

SPID TABLE 6-4 (revised), part of the "checklist"

SPID Table 6-4, Comparison of SPID Guidance to ASME/ANS PRA Standard Supporting Requirements: Element SHA

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR-SHA-A	The frequency of <u>earthquake seismic ground motions</u> at the site shall be based on a site-specific probabilistic seismic hazard analysis (existing or new) that reflects the composite distribution of the informed technical community. The level of analysis shall be determined based on the intended application and on site-specific complexity.			
SHA-A1	In performing the probabilistic seismic hazard analysis (PSHA), BASE it on, and MAKE it consist of, the collection and evaluation of available information and data, evaluation of the uncertainties in each element of the PSHA, and a defined process and documentation to make the PSHA traceable. <i>CC II-III</i>	In performing the probabilistic seismic hazard analysis (PSHA), BASE it on, and MAKE it consist of, the collection and evaluation of available information and data, evaluation of the uncertainties in each element of the PSHA, and a defined process and documentation to make the PSHA traceable. <i>CC II-III</i>	The PSHA is based on an evaluation of available information on historical seismicity, paleoseismic data on large-magnitude recurrence rates, and ground motion models, and is based on available information on each site's geologic profile. This information is modeled, including evaluation of uncertainties, using a defined evaluation process. Documentation will be included in each site's hazard report. Licensees in the CEUS will be using the CEUS-SSC, which is documented in NUREG-2115. PSHAs conducted under the SPID will meet this requirement directly.	This SR governs.

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SHA-A2	<p>As the parameter to characterize both hazard and fragilities, USE the spectral accelerations, or the average spectral acceleration over a selected band of frequencies, or peak ground acceleration.</p> <p><i>CC I-II</i></p>	<p>As the parameter to characterize both hazard and fragilities, USE the spectral accelerations, or the average spectral acceleration over a selected band of frequencies, or peak ground acceleration.</p> <p><i>CC I-II-III</i></p>	<p>Spectral accelerations will be used to characterize seismic hazard, and are transmitted for use in fragility evaluations. PSHAs conducted under the SPID will meet this requirement directly.</p>	<p>This SR governs.</p>
SHA-A3	<p>In the selection of frequencies to determine spectral accelerations or average spectral acceleration, CAPTURE the frequencies of those structures, systems, or components, or a combination thereof that are significant in the PRA results and insights.</p> <p><i>CC I-II-III</i></p>	<p>If spectral acceleration or average spectral acceleration over a band of frequencies is used, INCLUDE the response frequencies of SSCs that are significant in the PRA results and insights.</p> <p><i>CC I-II-III</i></p>	<p>Spectral accelerations will be reported in hazard calculations that capture spectral frequencies from 0.1 Hz to 100 Hz. This is sufficient to capture the frequencies of structures, systems, and components. PSHAs conducted under the SPID will meet this requirement directly.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SHA-A4	<p>In developing the probabilistic seismic hazard analysis results, whether they are characterized by spectral accelerations, peak ground accelerations, or both, EXTEND them to large-enough values (consistent with the physical data and interpretations) so that the truncation does not produce unstable final numerical results, such as core damage frequency, and the delineation and ranking of seismic-initiated sequences are not affected.</p> <p><i>CC I-II-III</i></p>	<p>In developing the probabilistic seismic hazard analysis results for use in accident sequence quantification, whether they are characterized by spectral accelerations, peak ground accelerations, or both, EXTEND them to large-enough values (consistent with the physical data and interpretations) so that the truncation does not produce unstable final numerical results, such as core damage frequency, and the delineation and ranking of seismic-initiated sequences are not affected.</p> <p><i>CC I-II-III</i></p>	<p>The PSHA results will be extended to spectral accelerations corresponding to annual frequencies of exceedence of 1E-8 or less. This should be sufficient to produce stable core damage frequency calculations and to identify and rank failure sequences. PSHAs conducted under the SPID will meet this requirement directly.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SHA-A5	<p>SPECIFY a lower-bound magnitude (or probabilistically defined characterization of magnitudes based on a damage parameter) for use in the hazard analysis, such that earthquakes of magnitude less than this value are not expected to cause significant damage to the engineered structures or equipment.</p> <p><i>CC I-II-III</i></p>	<p>SPECIFY a lower-bound magnitude (or probabilistically defined characterization of magnitudes based on a damage parameter) for use in the hazard analysis, such that earthquakes of magnitude less than this value are not expected to cause significant damage to the engineered structures or equipment.</p> <p><i>CC I-II-III</i></p>	<p>A lower-bound magnitude of 5.0 will be used in the PSHA and is sufficient to capture earthquakes that will cause damaging ground motions. PSHAs conducted under the SPID will meet this requirement directly.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR-SHA-B	<p>To provide inputs to the probabilistic seismic hazard analysis, a comprehensive up-to-date <u>data shall be compiled that include database, including geological, seismological, and geophysical data; local site topography; and surficial geologic and geotechnical site properties, shall be compiled.</u> A catalog of historical, instrumental, and paleoseismicity information shall also be compiled.</p>			

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SHA-B1	<p>In performing the probabilistic seismic hazard analysis (PSHA), BASE it on available or developed geological, seismological, geophysical, and geotechnical databases that reflect the current state of the knowledge and that are used by experts/analysts to develop interpretations and inputs to the PSHA.</p> <p><i>CC I-II</i></p>	<p>In performing the probabilistic seismic hazard analysis USE available or developed geological, seismological, geophysical, and geotechnical data that reflect the current state of the knowledge and that are used by experts/analysts to develop interpretations and inputs to the PSHA.</p> <p><i>CC I-II</i></p>	<p>Inputs to the PSHA will be based on SSHAC Level 3 studies (including the CEUS Seismic Source Characterization model for sites in the CEUS), which use available geological maps (including tectonic province, crustal thickness, and volcanic maps) and geophysical maps (including gravity, heat flow, and crustal velocity maps). Site response studies will use geotechnical databases (including topographic maps, site cross-sections, borehole data, and seismic velocity measurements).</p> <p>Seismological data used for the SSHAC Level 3 studies, including the CEUS Seismic Source Characterization project, includes an updated historical earthquake catalog that represents a compilation of available earthquake catalogs for the region.</p> <p>PSHAs conducted under the SPID will meet this requirement directly.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SHA-B2	<p>ENSURE that the database and information used are adequate to characterize all credible seismic sources that may contribute to the frequency of occurrence of vibratory ground motion at the site, considering regional attenuation of ground motions and local site effects.</p> <p>If the existing probabilistic seismic hazard analysis (PSHA) studies are to be used in the seismic PRA, ENSURE that any new data or interpretations that could affect the PSHA are adequately incorporated in the existing databases and analysis.</p> <p><i>CC I-II</i></p>	<p>ENSURE that the data and information used are adequate to characterize all credible seismic sources that may contribute significantly to the frequency of occurrence of vibratory ground motion at the site, considering regional attenuation of ground motions and local site effects.</p> <p>If the existing probabilistic seismic hazard analysis (PSHA) studies are to be used in the seismic PRA, ENSURE that any new data or interpretations that could affect the PSHA are adequately incorporated in the existing data and analysis.</p> <p><i>CC I-II</i></p>	<p>Under the SSHAC Level 3 process, databases and information are reviewed to ensure that all credible seismic sources are evaluated. Databases and information on ground motion equations are also reviewed to ensure that all credible ground motion models are evaluated.</p> <p>Available site data are reviewed as inputs to local site response calculations to ensure that all data and interpretations are incorporated into site response studies. Existing PSHA studies will not be used. PSHAs conducted under the SPID will meet this requirement through the use of published models used as inputs.</p>	<p>This SR governs if an existing PSHA is used. Otherwise, the PSHA must follow the guidance in SPID section 2.2.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SHA-B3	<p>As a part of the database used, COMPILE a catalog of historically reported, geologically identified, and instrumentally recorded earthquakes. USE reference [5-30] requirements or equivalent.</p> <p><i>CC II-III</i></p>	<p>As part of the data used, INCLUDE an appropriate existing catalog of historically reported earthquakes, earthquakes reported through geological investigations, and instrumentally recorded earthquakes. USE reference [5-30] requirements or equivalent.</p> <p><i>CC I-II</i></p>	<p>Under the SSHAC Level 3 process, a catalog of historically reported, geologically identified, and instrumentally recorded earthquakes is compiled. PSHAs conducted under the SPID will meet this requirement.</p>	This SR governs.

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR-SHA-C	To account for the frequency of occurrence of earthquakes <u>seismic ground motions</u> in the site region, the seismic sources with the hazard model of the probabilistic seismic hazard analysis shall examine all credible sources of potentially damaging earthquakes. For the purpose of characterizing the occurrence rates for those seismic sources, all earthquakes greater than magnitude 3 shall be considered. Both the aleatory and epistemic uncertainties shall be addressed in characterizing the seismic sources.			

