in the response.	The next version of the standard uses CALCULATE in reference to median response and uses ESTIMATE for variability: If median-centered response analysis is performed, **CALCULATE** the median response (i.e., structural loads and floor response spectra) and **ESTIMATE** variability in the response. **We request that NRC revise this comment.**

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33	Table 5-2.2-3, SFR-B4	Should explain whether “variability” means “composite” or “separate aleatory and epistemic”.	Add a note in the non-mandatory appendix to provide the clarification.	OK. This is clarified in the NMA.
34	Table 5-2.2-3, SFR-B5	Part of the SR asked one to QUANTIFY uncertainties in the SSI analysis. In the 2009 version, there was an extensive discussion on how to calculate the uncertainty. But the provisions are removed in 2013 and in the code case. It is understood that the emphasis of the Code is to identify the WHAT but not the HOW	To aid the user, add a description of the uncertainties that are to be quantified and their purpose.	The referenced note from 2009 in relation to calculation of uncertainty is removed from the Standard since it no longer reflects state of practice. **We request that NRC withdraw this comment.**
35	Table 5-2.2-3, SFR-B6	In the 2009 revision (SFR-C2), part of the SR asked one to ACCOUNT for the entire spectrum of input ground motion levels displayed in the seismic hazard curves. This sentence is removed in the code case. However, this sentence also ensures the quality of the results of the probabilities response analysis	If probabilistic response analysis is performed to calculate structural loads and floor response spectra, ENSURE that the number of simulations done (e.g., Monte Carlo simulation or Latin Hypercube Sampling) is large enough to calculate stable responses. **ACCOUNT for the entire spectrum of input ground motion levels displayed in the seismic hazard curves.**	The probabilistic seismic response analyses performed in the early days would require generation of 30 sets of time histories for the input ground motions which were defined by the median and 84th ground response spectra (GRS). The 84th percentile GRS was used to account for uncertainty in the spectral shape. The 30 sets of time histories were adjusted so that their median and 84th percentile ground response spectra would closely match the corresponding GRS. The other response variables explicitly considered in the probabilistic response analyses were structure stiffness and damping, and soil shear modulus and material damping. Thus, from the resulting statistically calculated median and 84th ISRS in-structure response spectra, one could obtain a composite variability for response due to variability associated with the input ground motion, the structure model, and soils. The PSHA performed in the IPEEE days accounted for the ground motion spectral shape uncertainty in the seismic hazard curves, but it did not account for the peak-to-valley randomness. Thus the 84th percentile UHRS used for the probabilistic response analysis was defined as median UHRS * exp (0.20). The current PSHA approach has the peak-to-valley variability also accounted for in the seismic hazard curves, as such only the mean UHRS is considered in the probabilistic response analysis. The above clarification will be included in the NMA. **We request that NRC withdraw this comment.**

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36	Table 5-2.2-3, SFR-B6	This should include quantifying what constitutes “stable” response as this could have a significant impact on cost for the fragility analysis.	Add a note in the non-mandatory appendix to provide the clarification.	OK The NMA will include description of what constitutes a stable response. However, no mention of cost implications should be made since the standard focuses on technical adequacy rather than cost incentives. Any mention of cost savings will be out of the scope of the standard. For clarification, this SR is revised in the next version of the standard as *“... to calculate statistical stable responses...”*
37	Table 5-2.2-4, SFR-C1	The intent is to provide the basis and methodology to justify that the capacity of the SSC exceeds the screening level.	SPECIFY the basis and methodologies established for the capacity-based screening for the level defined in SPR-B5 **(e.g., use of simplified fragility analysis, use of applicable generic fragility or qualification data or earthquake experience, and use and applicability of EPRI fragility screening guidance are examples)**.	There is no need to expand these examples in the SR since these are currently captured in the non-mandatory appendix (NMA). **We request that NRC withdraw or revise this comment.**