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SHA-C1	<p>In the probabilistic seismic hazard analysis, EXAMINE all potential sources of earthquakes that affect the probabilistic hazard at the site. BASE the identification and characterization of seismic sources on regional and site geological and geophysical data, historical and instrumental seismicity data, the regional stress field, and geological evidence of prehistoric earthquakes.</p> <p><i>CC I-II-III</i></p>	<p>In the probabilistic seismic hazard analysis, EVALUATE sources of earthquakes that have the potential to contribute significantly to the probabilistic hazard at the site. MAKE the identification and characterization of seismic sources taking into account previous compilations of seismic sources, on regional and site geological and geophysical data, historical and instrumental seismicity data, and geological evidence of prehistoric earthquakes.</p> <p><i>CC I-II-III</i></p>	<p>Under the SSHAC Level 3 process, all potential sources of earthquakes that might affect a PSHA are examined. The identification and characterization of those sources is based on geological and geophysical data, historical and instrumental earthquakes, crustal stress, and tectonic interpretations. Available evidence of prehistoric earthquakes in the CEUS is evaluated in defining earthquake sources and their characteristics. PSHAs conducted under the SPID will meet this requirement.</p>	<p>This SR governs.</p>
SHA-C2	<p>ENSURE that any expert elicitation process used to characterize the seismic sources is compatible with the level of analysis discussed in Requirement HA-A, and FOLLOW a structured approach.</p> <p><i>CC I-II-III</i></p>	<p>ENSURE that if an expert elicitation process is used to characterize the seismic sources then it needs to be compatible with the level of analysis discussed in Requirement HLR-SHA-A, and USE a structured approach.</p> <p><i>CC I-II-III</i></p>	<p>A SSHAC Level 3 approach for seismic sources is specified in the 50.54(f) letter to ensure that experts familiar with the regions of the study are contacted and elicited for information regarding potential seismic sources. Under the SSHAC Level 3 process, a structured approach is followed, including formal workshops and review of data and documentation. PSHAs conducted under the SPID will meet this requirement.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SHA-C3	<p>The seismic sources are characterized by source location and geometry, maximum earthquake magnitude, and earthquake recurrence. INCLUDE the aleatory and epistemic uncertainties explicitly in these characterizations.</p> <p><i>CC II-III</i></p>	<p>The seismic sources are characterized by alternative source representations and source geometry, maximum earthquake magnitude, and earthquake recurrence. INCLUDE the aleatory and epistemic uncertainties explicitly in these characterizations, where significant.</p> <p><i>CC II-III</i></p>	<p>Under the SSHAC Level 3 process, the aleatory and epistemic uncertainties in seismic sources are characterized for source location and geometry, magnitude, and activity rate. For each source, uncertainty in geometry and location is represented with alternative interpretations, uncertainties in recurrence rates are represented with alternative rates, and uncertainties in maximum magnitude are represented with distributions of values. All of these interpretations ensure that the aleatory and epistemic uncertainties are included explicitly in the characterizations. PSHAs conducted under the SPID will meet this requirement.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SHA-C4	<p>If an existing probabilistic seismic hazard analysis study is used, SHOW that any seismic sources that were previously unknown or uncharacterized are not significant, or INCLUDE them in a revision of the hazard estimates.</p> <p><i>CC I-II-III</i></p>	<p>If an existing seismic source model is used, DEMONSTRATE that any new seismic sources that have been identified or were uncharacterized when the existing models were developed are not significant, or INCLUDE them in the update of the hazard estimates.</p> <p><i>CC I-II-III</i></p>	<p>Existing PSHA studies are not used in characterizing seismic hazard. This requirement is not applicable to PSHAs conducted under the SPID.</p>	<p>This SR governs if an existing PSHA is used. Otherwise, the PSHA must follow the guidance in SPID section 2.2.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR-SHA-D	<p>The probabilistic seismic hazard analysis shall examine credible mechanisms influencing estimates of vibratory ground motion that can occur at a site given the occurrence of an earthquake of a certain type (e.g., <u>strike slip</u>, <u>normal</u>, <u>reverse</u>), magnitude, and at a certain location. Both the aleatory and epistemic uncertainties shall be addressed in characterizing the ground motion propagation.</p>			
SHA-D1	<p>ACCOUNT in the probabilistic seismic hazard analysis for</p> <ul style="list-style-type: none"> (a) credible mechanisms governing estimates of vibratory ground motion that can occur at a site (b) regional and site-specific geological, geophysical, and geotechnical data and historical and instrumental seismicity data (including strong motion data) (c) current attenuation models in the ground motion estimates <p><i>CC I-II-III</i></p>	<p>In the vibratory ground motion analysis, INCLUDE</p> <ul style="list-style-type: none"> (a) credible mechanisms governing estimates of vibratory ground motion that can occur at a site (b) available historical and instrumental seismicity data (including strong motion data) (c) current attenuation models for the ground motion estimates <p><i>CC I-II-III</i></p>	<p>(a) For the CEUS, the Updated Ground Motion Model project results to be used in the PSHA do not account explicitly for slip mechanism, because seismic sources in the CEUS do not distinguish between different slip mechanisms. Therefore, explicit modeling of slip mechanisms is not applicable to CEUS sites. For the WUS, ground motion prediction equations do take slip mechanisms into account and will be used for the PSAs.</p> <p>(b) Under the SSHAC Level 3 process, empirical data for the region of interest is used to evaluate published ground motion models and derive modifications and weights for those models. The effect of local site conditions will explicitly be taken into account by modeling site amplification using a site-</p>	<p>(a) This SR governs.</p> <p>(b) This SR governs.</p> <p>(c) This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
			<p>specific profile. PSHAs conducted under the SPID will meet this requirement through the use of published models used as inputs.</p> <p>(c) Ground motion models published for the WUS and CEUS, as appropriate, will be reviewed and evaluated to develop appropriate ground motion prediction models for the PSHAs. PSHAs conducted under the SPID will meet this requirement.</p>	

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SHA-D2	<p>ENSURE that any expert elicitation process used to characterize the ground motion is compatible with the level of analysis discussed in Requirement SHA-A, and FOLLOW a structured approach.</p> <p><i>CC I-II-III</i></p>	<p>ENSURE that any expert elicitation process used to characterize the ground motion or any other elements of the ground motion analysis is compatible with the level of analysis discussed in Requirement HLR-SHA-A, and USE a structured approach.</p> <p><i>CC I-II-III</i></p>	<p>For both the CEUS and WUS, the SSHAC approach is being used to characterize the ground motion. For the CEUS, the Updated Ground Motion Model project followed a SSHAC Level 2 approach for evaluating ground motion equations, which was appropriate for updating a prior ground motion model. For both CEUS and WUS, experts familiar with ground motions, for the respective regions, were or will be contacted and elicited to ensure that information regarding ground motion data and equations is properly characterized. A structured approach has or will be followed, including a formal questionnaire and documentation of responses to the questionnaire for each expert who has or will participate. PSHAs conducted under the SPID will meet this requirement.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SHA-D3	<p>ADDRESS both the aleatory and epistemic uncertainties in the ground motion characterization in accordance with the level of analysis identified for Requirement SHA-A.</p> <p><i>CC II-III</i></p>	<p>INCLUDE both the aleatory and epistemic uncertainties separately in the ground motion characterization in accordance with the level of analysis identified for Requirement HLR-SHA-A.</p> <p><i>CC II-III</i></p>	<p>Both aleatory and epistemic uncertainties in ground motion characterization have been or will be addressed to develop ground motion prediction equations.</p> <p>Multiple equations were or will be derived, each with multiple aleatory uncertainties, thereby capturing epistemic uncertainty in ground motions.</p>	<p>This SR governs.</p>
SHA-D4	<p>If an existing probabilistic seismic hazard analysis study is used, SHOW that any ground motion models or new information that were previously unused or unknown are not significant, or INCLUDE them in a revision of the hazard estimates.</p> <p><i>CC I-II-III</i></p>	<p>If existing ground motion models are used, DEMONSTRATE that new information not previously used or unknown would not significantly affect the PSHA results, or INCLUDE it in the update of the hazard estimates.</p> <p><i>CC I-II-III</i></p>	<p>Existing PSHA studies will not be used to characterize seismic hazard at any site. This requirement is not applicable to PSHAs conducted under the SPID.</p>	<p>This SR governs if an existing PSHA is used. Otherwise, the PSHA must follow the guidance in SPID section 2.3.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR-SHA-E	The probabilistic seismic hazard analysis SHALL -shall account for the effects of local site response.			
SHA-E1	<p>ACCOUNT in the probabilistic seismic hazard analysis for the effects of site topography, surficial geologic deposits, and site geotechnical properties on ground motions at the site.</p> <p><i>CC II-III</i></p>	<p>In the probabilistic seismic hazard analysis INCLUDE the effects of site topography, surficial geologic deposits, and site geotechnical properties on ground motions at the site.</p> <p><i>CC II-III</i></p>	<p>The effects of site topography, surficial geologic deposits, and site geotechnical properties will be taken into account by reviewing available licensing documents and other relevant studies in each site's vicinity. Any surficial geological deposits, and the geotechnical properties of subsurface geologic strata, will be taken into account in calculating the site amplification that might occur from incoming rock motions at the base of a sedimentary profile underlying each site. PSHAs conducted under the SPID will meet this requirement directly.</p>	<p>This SR governs, supported by review guidance in Topic#2. Also see Section 2.4 of the SPID.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SHA-E2	<p>ADDRESS both the aleatory and epistemic uncertainties in the local site response analysis.</p> <p><i>CC II-III</i></p>	<p>INCLUDE both the aleatory and epistemic uncertainties in the local site response analysis.</p> <p><i>CC II-III</i></p>	<p>Aleatory and epistemic uncertainties in local site response will explicitly be addressed in calculating site response: uncertainties will be included in shear-wave velocity for each sand, clay, and soft-rock layer, in the thickness of each sand and clay layer, in the depth to bedrock, and in the shear modulus and damping curves for each sand, clay, and soft-rock layer. PSHAs conducted under the SPID will meet this requirement directly.</p>	<p>This SR governs, supported by review guidance in Topic#2. Also see Section 2.4 of the SPID.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR-SHA-F	Uncertainties in each step of the hazard analysis shall be propagated and displayed in the final quantification of hazard estimates for the site. The results shall include fractile hazard curves, median and mean hazard curves, and uniform hazard response spectra. For certain applications, the probabilistic seismic hazard analysis shall include seismic source deaggregation and magnitude distance deaggregation.			
SHA-F1	In the final quantification of the seismic hazard, INCLUDE and DISPLAY the propagation of both aleatory and epistemic uncertainties. <i>CC II-III</i>	In the final quantification of the seismic hazard, INCLUDE uncertainties through a family of hazard curves. <i>CC II-III</i>	The final quantification of seismic hazard will include the propagation of both aleatory and epistemic uncertainties by generating multiple seismic hazard curves, each representing an alternative combination of epistemic uncertainties in input models and parameters, and each with an epistemic weight. The propagation of aleatory and epistemic uncertainties will be displayed through fractile hazard curves showing the effects of alternative assumptions on uncertainty in seismic hazard. PSHAs conducted under the SPID will meet this requirement directly.	This SR governs.
SHA-F2	In the probabilistic seismic hazard analysis, INCLUDE appropriate sensitivity studies and intermediate results to identify factors that are important to the site	In the probabilistic seismic hazard analysis, INCLUDE appropriate sensitivity studies and intermediate results to identify factors that are important to the site hazard and that make the analysis traceable.	For the CEUS, the CEUS Seismic Source Characterization project report includes sensitivity results at 7 test sites that show the effect on seismic hazard of alternative seismic sources and their parameters. In addition, for the CEUS, the Updated Ground Motion Model project report includes	This SR governs.