38	Table 5-2.2-4, SFR-C1	The systems analysts specifies the screening level (SPR-B5). This screening level should be high enough that the contribution to seismic core damage frequency and seismic large early release frequency from the screened components is not significant. SFR-C1 requires that the SPRA provide the basis and methodology for justifying that the capacity of the SSC exceeds the screening level.	Add a footnote to Table 5-2.2-4 such as: The intent of the requirement is to provide the basis and methodology for justifying that the capacities of certain SSCs exceed the screening level specific in SPR-B5. SFR-E1 is the requirement to ESTIMATE those capacities and DEMONSTRATE the applicability of the data and methodologies used.	This distinction between SFR-C1, SPR-B5 and SFR-E1 is covered in the NMA. **We request that NRC withdraw this comment or revise to indicate that the issue should be addressed in the NMA.**
39	Table 5-2.2-4, SFR-C2	In ASME/ANS RA-Sa-2009, Note (2) of the corresponding supporting requirement (i.e., SFR-B2) indicates that the screening criteria do not apply to high-seismic regions such as coastal California. However, SFR-C2 in the Code Case does not discuss this note.	Add the language from Note (2) of supporting requirement SFR-B2 from ASME/ANS RA-Sa-2009 in the non-mandatory appendix of the Code Case for SFR-C2 to clarify whether those specific screening criteria are applicable to high seismic region or not.	We disagree with this interpretation of this SR. This SR requires the definition of a screening criteria which, in principle, can be defined for any region taking into account its seismicity. It is understood that the earthquake experienced-based screening approach is very limited for regions like California but other screening criteria can be devised for such cases. **We request that NRC withdraw this comment or revise to indicate that the issue should be addressed in the NMA.**

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40	Table 5-2.2-4, SFR-C2	The intent is to provide the basis to justify that the capacity of the SSC is inherently rugged.	~~SPECIFY~~ **JUSTIFY** the basis for screening of inherently rugged components **(e.g., applicability of fragility or qualification test data, earthquake experience, past fragility analysis for similar SSCs and seismic responses, applicable EPRI guidance)**.	The intent here is for the analyst to provide the basis he/she used to screen inherently rugged components. The justification of whether such screening capacity basis is sufficient to screen components is covered by SFR-D1. We will consider the use of JUSTIFY and will provide examples in the NMA. In practice, inherently rugged components such as manual vales do not require a justification for why they meet the screening criteria. However, there may be cases where analysts expand the definition of inherently rugged components to include more components in the SEL such as MOVs and AOVs. In these cases, justification is required to ensure that applicable screening caveats are met.
41	Table 5-2.2-4, SFR-C2	Additional clarification is needed regarding what is meant by the term “inherently rugged component.”	Add language to the non-mandatory appendix indicating that the term inherently rugged refers to seismic capacities well beyond the risk-significant level. Typical items include manual valves, check valves, and small, in-line strainers. The SPID (guidance for NTTF Recommendation 2.1 response) includes extensive discussions on the meaning of inherently rugged and many other fragility topics.	This discussion is covered in the NMA. **We request that NRC withdraw this comment or revise to indicate that the issue should be addressed in the NMA.**
42	Table 5-2.2-5, SFR-D3, CC I	In general, the walkdown AND the fragility evaluation provide the assurance. This requirement supports that assurance but may not always ensure. Also, “vulnerability” needs to be defined.	IDENTIFY seismic vulnerabilities ~~and~~ **to ensure** ~~ENSURE~~ that assumptions and the use of generic seismic fragilities are conservative.	OK The SFR team recently discussed in detail the issue of whether this SR is limited to identification of vulnerabilities or does it also include ensuring that generic data is appropriate. As a result, this SR is rewritten as: “IDENTIFY seismic vulnerabilities so that the assumptions and the use of generic seismic fragilities are conservative.” The term seismic vulnerability is defined in the NMA.
43	Table 5-2.2-5, SFR-D3, CCII	The current language implies realistic and plant specific fragilities for all vulnerabilities, which is inconsistent with SFR-E3 and established practice.	IDENTIFY seismic vulnerabilities and ENSURE that the seismic fragilities **for SSCs that contribute significantly to seismic CDF or seismic LERF** are realistic and plant-specific.	The intent of this SR is to identify vulnerabilities regardless of risk contribution. This SR has been rewritten as: “IDENTIFY seismic vulnerabilities so that the seismic fragility calculations can be realistic and plant specific as needed.” **We request that NRC withdraw this comment.**
44	Table 5-2.2-5, SFR-D4	The walkdown should also focus on operator pathways and potential unavailability of those pathways	FOCUS on potential functional and structural failure modes, equipment anchorage, ~~and~~ support load paths, **and pathways necessary for performing required ex-control room actions**.	This is captured in SFR-D7. **We request that NRC withdraw this comment**.

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45	Table 5-2.2-5, SFR-D5	The purpose of SFR-D5 is to identify. The assessment action is in SPR-B9. Therefore, it does not make sense to use the term 'credible' in SFR-D5 as the purpose of this supporting requirement is to identify any seismic–induced failure for the flood sources.	IDENTIFY ~~credible~~ seismic-induced failures (including spray) for the flood sources provided in SPR-C3.	We disagree with the comment. SPR-C3 simply identifies the flood sources that exist, and the intent of the walkdown is to determine whether there is an associated seismic-induced failure mode that corresponds to that flood source. Under this SFR SR, the fragility experts are determining whether this exists, or the source can be screened based on seismic failure mode considerations (i.e., which flood sources get passed back to SPR-B9). This process is essential, allowing SPR-B9 to focus on credible interactions (rather than on unrealistic ones). **We request that NRC withdraw this comment.**
46	Table 5-2.2-5, SFR-D6	The purpose of SFR-D6 is to identify. The assessment action is in SPR-B10. Therefore, it does not make sense to use the term 'credible' in SFR-D6 as the purpose of this supporting requirement is to identify any seismic–induced failure for the fire sources	IDENTIFY ~~credible~~ seismic-induced failures for the fire sources provided in SPR-C4.	We disagree with the comment. SPR-C4 simply identifies the fire sources that exist, and the intent of the walkdown is to determine whether there is an associated seismic-induced failure mode that corresponds to that fire source. Under this SFR SR, the fragility experts are determining whether this exists, or the source can be screened based on seismic failure mode considerations (i.e., which fire sources get passed back to SPR-B9). This process is essential, allowing SPR-B9 to focus on credible interactions (rather than on unrealistic ones). **We request that NRC withdraw this comment.**
47	Table 5-2.2-5, SFR-D7	This supporting requirement appears to pre-judge which seismic interactions have the potential to be "risk-significant" prior to the walkdown. If the intent is that such information will be provided to the walkdown team by the plant-systems analyst it appears to be premature to expect such information to be available at the time of walkdown. Further, such an intent or appearance of intent can lead to an argument for excluding the plant-systems analyst from the walkdown. The second part of the SR starting with "EVALUATE the consequences…" is expected to capture the "risk-importance" of the identified interactions.	IDENTIFY ~~potential risk-significant~~ seismic interactions including proximity impacts, falling hazards, and differential displacements (e.g., failure and falling of masonry walls and nonseismically designed SSCs, impact between cabinets, differential building displacements) and EVALUATE the consequences of such interactions on SSC s contained in the systems model and on the credited operator actions. (See HLR-SPR-D.)	Along the same lines as above, if "potential risk-significant" is deleted, the word "credible" should be inserted in its place. **We request that NRC withdraw this comment.**

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48	Table 5-2.2-5, HLR-SFR-D	In 2009 (SFR-E3) indicates that if component screened out during or following the walkdowns, document anchorage calculation and provide the basis. However, this statement is removed in the code case and it is not clear if screening out equipment during walkdowns is allowed.	Add the following or equivalent as a new SFR-D6: IDENTIFY credible seismic-induced failure for the fire sources provided in SPR-C4. **If components are screened out during or following the walkdown, DOCUMENT anchorage calculations and PROVIDE the basis justifying such a screening.**	As part of the consistency revisions, documenting should never appear as an action anywhere except under a documentation SR. In conjunction with other changes related to better treating seismic-induced fires and flood, the prior statement related to anchorage is no longer applicable since the sources are considered SEL items and their screening is justified in the same way as other SEL items, which may consider things other than anchorage. **We request that NRC withdraw this comment.** Also, the revised SFR-D1 requires an anchorage evaluation for screened-out components.
49	Table 5-2.2-6, SFR-E2, CC I	The intent of the requirements should be to identify. In CCI conservative assumptions and data may be used.	For SSCs identified in ~~SPR-C4~~**SPR-C6** that significantly contribute to seismic core damage frequency and/or seismic large early release frequency, ~~conservatively~~ IDENTIFY relevant failure modes of structures, equipment, and soil. **ENSURE that the assumptions and data used in the identification are conservative.**	SPR-C6 is the correct reference. The intent of this SR for CCI is to IDENTIFY failure mechanisms in a more liberal and conservative manner. For example, failure of the anchorage for a heat exchanger may not lead directly to flooding of the room which is the failure modelled in the PRA. The fragility analysts should acknowledge this extra margin in capacity and thus conservative assessment of the failure mechanism. The process to ensure that failure modes are conservative for CCI is part of the fragility evaluation. The NMA provides examples of what constirtutes a conservative failure mecanisms. **We request that NRC revise this comment.**