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
	<p>hazard and that make the analysis traceable.</p> <p><i>CC I-II-III</i></p>	<p><i>CC I-II-III</i></p>	<p>sensitivity results at the same 7 test sites that show the effect on seismic hazard of alternative ground motion models and their uncertainties. The WUS licensees will also conduct sensitivity studies as part of their SSHAC Level 3 studies. These sensitivity studies provide identification and traceability from the seismic source and ground motion inputs to the hazard results. Explicit sensitivity results to alternative site amplification models will not be included for each site.</p>	

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SHA-F3	<p>DEVELOP the following results as a part of the quantification process, compatible with needs for the level of analysis determined in (HLR-SHA-A):</p> <ul style="list-style-type: none"> (a) fractile and mean hazard curves for each ground motion parameter considered in the probabilistic seismic hazard analysis, (b) fractile and mean uniform hazard response spectrum <p><i>CC II</i></p>	<p>CALCULATE the following results as a part of the quantification process, compatible with needs for the level of analysis determined in (HLR-SHA-A):</p> <ul style="list-style-type: none"> (a) fractile and mean hazard curves for each ground motion parameter considered in the probabilistic seismic hazard analysis, (b) uniform hazard response spectra <p><i>CC II</i></p>	<p>The following results will be developed and presented in the PSHA report:</p> <ul style="list-style-type: none"> (a) fractile and mean hazard curves for peak ground acceleration and spectral accelerations, for the spectral frequencies at which seismic hazard is calculated. (a) fractile and mean uniform hazard response spectrum, anchored at the spectral frequencies at which seismic hazard is calculated and interpolated in between. <p>PSHAs conducted under the SPID will meet this requirement directly.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR-SHA-G	For further use in the seismic PRA, the spectral shape shall be based on a site-specific evaluation taking into account the contributions of deaggregated magnitude-distance results of the probabilistic seismic hazard analysis. Broad band, smooth spectral shapes, such as those presented in NUREG/CR-0098 [5-5] (for lower seismicity sites such as most of those east of the U.S. Rocky Mountains) are also acceptable if they are shown to be appropriate for the site. The use of uniform hazard response spectra is also acceptable unless evidence comes to light that would challenge these uniform hazard spectral shapes.			
SHA-G1	BASE the response spectral shape used in the seismic PRA on site-specific evaluations performed for the probabilistic seismic hazard analysis. REFLECT or BOUND the site-specific considerations. <i>CC II</i>	ENSURE that the spectral shape used in the seismic PRA uses site-specific evaluations performed for the probabilistic seismic hazard analysis. <i>CC II</i>	The final site spectral shape is based on the site amplification calculations that take into account site-specific soil properties. Thus the final site spectral shape reflects site-specific considerations. PSHAs conducted under the SPID will meet this requirement directly.	This SR governs.
HLR-SHA-H	When use is made of an existing study for probabilistic seismic hazard analysis purposes, it shall be confirmed that the basic data and interpretations are still valid in light of current information, the study meets the requirements outlined in A through G above, and the study is suitable for the intended application.			

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SHA-H1	<p>Use of existing studies allowed.</p> <p><i>CC II</i></p>	<p>CONFIRM that the basic data and interpretations of any existing studies used remain valid in light of established current information, consistent with the requirements in HLR-SHA-A through G, and DESCRIBE the bases and methodology used.</p> <p><i>CC I-II-III</i></p>	<p>Existing PSHA studies will not be used to characterize seismic hazard at any site. This requirement is not applicable to PSHAs conducted under the SPID.</p>	<p>This SR governs if an existing PSHA is used. Otherwise, the PSHA must follow the guidance in SPID sections 2.1, 2.2, and 2.3.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR-SHA-I	A screening analysis shall be performed to assess whether in addition to the vibratory ground motion, other seismic hazards, such as fault displacement, landslide, soil liquefaction, or soil settlement, need to be included in the seismic PRA for the specific application. If so, the seismic PRA shall address the effect of these hazards through assessment of the frequency of hazard occurrence or the magnitude of hazard consequences, or both.			
SHA-I1	(There are no supporting requirements here.) <i>CC I-II-III</i>	DOCUMENT the basis and methodology used for any screening out of the seismic hazards other than the vibratory ground motion. <i>CC I-II-III</i>	Screening evaluations for fault displacements should be performed on a site-specific basis ¹ . Screening evaluations for landslides, soil liquefaction, and soil settlement should be performed as necessary in the SPRA.	This SR governs.
SHA-I2	Not included in Addendum A	For those hazards not screened out, INCLUDE their effect through assessment of the frequency of hazard occurrence and the magnitude of hazard consequences.	The effects of fault displacements should be included in SPRAs if not screened out. The effects of landslides, soil liquefaction, and soil settlement should be included in the SPRA if not screened out.	This SR governs.

¹ Fault displacements significant enough to be considered would be identified in the plant UFSAR. If significant fault displacements are not identified in the plant UFSAR, that should be considered an adequate methodology for screening them out for SPRA impacts.

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR-SHA-J	Documentation of the probabilistic seismic hazard analysis shall be consistent with the applicable supporting requirements.			
SHA-J1	DOCUMENT the probabilistic seismic hazard analysis in a manner that facilitates PRA applications, upgrades, and peer review. <i>CC I-II-III</i>	DOCUMENT the probabilistic seismic hazard analysis in a manner that facilitates PRA applications, upgrades, and peer review. <i>CC I-II-III</i>	The PSHA will be documented with plots, tables of digital values, and supporting electronic files to facilitate PRA applications, upgrades, and peer review. PSHAs conducted under the SPID will meet this requirement directly.	This SR governs, supplemented by review guidance in Topic #15 and the documentation described in Section 6.8 of the SPID.
SHA-J2	(a) the specific methods used for source characterization and ground motion characterization, (b) the scientific interpretations that are the basis	DOCUMENT the process used in the probabilistic seismic hazard analysis. For example, this documentation is typically consistent with reference [5-28] and includes a description of: (a) the specific methods used for source characterization and ground motion characterization, (b) the scientific interpretations that are the basis for the inputs and results, and (c) if an existing PSHA is used, documentation to ensure that it is adequate to meet the	For the WUS, seismic hazards will be developed using the SSHAC Level 3 process, which is expected to meet the applicable documentation process. For the CEUS, the process used for developing the CEUS seismic sources and ground motion equations has been documented with references to supporting documents, experts contacted (with questionnaires and responses), and explanation/justification of alternative models and weights. Specifically: (a) For seismic source and ground motion characterization, the CEUS-Seismic Source Characterization and Updated Ground Motion Model projects documented the ranges of applicable models and data, to characterize epistemic uncertainties. PSHAs conducted under the SPID will meet this requirement through	(a) This SR governs, supplemented by review guidance in Topic #15 and the documentation described in Section 6.8 of the SPID. (b) This SR governs, supplemented by review guidance in Topic #15 and the documentation described in Section 6.8 of the SPID. (c) This SR governs if an existing PSHA is used. Otherwise, the PSHA must follow the guidance in SPID sections 2.1, 2.2, and 2.3.