50	Table 5-2.2-6, SFR-E2, CC II	The examples listed in the requirement confuse the understanding of the differences between CCI and CCII. The only real difference is that CCI says 'conservatively IDENTIFY relevant' while CCII says 'IDENTIFY relevant and realistic'. This SR also references SPR-C4, but should reference SPR-C6.	For those SSCs identified in ~~SPR-C4~~**SPR-C6** that significantly contribute to seismic core damage frequency and/or seismic large early release frequency, IDENTIFY relevant and realistic failure modes of structures ~~(e.g., sliding, overturning, yielding, and excessive drift)~~, equipment ~~(e.g., anchorage failure, functional failure, impact with adjacent equipment or structures, and bracing failure)~~, and soil ~~(e.g., liquefaction, slope instability, and excessive differential settlement)~~. **For the other SSCs identified in SPR-C6, conservatively IDENTIFY relevant failure modes of structures, equipment, and soil.**	It is correct that this SR should reference SPR-C6. The difference between CCI and CCII is further discussed in the NMA. Note also that it is not necessary to state what should be done with "non-significant" items – CC I applies unless stated otherwise. This is a consistency issue resolution. We agree to remove examples but the last sentence should also be removed. **We request that NRC revise this comment.**
51	Table 5-2.2-6, SFR-E2, CC I and CC II	Listing of examples for CCII only but they seem to be applicable to CCI as well.	Remove the comments from the requirement. Comments in the parentheses in the original should go into the NMA.	OK

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52	Table 5-2.2-6, SFR-E4	The action verb ESTIMATE implies using judgement or qualitative measures which are inconsistent with the intent of the SR. The action verb CALCULATE involves a mathematical process whereas the action verb ESTIMATE does not necessarily involve a calculation (e.g., quantification of a probability or frequency) and can be derived qualitatively.	~~ESTIMATE~~ **CALCULATE** fragilities for the relevant failure modes for SSCs that are not screened out and do not significantly contribute to seismic core damage frequency and/or seismic large early release frequency.	ESTIMATE is the correct action in this SR. This SR refers to components that screen-in for further evaluation but that are shown not to contribute significantly to plant risk. Clarify in NMA what is the target group of SSCs in this SR. **We request that NRC withdraw this comment.**
53	Table 5-2.2-6, SFR-E5, CCI and II	The SR (CC I and II) refers to SPR-B6 for identification purposes. SPR-B6 discusses "relay or other similar devices". This SR also needs to capture "or other similar devices" which is currently missing not only for consistency but also to prevent any implication that "other similar devices" need not be considered here. Additionally, the action verb for the second part of the CC II requirements needs to be capitalized to identify it.	For CCI: ESTIMATE contact-chatter seismic fragilities for relays **or other similar devices** that are identified in the systems analysis. (See SPR-B6.) For CCII: CALCULATE contact-chatter seismic fragilities for relays **or other similar devices** that are identified in the systems analysis (see SPR-B6) that significantly contribute to seismic core damage frequency and/or seismic large early release frequency. For those relays **or other similar devices** that do not significantly contribute to seismic core damage frequency and/or seismic large early release frequency, ~~estimate~~ the seismic fragilities.	The inclusion of the sentence "For those relays **or other similar devices** that do not significantly contribute to seismic core damage frequency and/or seismic large early release frequency, ~~estimate~~ **ESTIMATE** the seismic fragilities" is an error, as it contradicts a consistency resolution. In CCII, CCI prevails for non-risk significant components. **We request that NRC revise the comment**
54	Table 5-2.2-6, SFR-E6, CCII	The action verb for the second part of the CC II requirements needs to be capitalized to identify it.	CALCULATE seismic fragilities for credible seismic-induced flood sources (see SFR-D5) and seismic-induced fire sources (see SFR-D6) that significantly contribute to seismic core damage frequency and/or seismic large early release frequency. For those flood and fire sources that do not significantly contribute to seismic core damage frequency and/or seismic large early release frequency, ~~estimate~~ **ESTIMATE** the seismic fragilities.	The last sentence should actually be eliminated as part of implementing consistency issues. The standard will state that whenever CC II requires something for a risk-significant contributor, CC I applies for everything else. **We request that NRC revise this comment.** The next revision of the standard deletes the last sentence.
55	Table 5-2.2-5 SFR-D3, Table 5-2.2-6 HLR-SFR-E SFR-E1, -E2, and -E3	The use of word "conservative" is found in these requirements. Given that a goal of a PRA is to be as realistic as possible with display of uncertainties, the use of this term needs to be defined in context of this goal	The word "conservative' needs to be defined or further explained in a note. The conservative fragilities when used should assure that the numerical results, such as CDF and LERF, are not under estimated: however, their use should not lead to mischaracterization of significant contributors or ranking of accident sequences or other risk insights.	This is correct usage of conservative. The term conservative is cautiously used in these SRs to allow for a less rigorous evaluation of seismic fragilities as long as sources of uncertainties are well acknowledged and document in the context of its impact to the intended use of PRA. This is further explained in the NMA. **We request that NRC withdraw this comment.**

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56	Table 5-2.2-7, SFR-F2	Related Table 5-2.2-6 that provides supporting requirements associated with calculation of seismic-fragility parameters use distinct action verbs ESTIMATE and CALCULATE, respectively, for Capability Category I and Capability Category II. However, the related supporting requirement SFR-F2, item *(i)* associated with documentation of fragility parameter values only uses the word "estimation," but not "calculation." Therefore, the documentation supporting requirement item *(i)* is partly inconsistent with other related supporting requirements.	Regarding list item *(i)* in SFR-F2: *(i)* estimation **or calculation** of fragility parameter values for each SSC modeled (median capacity, logarithmic standard deviation reflecting the randomness in median capacity, and logarithmic standard deviation representing the uncertainty in median capacity), and	We agree to add the word calculation.
57	Section 5-2.3 Seismic Plant Response Analysis (SPR), Second list	The seismic PRA depends on both the capability and completeness of the internal events at-power PRA.	It is assumed: • Relative to the systems-analysis requirements contained herein, the seismic PRA analysis team possesses a full-scope internal events, at-power Level 1 and Level 2 LERF PRA, developed either before or concurrently with the seismic PRA. • The internal-events PRA is then used as the basis for the seismic PRA systems analysis. • It is recognized that the capability and completeness of the seismic PRA is a function of the capability **and completeness** of the internal events at-power PRA.	OK
58	Section 5-2.3 Seismic Plant Response Analysis (SPR)	The sentence reads like a "how to" which is not the intent of the Standard. Further, none of the references cited in the Section are endorsed by the staff. Such references should be moved to the NMA portion of the Standard.	~~A general methodology for the modeling and quantification of a seismic PRA is documented in references such as EPRI 3002000709 [5-5], EPRI 1020756 [5-6], and EPRI 1025294 [5-7].~~	OK
59	Section 5-2.3 Seismic Plant Response Analysis (SPR)	Cross-references in SFR to SPR (ensure that they also are in SPR). • SPR-B4 includes the reference to SFR-A2 • SPR-B5 includes the reference to SFR-C1 • SPR-C4 does not cross-reference SFR-D6 • SPR-D does not cross-reference SFR-D7	Include the missing cross-references either in the requirements or footnotes	OK

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60	Table 5-2.3-2 SPR-A2	It is unclear whether the SR is seeking to identify all possible initiating events from secondary hazards or if the intent is to identification and screen such initiators for inclusion in the plant-systems model.	Using a systematic process, IDENTIFY seismically induced initiating events caused by secondary hazards (e.g., seismically induced internal flooding, external flooding, and fire) including those identified in SHA-I2 **for retention in the seismic PRA plant-response model**.	The intent of this SR is to systematically identify credible events from secondary hazards for consideration in the SPR analysis process. It should not be expected that all the secondary hazards identified will be explicitly included in the logic model, so adding this phrase is not appropriate here as it would preclude further assessment and screening. The further assessment is assured because SPR-A4 states that everything coming from this SR needs to be included in the analysis. **We request that NRC withdraw this comment.**
	Table 5-2.3-2 SPR-A2	Additional clarity is needed regarding secondary hazards: SPR-A2 – Seems to imply that there are secondary hazards other than those in SHA-A2.	Additional clarification is needed regarding what other secondary hazards are to be considered besides those in SHA-I2. If there are no others, delete the words “including those” from the supporting requirement.	It is expected that a comprehensive list of potential secondary hazard should be included. Seismic induced fires and floods (internal and external) are an example. The SPRAIG, for example, has a list of external hazards that is normally reviewed for applicability for individual plants. These are not covered by SR SHA-I1/2, which identifies only certain types of seismic-induced non-vibratory hazards that have been subject of confusion in recent SPRAs (i.e., identified but not appropriately screened and not modeled, missing to close the loop), this is the reason for the language (i.e., “including those”), which should be retained. As it is true that there are secondary hazards other than those in SHA, **we request that NRC withdraw this comment**
62	Table 5-2.3-2 SPR-A3	The verb “encompasses” is overly severe and cannot reasonably be achieved in practice. The wording of this SR should be similar to IE-A3 and IE-A4.	REVIEW plant-specific response to past seismic events, as well as other available seismic risk evaluations for nuclear plants, to ensure that the list of initiating events included in the evaluation ~~encompasses~~ **accounts for** industry experience.	OK
63	Table 5-2.3-2 SPR-A4	The plant-response analysis should include all identified events.	INCLUDE in the plant-response analysis the events identified in SPR-A1**,** ~~and~~ SPR-A2**, and SPR-A3** above.	OK