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
	<p>for the inputs and results, and</p> <p>(c) if an existing PSHA is used, documentation to ensure that it is adequate to meet the spirit of the requirements herein.</p> <p><i>CC I-II-III</i></p>	<p>spirit of the requirements herein.</p> <p><i>CC I-II-III</i></p>	<p>the use of published models used as inputs.</p> <p>(b) The CEUS-Seismic Source Characterization and Updated Ground Motion Model projects documented the scientific interpretations (including tectonic models, geology, seismology, and empirical ground motion data) that were used to select applicable seismic sources and ground motion equations, and to reflect the range of interpretations that is scientifically justified.</p> <p>(c) Existing PSHA studies will not be used to characterize seismic hazard at any site. This requirement is not applicable to PSHAs conducted under the SPID.</p>	

SHA-J3	<p>DOCUMENT the sources of model uncertainty and related assumptions associated with the probabilistic seismic hazard analysis.</p> <p><i>CC I-II-III</i></p>	<p>DOCUMENT the sources of model uncertainty and related assumptions associated with the probabilistic seismic hazard analysis.</p> <p><i>CC I-II-III</i></p>	<p>The CEUS-Seismic Source Characterization and Updated Ground Motion Model projects documented the sources of model and parameter uncertainties as follows:</p> <ul style="list-style-type: none"> (a) Alternative RLME and background seismic sources reflect different interpretations on crustal structure and on the homogeneity of that structure. PSHAs conducted under the SPID will meet this requirement through the use of published models used as inputs. (b) Alternative parameters for RLME and background seismic sources reflect alternative interpretations and assumptions on homogeneity and possible earthquake size. PSHAs conducted under the SPID will meet this requirement through the use of published models used as inputs. (c) Alternative ground motion models reflect uncertainties on seismic ground motion in the CEUS. PSHAs conducted under the SPID will meet this requirement through the use of published models used as inputs. (d) Uncertainties in site profile parameters reflect uncertainties in shear-wave velocities, modulus curves, and damping curves appropriate for sites where direct data and measurements are limited. PSHAs conducted under the SPID will meet this requirement directly. 	<p>This SR governs, supplemented by review guidance in Topic #15 and the documentation described in Section 6.8 of the SPID.</p>
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SPID Table 6-4, Comparison of SPID Guidance to ASME/ANS PRA Standard Supporting Requirements: Element SFR

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR-SFR-A	The seismic-fragility evaluation shall be performed to estimate plant specific, realistic seismic fragilities of SSCs structures, or systems, or components, or a combination thereof whose failure may contribute to core damage or large early release, or both.			
SFR-A1	DEVELOP seismic fragilities for all those structures, systems, or components, or a combination thereof identified by the systems analysis (see Requirement SPR-D1). <i>CC I-II-III</i>	CALCULATE seismic fragilities for SSCs identified by the systems analysis (see Requirement SPR-D1). <i>CC I-II-III</i>	No substantive change from Addenda A to Addenda B. A note in the Standard refers to the screening criteria in HLR-SFR-B. Using these criteria, some SSCs do not require explicit fragility calculations, and others may be assessed using screening values. Note that Section 6.4.3 of this document provides explicit guidance for screening SSCs recognized to be very rugged and for performing more limited fragility calculations for certain other SSCs. The SPID does not provide guidance for identifying SSCs relevant to the seismic evaluation, but relies on other guidance. The intent is that the seismic evaluation be consistent with this requirement.	This SR governs. However, if the guidance in Section 6.4.3 of the SPID is used to perform screening of SSCs, the screening should be reviewed using Topic #8.

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SFR-A2	<p>BASE the seismic fragilities on plant-specific data, and ENSURE that they are realistic (median with uncertainties). Generic data (e.g., fragility test data, generic seismic qualification test data, and earthquake experience data) MAY be used for screening of certain structures, systems, or components, or a combination thereof and for calculating their seismic fragilities by applying the requirements under (HLR-SFR-F), which permits use of such generic data under specified conditions.</p> <p>However, DEMONSTRATE that any use of such generic data is conservative.</p> <p><i>CC II</i></p>	<p>CALCULATE the seismic fragilities based on plant-specific data, and ENSURE that they are realistic (median with uncertainties). Generic data (e.g., fragility test data, generic seismic qualification test data, and earthquake experience data) MAY be used for screening of certain SSCs and for calculating their seismic fragilities by applying the requirements under (HLR-SFR-F), which permits use of such generic data under specified conditions. However, DEMONSTRATE that any use of such generic data is applicable.</p> <p><i>CC II</i></p>	<p>The guidance in the SPID is consistent with this requirement. It entails applying simplified or generic values as a screening measure, and performing detailed calculations for SSCs that are important to risk (refer to Section 6.4).</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR-SFR-B	If screening of high-seismic-capacity components is performed, the basis for the screening shall be fully described (HLR-SFR-B).			
SFR-B1	<p>If screening of high-seismic-capacity components is performed, DESCRIBE fully the basis for screening and supporting documents. For example, it is acceptable to apply guidance given in EPRI NP-6041-SL, Rev. 1, and NUREG/CR-4334 to screen out components with high seismic capacity. However, CHOOSE the screening level high enough that the contribution to core damage frequency and large early release frequency from the screened-out components is not significant.</p> <p><i>CC I-II</i></p>	<p>If screening of high-seismic-capacity components is performed, DESCRIBE the basis for screening and supporting documents and SELECT the screening level high enough that the contribution to core damage frequency and large early release frequency from the screened-out components is not significant.</p> <p><i>CC I-II</i></p>	<p>Reference to NP-6041 and NUREG/CR-4334 has been removed in Addendum B but retained in a note, and its removal from the supporting requirement does not constitute a substantive change.</p> <p>The guidance in the SPID is consistent with this requirement. Screening criteria are addressed in detail in Section 6.4.3.</p>	<p>This SR governs. However, if the guidance in Section 6.4.3 of the SPID is used to perform screening of SSCs, the screening work should be reviewed using Topic #8.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SFR-B2	<p>ASSESS and DOCUMENT the applicability of the screening criteria given in EPRI NP-6041-SL, Rev. 1 [5-3] and NUREG/CR-4334 [5-4] for the specific plant and specific equipment.</p> <p><i>CC I-II-III</i></p>	<p>Deleted.</p> <p><i>CC I-II-III</i></p>	<p>The deletion of this supporting requirement in Addendum B is consistent with the general nature of the PRA Standard.</p> <p>The guidance for screening in the SPID does not explicitly address these documents, but the approach is consistent with the guidance they provide.</p>	<p>This SR governs if Addendum a is being used.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR-SFR-C	The seismic-fragility evaluation shall be based on realistic a seismic response that SSCs the structures, or systems, or components, or a combination thereof experience at their failure levels.			
SFR-C1	ESTIMATE the seismic responses that the components experience at their failure levels on a realistic basis using site-specific earthquake response spectra in three orthogonal directions, anchored to a ground motion parameter such as peak ground acceleration over a given frequency band. ENSURE that the spectral shape used reflects or bounds the site-specific conditions. <i>CC I-II</i>	ESTIMATE the seismic responses that the components experience at their failure levels on a realistic basis using earthquake response spectra in three orthogonal directions, anchored to a ground motion parameter such as peak ground acceleration or average spectral acceleration over a given frequency band or ENSURE that the spectral shape used bounds the site-specific conditions. <i>CC I-II</i>	Guidance for seismic-response analyses, and particularly for determining whether existing analyses are adequate, is provided in Section 6.3.2. The guidance provided conforms to each of the aspects of Supporting Requirement SFR-C1. A characterization of site-specific earthquakes is being provided for each NPP site as described in Section 2 of this document. The guidance does not provide specific recommendations as to use of peak ground acceleration (PGA) or average spectral acceleration. It is left to the SPRA analysts to assure appropriate alignment with the fragility parameter.	This SR governs.

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SFR-C2	<p>If probabilistic response analysis is performed to obtain realistic structural loads and floor response spectra, ENSURE that the number of simulations done (e.g., Monte Carlo simulation and Latin Hypercube Sampling) is large enough to obtain stable median and 85% nonexceedance responses. ACCOUNT for the entire spectrum of input ground motion levels displayed in the seismic hazard curves.</p> <p><i>CC I-II</i></p>	<p>If probabilistic response analysis is performed to obtain structural loads and floor response spectra, ENSURE that the number of simulations done (e.g., Monte Carlo simulation and Latin Hypercube Sampling) is large enough to obtain stable median and 85% nonexceedance responses.</p> <p>INCLUDE the entire spectrum of input ground motion levels displayed in the seismic hazard curves.</p> <p><i>CC I-II</i></p>	<p>Addendum B made minor changes.</p> <p>This consideration is not addressed explicitly in the SPID.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SFR-C3	<p>If scaling of existing design response analysis is used, JUSTIFY it based on the adequacy of structural models, foundation characteristics, and similarity of input ground motion.</p> <p><i>CC I-II</i></p>	<p>If scaling of existing response analysis is used, JUSTIFY it based on the adequacy of structural models, foundation characteristics, and similarity of input ground motion.</p> <p><i>CC I-II</i></p>	<p>The only change in Addendum B was to delete the word “design” from “existing design response analysis”. Explicit guidance for scaling of response analysis is provided in Section 6.3.3. This guidance provides an appropriate technical approach for Capability Category II. The guidance also addresses the use of response analysis other than that performed for design. Therefore, this supporting requirement should be satisfied for Addendum B, and the intent is satisfied for Addendum A.</p>	<p>If scaling is used, supplement this SR with review guidance in Topic #6.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SFR-C4	<p>When the design response analysis models are judged not to be realistic and state of the art, or when the design input ground motion is significantly different from the site-specific input motion, PERFORM new analysis to obtain realistic structural loads and floor response spectra.</p> <p><i>CC I-II</i></p>	<p>When the existing response analysis models are judged not to be realistic and state of the art, or when the existing input ground motion is significantly different from the site-specific input motion, PERFORM new analysis to obtain realistic structural loads and floor response spectra for use in the seismic PRA.</p> <p><i>CC I-II</i></p>	<p>The changes in Addendum B were to replace “design” with “existing”, and to add the condition that new analysis should be performed “for use in the seismic PRA”.</p> <p>This document provides guidance on how to characterize whether the existing seismic input motion is significantly different from the new estimate. It also provides guidance on determining whether an existing structural model is realistic and reflective of the state of the art. This guidance meets the intent Capability Category II.</p> <p>The guidance in Section 6.3 of the SPID is consistent with these requirements, except (as noted above), the response analysis need not be that used in the plant design. Therefore, this supporting requirement should be satisfied for Addendum B, and the intent is satisfied for Addendum A.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SFR-C5	<p>If median-centered response analysis is performed, ESTIMATE the median response (i.e., structural loads and floor response spectra) and variability in the response using established methods.</p> <p><i>CC I-II</i></p>	<p>If median-centered response analysis is performed, ESTIMATE the median response (i.e., structural loads and floor response spectra) and variability in the response using established methods.</p> <p><i>CC I-II</i></p>	<p>No change in Addendum B. This consideration is not addressed explicitly in the SPID.</p>	<p>This SR governs.</p>

SFR-C6	<p>When soil-structure interaction (SSI) analysis is conducted, ENSURE that it is median centered using median properties, at soil strain levels corresponding to the input ground motions that dominate the seismically induced core damage frequency. ACCOUNT for the uncertainties in the SSI analysis by varying the low strain soil shear modulus between the median value times $(1 + Cv)$ and the median value divided by $(1 + Cv)$, where Cv is a factor that accounts for uncertainties in the SSI analysis and soil properties. If adequate soil investigation data are available, ESTABLISH the mean and standard deviation of the low strain shear modulus for every soil layer. Then ESTABLISH the value of Cv so that it will cover the mean plus or minus one standard deviation for every layer. The minimum value of Cv is 0.5. When insufficient data are</p>	<p>When soil-structure interaction (SSI) analysis is conducted, ENSURE that it is median centered using median properties, at soil strain levels corresponding to the input ground motions that contribute most to the seismically induced core damage frequency. INCLUDE the uncertainties in the SSI analysis.</p> <p><i>CC I-II</i></p>	<p>Addendum B changes the action verb from “ACCOUNT for” to “INCLUDE” and deletes the “how-to” portion of the Addendum A requirement. This consideration is not addressed explicitly in the SPID.</p>	<p>This SR governs.</p>
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Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
	available to address uncertainties in soil properties, ENSURE that Cv is taken as no less than 1.0. <i>CC I-II</i>			

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR-SFR-D	The seismic-fragility evaluation shall be performed for critical failure modes of <u>SSCs</u> structures, or systems, or components, or a combination thereof such as structural failure modes and functional failure modes identified through the review of plant design documents, supplemented as needed by earthquake experience data, fragility test data, generic qualification test data, and a walk down.			

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SFR-D1	<p>IDENTIFY realistic failure modes of structures and equipment that interfere with the operability of equipment during or after the earthquake through a review of the plant design documents and the walkdown.</p> <p><i>CC I-II-III</i></p>	<p>IDENTIFY realistic failure modes of structures (e.g., sliding, overturning, yielding, and excessive drift), equipment (e.g., anchorage failure, impact with adjacent equipment or structures, bracing failure, and functional failure) and soil (i.e., liquefaction, slope instability, and excessive differential settlement) that interfere with the operability of equipment during or after the earthquake through a review of the plant design documents and the walkdown.</p> <p><i>CC I-II-III</i></p>	<p>Addendum B added examples of failure modes that needed to be addressed but did not change the substance of the supporting requirement.</p> <p>This consideration is not addressed explicitly in the SPID.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SFR-D2	<p>EXAMINE all relevant failure modes of structures (e.g., sliding, overturning, yielding, and excessive drift), equipment (e.g., anchorage failure, impact with adjacent equipment or structures, bracing failure, and functional failure), soil (e.g., liquefaction, slope instability, and excessive differential settlement), and EVALUATE fragilities for critical failure modes.</p> <p><i>CC I-II-III</i></p>	<p>EVALUATE relevant failure modes identified in SFR –D1 and EVALUATE fragilities for critical failure modes.</p> <p><i>CC I-II-III</i></p>	<p>Addendum B changed EXAMINE to EVALUATE and omitted “all” relative to failure modes, and omitted explicit listing of the failure modes (since they are already presented in Supporting Requirement SFR-D1).</p> <p>This consideration is not addressed explicitly in the SPID. It should be noted, however, that this document does provide guidance regarding liquefaction and soil failure relative to performing the quality review of IPEEE quality review for those plants using the IHS in the screening process.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR-SFR-E	The seismic-fragility evaluation shall incorporate the findings of a detailed walkthrough of the plant focusing on the anchorage, lateral seismic support, and potential systems interactions.			
SFR-E1	CONDUCT a detailed walkthrough of the plant, focusing on equipment anchorage, lateral seismic support, spatial interactions and potential systems interactions (both structural and functional interactions). <i>CC I-II-III</i>	CONDUCT a detailed walkthrough of the plant, focusing on equipment anchorage, lateral seismic support, spatial interactions and potential systems interactions (both structural and functional interactions). <i>CC I-II-III</i>	No change in Addendum B. This consideration is not addressed explicitly in the SPID.	This SR governs.
SFR-E2	DOCUMENT the walkthrough procedures, walkthrough team composition and its members' qualifications, walkthrough observations, and conclusions. <i>CC I-II-III</i>	DOCUMENT the walkthrough procedures, walkthrough team composition and its members' qualifications, walkthrough observations, and conclusions. <i>CC I-II-III</i>	No change in Addendum B. This consideration is not addressed explicitly in the SPID.	This SR governs.