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64	Table 5-2.3-1 HLR-SPR-B	XSLOCA was called out specifically in 2009 (SPR-B10) and 2013 (SPR-B8) to be evaluated. Not clear if the current SRs in Table 5.2.3-3 are sufficient.	Add the equivalent of the supporting requirement SPR-B10 from the 2009 version of Part 5 to the note for SPR-A1 in the Code Case, to account for the consideration, and unless appropriately justified, the inclusion of an earthquake-caused "very small loss-of-coolant accident" in the seismic-PRA accident sequences as an additional fault within each sequence in the seismic-PRA model.	A significant amount of discussion went into the deletion of this SR. Primarily, this deletion was to address an unnecessary duplication of a requirement, since VSLOCA is simply another initiating event, and should be treated the same as all other initiating events under SPR-A1.The original SR was a legacy from a time more than 15 years ago when this IE was left out of a number of PRAs, so the intent was to include an additional failure in the plant to account for the potential for every non-LOCA scenario to also include a loss of RCS integrity. This would require making sure that the success criteria for each non-LOCA sequence also asks for RCS inventory control. The fact is that in current application, any SPRA that failed to consider VSLOCA and treat it in the same way as other initiating events would be guaranteed to receive a finding, the same as if they left out any other IE. Further, this SR crosses into "how to" address a VSLOCA. We believe that SPR-A1, as currently written, is sufficient to ensure that VSLOCA is properly considered. This may be discussed in a note or in the NMA. Having both SPR-A1 plus another SPR SR just for VSLOCA is like having a requirement that says, "say the entire alphabet" and another one that says "say the letter G", which is duplicative and inconsistent. **We request that NRC withdraw this comment.**
65	Table 5-2.3-3 SPR-B2	Due to the input from the fire and internal flooding PRAs, and possibly other hazard PRAs, in addition to internal events the findings from all relevant PRAs should be appropriately dispositioned. Additionally, it is not clear what is intended by the latter part of this SR ("…does not adversely affect…").	ENSURE that the peer review findings for the internal-events **and other hazard** PRA**s** that are relevant to the seismic PRA are resolved and ~~that the disposition does not adversely affect~~ **incorporated into** the development of the seismic PRA plant-response model.	OK
66	Table 5-2.3-3 SPR-B3	Incorrect reference to SPR-C4 instead of SPR-C6.	INCLUDE seismically induced failures representing the failure modes of interest in the seismic PRA plant-response model (e.g., tank rupture, pump failure to start/run, etc.). (See ~~SPR-C4~~**SPR-C6**.)	OK
67	Table 5-2.3-3 SPR-B5	The justification for the appropriate capacity based screening level needs to be provided. Neither the action verb for this SR nor that used for SFR-C1 achieves that purpose.	~~SPECIFY~~ **JUSTIFY (e.g. based on the contribution to the risk quantification)** ~~an appropriate~~ **the** set of criteria to be used in support of the screening of SSC failure modes on the basis of fragility. (See SFR-C1.)	OK

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68	Table 5-2.3-3 SPR-B6	The term “with a significant contributor to CDF or LERF” is not defined. How can one determine the significance without performing the calculation?	USE a systematic approach to INCLUDE in the system analysis the effects of those relays or similar devices whose contact chatter results in the unavailability or spurious actuation of SSCs ~~with a significant contribution to CDF or LERF~~.	We understand and agree with the objective of the comment, but note that the change as specified implies that all devices would need to be included in the model if it determined that their chatter could affect an SSCs. The intent of the SR is to only include the important relays. We suggest: USE a systematic approach to INCLUDE in the system analysis the effects of those relays or similar devices **susceptible to contact chatter** whose contact chatter results in the unavailability or spurious actuation of SSCs **on the seismic equipment list.** ~~with a significant contribution to CDF or LERF~~. **We request that NRC revise this comment.**
69	Table 5-2.3-3 SPR-B9	The seismic induced flood events are expected to be identified in SPR-A2 and this SR should refer to SPR-A2 for consistency and to highlight the inter-dependence.	For any seismic-induced internal flood retained in the seismic PRA **(see SPR-A2)**, ENSURE the model is consistent with HLR-IFSN-A, IFQU-A1, A2, A3, and A4.	We do not believe it is necessary to specifically cite the source of input to this SR, however if it is desired to do this the correct citation would be SPR-A4 (which “collects” and analyzes all the seismically-induced initiating events). **We request that NRC reconsider/revise this comment.** Please note that this SR is being revised to comply with new back-referencing guidance.