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SFR-E3	<p>If components are screened out during or following the walkdown, DOCUMENT any anchorage calculations and PROVIDE the basis justifying such a screening.</p> <p><i>CC I-II-III</i></p>	<p>If components are screened out during or following the walkdown, DOCUMENT the basis including any anchorage calculations that justify such a screening.</p> <p><i>CC I-II-III</i></p>	<p>Wording changes in Addendum B account for the need to document the basis for any screening in addition to that based on anchorage calculations.</p> <p>Screening during the walkdown itself is not addressed explicitly in the SPID. Note, however, that Section 6.4.3 of this document provides explicit guidance for screening SSCs recognized to be very rugged and for performing more limited fragility calculations for certain other SSCs.</p>	<p>This SR governs. However, if the guidance in Section 6.4.3 of the SPID is used to perform screening of SSCs, the screening work should be reviewed using Topic #8.</p>
SFR-E4	<p>During the walkdown, FOCUS on the potential for seismically induced fire and flooding.</p> <p><i>CC I-II-III</i></p>	<p>During the walkdown, EVALUATE the potential for seismically induced fire and flooding by focusing on the issues described in NUREG-1407.</p> <p><i>CC I-II-III</i></p>	<p>Addendum B changed the action verb and provided additional guidance by reference.</p> <p>The assessment of seismically-induced fire and flooding is beyond the scope of the evaluations for which guidance is provided in the SPID.</p>	<p>If seismic-induced fire and flood evaluations are in the SPRA's scope, this SR governs. However, this evaluation is not required by the SPID.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SFR-E5	<p>During the walkthrough, EXAMINE potential sources of interaction (e.g., II/I issues, impact between cabinets, masonry walls, flammable and combustion sources, flooding, and spray) and consequences of such interactions on equipment contained in the systems model.</p> <p><i>CC I-II-III</i></p>	<p>During the walkthrough, EVALUATE potential sources of interaction (e.g., II/I issues, impact between cabinets, masonry walls, flammable and combustion sources, flooding, and spray) and consequences of such interactions on equipment contained in the systems model.</p> <p><i>CC I-II-III</i></p>	<p>Addendum B changed the action verb.</p> <p>This consideration is not addressed explicitly in the SPID.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR-SFR-F	The calculation of seismic-fragility parameters such as median capacity and variabilities shall be based on plant-specific data <u>supplemented as needed or if necessary</u> on earthquake experience data, fragility test data, and generic qualification test data. Use of such generic data shall be justified.			
SFR-F1	BASE component seismic-fragility parameters such as median capacity and variabilities (logarithmic standard deviations reflecting randomness and uncertainty) on plant-specific data supplemented as appropriate by earthquake experience data, fragility test data, and generic qualification test data. <i>CC I-II</i>	CALCULATE component seismic-fragility parameters such as median capacity and variabilities (logarithmic standard deviations reflecting randomness and uncertainty) based on plant-specific data or if necessary based on earthquake experience data, fragility test data, and generic qualification test data. <i>Exception:</i> JUSTIFY the use of generic fragility for any SSC as being appropriate for the plant. <i>CC I-II</i>	Addendum B changes the action verb from “BASE” to “CALCULATE” and changes the reference to sources beyond plant-specific data slightly. Section 6.4 of the SPID provides some guidance on the performance of the fragility analysis and suggests the use of the CDFM method to limit the amount of detailed analysis required. The SPID does not provide explicit guidance on how to calculate fragility parameters, but SPRA fragility analyses would be expected to satisfy this requirement.	This SR governs.

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SFR-F2	<p>For all structures, or systems, or components, or a combination thereof (SSCs) that appear in the dominant accident cut sets, ENSURE that they have site-specific fragility parameters that are derived based on plant-specific information, such as anchoring and installation of the component or structure and plant-specific material test data. Exception: JUSTIFY the use of generic fragility for any SSC as being appropriate for the plant.</p> <p><i>CC I-II</i></p>	<p>For SSCs that appear in the significant accident sequences, ENSURE that they have site-specific fragility parameters that are derived based on plant-specific information, such as anchoring and installation of the component or structure and plant-specific material test data.</p> <p><i>Exception:</i> JUSTIFY the use of generic fragility for any SSC as being appropriate for the plant.</p> <p><i>CC I-II</i></p>	<p>Addendum B changes the word “dominant” to the convention of “significant” used elsewhere in the PRA Standard.</p> <p>Section 6.4 of the SPID provides guidance on the performance of the fragility analysis that is intended to result in plant-specific estimates for risk-significant SSCs. This is intended to satisfy this supporting requirement.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SFR-F3	<p>DEVELOP seismic fragilities for relays identified to be essential and that are included in the systems-analysis model.</p> <p><i>CC II-III</i></p>	<p>CALCULATE seismic fragilities for relays identified to be essential and that are included in the systems-analysis model.</p> <p><i>CC II-III</i></p>	<p>Addendum B changed the action verb.</p> <p>Section 6.4 of the SPID provides guidance on the evaluation of relays. This guidance should be consistent with satisfying this supporting requirement.</p>	<p>This SR governs. For relays and related devices that are sensitive to high frequencies, the review should also use Topics #10 and #11.</p>
SFR-F4	<p>DEVELOP seismic fragilities for structures, or systems, or components, or a combination thereof that are identified in the systems models as playing a role in the large early release frequency part of the seismic PRA. (See Requirements SPR-A1 and SPR-A3).</p> <p><i>CC I-II-III</i></p>	<p>CALCULATE seismic fragilities for SSCs that are identified in the systems models as playing a role in the large early release frequency part of the seismic PRA. (See Requirements SPR-A1 and SPR-A3).</p> <p><i>CC I-II-III</i></p>	<p>No substantive change from Addenda A to Addenda B.</p> <p>This document provides guidance for identifying the SSCs that could be relevant for calculating LERF, and for which fragility analyses might be needed.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR-SFR-G	Documentation of the seismic fragility evaluation shall be consistent with the applicable supporting requirements.			
SFR-G1	<p>DOCUMENT the seismic fragility analysis in a manner that facilitates PRA applications, upgrades, and peer review.</p> <p><i>CC I-II-III</i></p>	<p>DOCUMENT the seismic fragility analysis in a manner that facilitates PRA applications, upgrades, and peer review.</p> <p><i>CC I-II-III</i></p>	<p>No change in Addendum B. The SPID identifies specific elements that need to be documented, but it is expected that the fragility analysis will be thoroughly documented in a manner consistent with this supporting requirement.</p>	<p>This SR governs, supplemented by review guidance in Topic #15 and the documentation described in Section 6.8 of the SPID.</p>

SFR-G2	<p>DOCUMENT the process used in the seismic fragility analysis. For example, this typically includes a description of:</p> <ul style="list-style-type: none"> (a) The methodologies used to quantify the seismic fragilities of structures, or systems, or components, or a combination thereof, together with key assumptions, (b) The structure, or system, or component, or a combination thereof (SSC) fragility values that includes the method of seismic qualification, the dominant failure mode(s), the source of information, and the location of the component, (c) The fragility parameter values (i.e., median acceleration capacity, β_R and β_U) and the technical bases for them for each analyzed SSC, and (d) The different elements of seismic- 	<p>DOCUMENT the process used in the seismic fragility analysis. For example, this typically includes a description of:</p> <ul style="list-style-type: none"> (a) The methodologies used to quantify the seismic fragilities of SSCs, together with key assumptions, (b) The structure, or system, or component, or a combination thereof (SSC) fragility values that includes the method of seismic qualification, the dominant failure mode(s), the source of information, and the location of the component, (c) The fragility parameter values (i.e., median acceleration capacity, β_R and β_U) and the technical bases for them for each analyzed SSC, and (d) The different elements of seismic-fragility analysis, such as <ol style="list-style-type: none"> (1) the seismic response analysis, (2) the screening steps, (3) the walkdown, (4) the review of design documents, (5) the identification of critical failure modes for each SSC, and (6) the calculation of 	<p>No substantive change in Addendum B.</p> <p>The SPID identifies specific elements that need to be documented, but it is expected that the fragility analysis will be thoroughly documented in a manner consistent with this supporting requirement.</p>	<p>This SR governs, supplemented by review guidance in Topic #15 and the documentation described in Section 6.8 of the SPID.</p>
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Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
	<p>fragility analysis, such as (1) the seismic response analysis, (2) the screening steps, (3) the walkdown, (4) the review of design documents, (5) the identification of critical failure modes for each SSC, and (6) the calculation of fragility parameter values for each SSC modeled.</p> <p><i>CC I-II-III</i></p>	<p>fragility parameter values for each SSC modeled.</p> <p><i>CC I-II-III</i></p>		
SFR-G3	<p>DOCUMENT the sources of model uncertainty and related assumptions associated with the seismic fragility analysis.</p> <p><i>CC I-II-III</i></p>	<p>Deleted.</p> <p><i>CC I-II-III</i></p>	<p>The SPID identifies specific elements that need to be documented, but it is expected that the fragility analysis will be thoroughly documented in a manner consistent with this supporting requirement.</p>	<p>This SR governs, supplemented by review guidance in Topic #15 and the documentation described in Section 6.8 of the SPID.</p>

SPID Table 6-4, Comparison of SPID Guidance to ASME/ANS PRA Standard Supporting Requirements: Element SPR

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR-SPR-A	The seismic-PRA systems model SHALL include seismic-caused initiating events and other failures including seismic-induced SSC failures, non-seismic-induced unavailabilities, and human errors that give rise to significant accident sequences and/or significant accident progression sequences.			
SPR-A1	ENSURE that earthquake-caused initiating events that give rise to significant accident sequences and/or significant accident progression sequences are included in the seismic-PRA system model using a systematic process. <i>CC I-II-III</i>	ENSURE that earthquake-caused initiating events that give rise to significant accident sequences and/or significant accident progression sequences are included in the seismic-PRA system model using a systematic process. <i>CC I-II-III</i>	No change in Addendum B. The SPID does not provide explicit guidance regarding the general nature of the SPRA model, but it would be expected that the SPRA would satisfy this requirement.	This SR governs.
SPR-A2	In the initiating-event selection process, DEVELOP a hierarchy to ensure that every earthquake greater than a certain defined size produces a plant shutdown within the systems model. <i>CC I-II-III</i>	In the initiating-event selection process, DEVELOP a hierarchy to ensure that every earthquake greater than a certain defined size produces a plant shutdown within the systems model. <i>CC I-II-III</i>	No change in Addendum B. The SPID does not provide explicit guidance relative to this aspect of the SPRA model, but it would be expected that the SPRA would satisfy this requirement.	This SR governs.

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SPR-A3	<p>USE the event trees and fault trees from the internal-event full-power PRA model as the basis for the seismic event trees.</p> <p><i>CC I-II-III</i></p>	<p>USE the accident sequences and the systems logic model from the internal-event at-power PRA model as the basis for the seismic PRA model.</p> <p><i>CC I-II-III</i></p>	<p>The change from Addendum A to Addendum B makes the reference to the type of models used more general.</p> <p>The SPID does not provide explicit guidance, but it is expected that any SPRA would build on the existing models from the internal-events PRA.</p>	<p>This SR governs.</p>
SPR-A4 (Add. A) SPR-A5 (Add. B)	<p>ENSURE that the PRA systems models reflect earthquake-caused failures and nonseismically induced unavailabilities and human errors that give rise to significant accident sequences or significant accident progression sequences.</p> <p><i>CC I-II-III</i></p>	<p><i>Becomes SPR-A5 in Addendum B.</i></p> <p>ENSURE that the PRA systems models reflect earthquake-caused failures and nonseismically induced unavailabilities and human errors that give rise to significant accident sequences or significant accident progression sequences.</p> <p><i>CC I-II-III</i></p>	<p>There is no change in the supporting requirement from Addendum A to Addendum B, except that the insertion of a new SPR-A4 in Addendum B changes the number for this requirement.</p> <p>The SPID does not provide explicit guidance, but it is expected that any SPRA would build appropriately incorporate both seismic and non-seismic failures in the PRA model.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SPR-A4 (Add. B)	This supporting requirement is new to Addendum B and not included in Addendum A.	<p>New SPR-A4 in Addendum B.</p> <p>Under special circumstances based on the judgment of the analyst, DEVELOP an <i>ad hoc</i> systems model tailored especially to the seismic-PRA configurations or issues being modeled, instead of starting with the internal-events model and adapting it, as in SPR-A3. If this approach is used, ENSURE that the resulting model is consistent with the internal-events systems model regarding plant response and the cause-effect relationships of the failures.</p> <p><i>CC I-II-III</i></p>	<p>This supporting requirement was added for Addendum B.</p> <p>The SPID does not provide explicit guidance, but it is expected that any SPRA would employ an appropriate approach, consistent with this requirement, in applying any <i>ad hoc</i> models.</p>	This SR governs.

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR-SPR-B	The seismic-PRA systems model shall be adapted to incorporate seismic-analysis aspects that are different from corresponding aspects found in the at-power full power , internal-events PRA systems model.			

SPR-B1	<p>In each of the following aspects of the seismic-PRA systems-analysis work, SATISFY the corresponding requirements in Part 2, except where they are not applicable or where this Part includes additional requirements.</p> <p>DEVELOP a defined basis to support the claimed nonapplicability of any exceptions. The aspects governed by this requirement are</p> <ul style="list-style-type: none"> (1) initiating-event analysis; (2) accident-sequence analysis; (3) success-criteria analysis; (4) systems analysis; (5) data analysis; (6) human-reliability analysis; (7) use of expert judgment. 	<p>In each of the following aspects of the seismic-PRA systems-analysis work, SATISFY the corresponding requirements in Part 2, except where they are not applicable or where this Part includes additional requirements.</p> <p>SPECIFY the basis to support the claimed nonapplicability of any exceptions. The aspects governed by this requirement are</p> <ul style="list-style-type: none"> (1) initiating-event analysis; (2) accident-sequence analysis; (3) success-criteria analysis; (4) systems analysis; (5) data analysis; (6) human-reliability analysis; (7) use of expert judgment. <p><i>CC I-II-III</i></p>	<p>There was a small wording change to remove “defined” basis and to indicate the need to “specify” the basis rather than to “develop” it.</p> <p>The SPID does not provide explicit guidance regarding following relevant elements of the PRA Standard for internal initiating events, but it would be expected that the SPRA would satisfy these requirements.</p>	<p>This SR governs.</p>
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Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
	<p>When the Part 2 requirements are used, USE the Capability Category designations in Part 2, and for consistency USE the same Capability Category in this analysis.</p> <p><i>CC I-II-III</i></p>			

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SPR-B2	<p>In the human reliability analysis (HRA) aspect, EXAMINE additional postearthquake stresses that can increase the likelihood of human errors or inattention, compared to the likelihood assigned in the internal-events HRA when the same activities are undertaken in nonearthquake accident sequences. Whether or not increases in error probabilities are used, JUSTIFY the basis for this decision about what error rates to use.</p> <p><i>CC I-II-III</i></p>	<p>INCLUDE the following seismic impacts on Performance Shaping Factors (PSFs) for the control room and ex-control room post-initiator actions as appropriate to the Human Reliability Analysis (HRA) methodology used:</p> <ul style="list-style-type: none"> (a) Additional post earthquake workload and stress that can increase the likelihood of human errors or inattention (b) Seismic failures that impact access (c) Cue availability <p><i>CC I-II</i></p>	<p>The requirement related to HRA has been completely re-written for Addendum B (including defining a separate requirement for Capability Category III). The updated requirement clarifies what is expected of the seismic HRA.</p> <p>The SPID does not provide explicit guidance regarding the conduct of the HRA for the seismic PRA, but it would be expected that the SPRA would satisfy this requirement.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SPR-B3 (Add. A) SPR-B4a (Add. B)	<p>If any screening is performed, PERFORM it using defined criteria that are documented in the PRA.</p> <p><i>CC I-II-III</i></p>	<p><i>Deleted in Addendum B and addressed by SPR-B5 as follows.</i></p> <p>If screening out on the basis of seismic capacity is performed in the systems model, PERFORM the screening on a documented basis.</p> <p><i>CC I-II-III</i></p>	<p>This requirement has been deleted in Addendum B because it is covered by Supporting Requirement SPR-B5. Acceptable screening criteria are provided in Section 6.4.3 of the SPID.</p>	<p>If Addendum a is used, this SR governs. However, if the guidance in Section 6.4.3 of the SPID is used to perform screening of SSCs, the screening work should be reviewed using Topic #8.</p>
SPR-B4 (Add. A) SPR-B3 (Add. B)	<p>PERFORM an analysis of seismic-caused dependencies and correlations in a way so that any screening of SSCs appropriately accounts for those dependencies and correlations. USE bounding or generic correlation values and PROVIDE the basis for such use.</p> <p><i>CC I-II</i></p>	<p>PERFORM an analysis of seismic-caused correlations in a way so that any screening of SSCs appropriately accounts for those correlations. USE bounding or generic correlation values and PROVIDE the basis for such use.</p> <p><i>CC I-II</i></p>	<p>A relatively minor change in Addendum B was to delete the phrase “dependencies and” in two places. The intent of the requirement did not change. The SPID does not provide explicit guidance regarding the treatment of seismic correlations. The SPRA would be expected to satisfy this requirement.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SPR-B5 (Add. A)	ENSURE that any screening of human-error basic events and non-seismic failure basic events does not significantly affect the PRA results.	<i>Deleted in Addendum B and replaced by SPR-B4a as follows.</i>	The requirement related to screening of non-seismic failures has been deleted, and a new requirement was added in Addendum B related to screening based on seismic capacity.	If Addendum a is used, this SR governs.
SPR-B4a (Add. B)	If screening out on the basis of seismic capacity is performed in the systems model, SPECIFY the screening criterion.	<i>CC I-II-III</i>	The SPID provides acceptable guidance regarding screening based on seismic capacity in Section 6.4.3.	
SPR-B4b (Add. B)	Not included in Addendum A.	If post-earthquake recovery actions are included in the systems model, INCLUDE them on a documented basis.	This is a new requirement in Addendum B.	This SR governs.
SPR-B6 (Add. A)	EXAMINE the effects of the chatter of relays and similar devices.	INCLUDE the effects of the chatter of relays and similar devices in the systems model.	Section 6.4.2 of the SPID provides acceptable guidance for the treatment of chattering due to high frequency ground motions.	This SR governs. The staff review of high-frequency relays and similar devices should use the guidance in Topics #10 and #11.
SPR-B4 (Add. B)	<i>CC II-III</i>	<i>CC I-II-III</i>		

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SPR-B7 (Add. A) SPR-B5 (Add. B)	In the systems-analysis models, for each basic event that represents a seismically caused failure, INCLUDE the complementary “success” state where applicable to a particular SSC. <i>CC I-II-III</i>	In the systems-analysis models, for each basic event that represents a significant seismically caused failure, INCLUDE the complementary “success” state where applicable to a particular SSC and SPECIFY the criteria used for the term “significant” in this activity. <i>CC I-II</i>	The supporting requirement from Addendum A was retained in Addendum B for Capability Category III, with the word “significant” added for Capability Categories I and II in Addendum B. The SPID does not present explicit guidance relative to this aspect of the systems models; it is expected that a SPRA would satisfy this requirement.	This SR governs.
SPR-B8 (Add. A) SPR-B6 (Add. B)	EXAMINE the possibility that a large earthquake can cause damage that blocks personnel access to safety equipment or controls, thereby inhibiting operator actions that might otherwise be credited. <i>CC I-II-III</i>	EVALUATE the possibility that a large earthquake can cause damage that blocks personnel access to safety equipment or controls, thereby inhibiting operator actions that might otherwise be credited. <i>CC I-II-III</i>	The only change from Addendum A to Addendum B was the change in action verb. The SPID does not present explicit guidance relative to this aspect of the treatment of operator response; it is expected that a SPRA would satisfy this requirement.	This SR governs.