70	Table 5-2.3-3 SPR-B10	The seismic induced fire events are expected to be identified in SPR-A2 and this SR should refer to SPR-A2 for consistency and to highlight the inter-dependence.	For any seismic-induced internal fire retained in the seismic PRA **(see SPR-A2)**, ENSURE the model is consistent with HLR-PRM-A and B.	We do not believe it is necessary to specifically cite the source of input to this SR, however if it is desired to do this the correct citation would be SPR-A4 (which “collects” and analyzes all the seismically-induced initiating events). **We request that NRC reconsider/revise this comment.** Please note that this SR is being revised to comply with new back-referencing guidance.
71	Table 5-2.3-3 SPR-B11	The secondary hazards are expected to be identified in SPR-A2 and this SR should refer to SPR-A2 for consistency and to highlight the inter-dependence.	For all other secondary hazards explicitly retained in the seismic PRA **(see SPR-A2)**, USE Part 8 or Part 9 in this Standard for applicable supporting requirements.	We do not believe it is necessary to specifically cite the source of input to this SR, however if it is desired to do this the correct citation would be SPR-A4 (which “collects” and analyzes all the seismically-induced initiating events). **We request that NRC reconsider/revise this comment.** Please note that this SR is being revised to comply with new back-referencing guidance.

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72	Table 5-2.3-3 SPR-B11	Additional clarity is needed regarding secondary hazards: SPR-B11 – It is not clear if it refers to secondary hazards in addition to those identified in SHA-A2.	Additional clarification is needed regarding what other secondary hazards are to be considered besides those in SHA-I2. If there are no others, replace "explicitly retained in the seismic PRA" with "identified in SHA-I2 and explicitly retained in the seismic PRA".	The link with SHA-I1/2 is provided in HLR-SPR-A and it does not need to be repeated here. B11 points to Part 9 as one can envision a seismic-induced external hazards (e.g., seismic-induced explosion on nearby industrial facility). The intent here is that any secondary hazard of any type that progresses through the assessment required by SPR-A4 and is retained in the model should be modeled in accordance with its relevant Part, and as stated before these include more than just those that come from SHA-I. **We request that NRC withdraw this comment.**
73	Table 5-2.3-4 SPR-C6	The term "failure mode(s) of interest for the fragility analysis" is not well-defined here. Use 2009 version SFR-D1 definition.	For the SSCs identified in SPR-C1, SPR-C2, SPR-C3, SPR-C4, and SPR-C5, IDENTIFY the failure mode(s) of interest **that interfere with the operability of equipment during or after the earthquake through a review of the plant design document and the walkdown** for the fragility analysis to be performed.	The comment confuses the distinction between the "PRA failure mode of interest" and the "seismic failure mode" that causes it to occur. There is a fundamental difference between the failure mode of interest for the system analyst (e.g., fail to run, fail to start, fail to maintain pressure boundary) and the failure mechanisms that are observed by the fragility team during the walkdown (e.g., anchorage failure). SPR-C6 defines the PRA failure mode of interest so that it can be passed on to the fragility analysts. This information is then used under the SFR SRs then address the associated failure mechanisms "that interfere with the operability of equipment during or after the earthquake through a review of the plant design document and the walkdown." This phrase, which as you note comes from a 2009 SFR SR, does not belong in an SPR SR. **We request that NRC withdraw this comment.**
74	Table 5-2.3-1 HLR-SPR-D	The term "operator performance" can be interpreted in a narrow context to mean only in-control room actions and performance. However, the HLR and the corresponding SRs are applicable to all human actions included in the SPRA.	Human actions credited in the seismic PRA shall consider seismic-specific challenges to ~~operator performance~~ **credited human actions**.	We do not believe that this this mis-interpretation can occur, and are concerned about the use of the word "credited" in this SR, as this has become an issue in the past. If there is a strong feeling that a modification is needed, we suggest that it refer to "human failure events included in the seismic PRA model." **We request that NRC either withdraw or reword this comment.**

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75	Table 5-2.3-5 SPR-D3	Cue availability as well as dependencies are integral part of HRA analyses and maybe affected by seismic events	For CCI: CALCULATE the HEPs for all HFEs taking into account relevant seismic-related effects on control room and ex-control room post-initiator actions in accordance with the SRs for HLR-HR-G in Part 2 of this Standard as set forth under Capability Category I. In addressing influencing factors and the timing considerations covered in SRs HR-G3, HR-G4, and HR-G5 in Part 2, attention is to be given to how the seismic event alters any previous assessments in nonseismic analyses including: additional workload and stress; effects of the seismic event on mitigation, **cue availability**, **dependencies,** required response, timing, accessibility, and potential for physical harm; and seismic-specific job aids and training. For CCII: CALCULATE the HEPs for all HFEs taking into account relevant seismic-related effects on control room and ex-control room post-initiator actions in accordance with the SRs for HLR-HR-G in Part 2 of this Standard as set forth under Capability Category II. In addressing influencing factors and the timing considerations covered in SRs HR-G3, HR-G4, and HR-G5 in Part 2, attention is to be given to how the seismic event alters any previous assessments in nonseismic analyses including: additional workload and stress; effects of the seismic event on mitigation, **cue availability**, **dependencies,** required response, timing, accessibility, and potential for physical harm; and seismic-specific job aids and training.	OK
76	Table 5-2.3-5 SPR-D4	The action verb ESTIMATE implies using judgement or qualitative measures only which are inconsistent with the intent of the SR. Some of the examples of approaches provide more information than an estimate.	For significant HFEs, ~~ESTIMATE~~ **DETERMINE** the timing aspects of the response actions (i.e., time of relevant indication, time available to complete action, and time required to complete action) recognizing the sequence of events and expected seismic conditions based on one or a combination of the following approaches: *(a)* Walk-throughs or talk-throughs of procedures with plant operations or training personnel *(b)* Simulator observations *(c)* Plant-specific thermal-hydraulic analyses *(d)* Realistic and applicable generic or similar plant thermal-hydraulic analyses. Based on a review of procedures with plant operations or training personnel and recognizing the sequence of events and expected seismic conditions, CONFIRM for nonsignificant HFEs the timing aspects of the response actions.	OK

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77	Table 5-2.3-6 SPR-E3	For CCII, QU-D4 indicated that one should compare results to those from similar plants and IDENTIFY causes for significant differences.	QUANTIFY the seismic sequences in accordance with the following supporting requirements from Part 2 of this Standard, which are applicable to the seismic hazard for CCII: QU-A2, A3, A4, and A5; QU-B1, B2, B3, B5, B6, B7, B8, B9, and B10; QU-C1, C2, and C3; QU-D1, D2, D3,**[D4],** D5, D6, and D7.	Disagree with the comment. Even for identical plants the difference in hazard makes the comparison little informative and essentially impossible to perform in a systematic way. This results in very little added value from this requirement being carried over to Part 5. Note that this same conclusion is reached in Part 4 with regard to fire, which states "There is no requirement for a comparison of Fire PRA results for similar plants under this SR, due to lack of Fire PRA results using the updated industry Fire PRA methods [4-A-6]. Additionally, small differences in geometry, plant layout, and the Fire Safe Shutdown Procedures may result in significant differences in risk that may be difficult to understand without detailed Fire PRA results from plants being compared." While the issues are not identical, the conclusion is the same – unlike internal events, the plant specific seismic design and as-built differences are such that these comparisons have little, if any, value. **We request that NRC withdraw this comment.**
78	Table 5-2.3-6 SPR-E4	The phrase "dominant sequence insights" is not defined in either Addendum A or Addendum B. Use of the term "dominant" was decided not to be used anywhere in the standard.	USE the quantification process to ensure that the components screened out, based on the screening level defined in SPR-B5, do not become a significant contributor or do not invalidate the ~~dominant~~ **significant** sequence insights of the seismic PRA.	OK
79	Table 5-2.3-6 SPR-E5, CC-II	It is not possible or necessary to quantify all uncertainties.	QUANTIFY the mean core damage frequency and large early release frequency and propagate the **parameter** uncertainty that results from each input (i.e., the seismic hazard, the seismic fragilities, and the systems analysis).	OK
80	Table 5-2.3-6 SPR-E7	The reference to Part 2 is missing for HLR-QU-E for CCII.	For CC II: PERFORM the uncertainty analysis consistent with HLR-QU-E **of Part 2** addressing key assumptions in the hazard analysis (see SHA-J2), fragility analysis (see SFR-F3), and system modeling for Capability Category II.	OK, but please note that this SR is being revised to comply with new back-referencing guidance.
81	Table 5-2.3-1 HLR-SPR-F	This HLR is overly broad since HLR-SHA-J and HLR-SFR-F already address documentation of the seismic hazard evaluation and the seismic-fragility evaluation, respectively.	Documentation of the seismic ~~PRA analysis~~ **plant-response model** shall be consistent with the applicable supporting requirements.	OK, although there is a consistency activity (regarding "plant-response model") that may be correcting this further.
82	Table 5-2.3-7 SPR-F2	The Code Case needs to specify the type of documentation to be provided, rather than relying on the discretion of the user.	DOCUMENT the process used in the seismic plant-response analysis and quantification**, including**~~. For example, this documentation typically includes a description of~~	OK