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SPR-B9 (Add. A) SPR-B7 (Add. B)	EXAMINE the likelihood that system recoveries modeled in the internal-events PRA may be more complex or even not possible after a large earthquake, and ADJUST the recovery models accordingly. <i>CC II-III</i>	EVALUATE the likelihood that system recoveries modeled in the internal-events PRA may be more complex or even not possible after a large earthquake, and ADJUST the recovery models accordingly. It is acceptable to use generic or conservative recovery values. <i>CC II</i>	The action verb was changed from Addendum A to Addendum B. Also, the acceptability of using generic or conservative values was added for Capability Category II. The SPID does not present explicit guidance relative to this aspect of the treatment of recovery; it is expected that a SPRA would satisfy this requirement.	This SR governs.
SPR-B10 (Add. A) SPR-B8 (Add. B)	EXAMINE the effect of including an earthquake-caused “small-small loss-of-coolant accident” as an additional fault within each sequence in the seismic-PRA model. <i>CC I-II-III</i>	ASSUME the existence of an earthquake-caused “very small loss-of-coolant accident” in the SPRA accident sequences and system modeling, unless it is demonstrated that such a LOCA can be excluded, based on a walkdown or on another examination of the possible sources of such a LOCA. <i>CC I-II</i>	The requirement was made more definitive in Addendum B. The SPID does not provide explicit guidance on how to evaluate very small loss-of-coolant accidents, but the SPRA analyses would be expected to satisfy this requirement.	This SR governs.

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SPR-B11 (Add. A)	In the seismic PRA walkdown, EXAMINE the potential for seismically induced fires and flooding following the guidance given in NUREG-1407.		If the seismic PRA walkdown (see SFR-E4) identifies the potential for seismically induced fires and flooding, INCLUDE potential significant contributions to accident sequences in the systems model.	The action verb was changed from Addendum A to Addendum B.
SPR-B9 (Add. B)			The SPID does not present explicit guidance relative to this aspect of the treatment of recovery; it is expected that the walkdowns would include consideration of seismically induced fire and flooding. Any detailed analyses of scenarios associated with such consequential events would, however, be performed in a later assessment.	If seismic-induced fire and flood evaluations are in the SPRA's scope, this SR governs. However, this evaluation is not required by the SPID.

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR-SPR-C	The seismic-PRA systems model shall reflect the as-built and as-operated plant being analyzed.			
SPR-C1	To ensure that the systems-analysis model reflects the as-built, as-operated plant, JUSTIFY any conservatisms or other distortions introduced by demonstrating that the seismic-PRA's validity for applications is maintained. <i>CC I-II-III</i>	To ensure that the systems-analysis model reflects the as-built, as-operated plant, JUSTIFY any conservatisms or other distortions that do not adequately reflect the as-built, as-operated plant. <i>CC I-II-III</i>	The language has been clarified in Addendum B. The SPID does not provide explicit guidance, but it would be expected that the SPRA would satisfy this requirement.	This SR governs.
HLR-SPR-D	The list of SSCs selected for seismic-fragility analysis shall include <u>the all</u> SSCs that participate in accident sequences included in the seismic-PRA systems model.			

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SPR-D1	<p>USE the seismic PRA systems model as the basis for developing the seismic equipment list, which is the list of all SSCs to be considered by the subsequent seismic-fragility evaluation task.</p> <p><i>CC I-II-III</i></p>	<p>USE the PRA systems model as the basis for developing the seismic equipment list to support the fragility analysis of Section 5-2.2. INCLUDE structures and passive components that may not be present in the internal events model but which require consideration in the seismic PRA. SUPPLEMENT the list based on review of industry SPRA SELs (if available).</p> <p><i>CC I-II-III</i></p>	<p>“All” was deleted and the consideration of some structures was added in Addendum B.</p> <p>The SPID does not provide explicit guidance for developing the SEL, but it would be expected that the SPRA would satisfy this requirement.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR-SPR-E	The analysis to quantify core damage frequency and large early release frequency shall appropriately integrate the seismic hazard, the seismic fragilities, and the systems-analysis aspects.			
SPR-E1	<p>In the quantification of core damage frequency and large early release frequency, PERFORM the integration using the seismic hazard, fragility, and systems analyses.</p> <p><i>CC I-II-III</i></p>	<p>In the quantification of core damage frequency and large early release frequency, PERFORM the integration using the seismic hazard, fragility, and systems analyses.</p> <p><i>CC I-II-III</i></p>	<p>No change in Addendum B. The SPID does not provide explicit guidance for performing the quantification, but this integration is a typical task in SPRA, and the SPRA would be expected to satisfy this requirement.</p>	<p>This SR governs.</p>
SPR-E2	<p>In quantifying core damage frequency and large early release frequency, PERFORM the quantification on a cut-set-by-cut-set or accident-sequence-by-accident-sequence basis (or for defined groups of these), as well as on a comprehensive/integrated basis. It is acceptable to use broad groupings.</p> <p><i>CC I-II</i></p>	<p>PERFORM the quantification in accordance with applicable requirements described in subsection 2.2.7.</p> <p><i>CC I-II-III</i></p>	<p>The language was revised in Addendum B to refer to guidance in the internal-events portion of the Standard. The SPID does not provide explicit guidance for performing the quantification, but this integration is a typical task in SPRA, and the SPRA would be expected to satisfy this requirement.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SPR-E3	<p>In the analysis, USE the quantification process to ensure that any screening of SSCs does not affect the results, taking into account the various uncertainties.</p> <p><i>CC I-II-III</i></p>	<p>USE the quantification process to confirm and support the screening of SSCs (refer to SFR-B1).</p> <p><i>CC I-II-III</i></p>	<p>The language was clarified in Addendum B.</p> <p>The SPID provides acceptable guidance for the screening process, and the validity of the screening should be confirmed during the quantification.</p>	<p>This SR governs.</p>
SPR-E4	<p>In the integration/quantification analysis, ACCOUNT for all significant dependencies and correlations that affect the results. It is acceptable to use generic correlation values. If used, PROVIDE the basis for such use.</p> <p><i>CC I-II</i></p>	<p>In the integration/quantification analysis, INCLUDE the significant correlations that affect the results. It is acceptable to use generic correlation values. If used, PROVIDE the basis for such use.</p> <p><i>CC I-II</i></p>	<p>The language was clarified in Addendum B.</p> <p>The SPID does not provide explicit guidance for treating correlations. The SPRA would be expected to satisfy this requirement.</p>	<p>This SR governs.</p>
SPR-E5	<p>USE the mean hazard, composite fragilities, and the systems analysis to generate point estimates for core damage frequency (CDF) and large early release frequency (LERF). ESTIMATE the uncertainties in overall CDF and LERF.</p> <p><i>CC I-II</i></p>	<p>In the integration/quantification analysis, analysis, INCLUDE in the uncertainties in core damage frequency and large early release frequency results that arise from each of the several inputs (the seismic hazard, the seismic fragilities, and the systems-analysis aspects).</p> <p><i>CC II</i></p>	<p>The requirement was re-written for Addendum B, and separate requirements are provided for each of the three capability categories.</p> <p>The SPID does not provide explicit guidance for assessing uncertainty in the results, but the SPRA would be expected to satisfy this requirement.</p>	<p>This SR governs.</p>

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SPR-E6 (Add. A only)	PERFORM appropriate sensitivity studies to illuminate the sensitivity of the core damage frequency and large early release frequency results to the assumptions used about dependencies and correlations. <i>CC I-II-III</i>	Deleted in Addendum B	The SPID does not provide explicit guidance for sensitivity studies for the integrated model. The SPRA would be expected to satisfy this requirement.	This SR governs.
SPR-E6 (Add. B only)	New requirement in Addendum B.	In the analysis of LERF, SATISFY the LERF requirements in the internal-initiators section (Part 2, Section 2.2.8), where applicable. <i>CC I-II-III</i>	This requirement is entirely new for Addendum B. The SPID provides some guidance for assessment of LERF in Section 6.5.1.	This SR governs. In addition, the review of this technical issue should follow the guidance in Topic #13.
Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
HLR- SPR-F	The seismic-PRA analysis shall be documented in a manner that facilitates applying the PRA and updating it and that enables peer review.			
SPR-F1	DOCUMENT the seismic plant response analysis and quantification in a manner that facilitates PRA applications, upgrades, and peer review. <i>CC I-II-III</i>	DOCUMENT the seismic plant response analysis and quantification in a manner that facilitates PRA applications, upgrades, and peer review. <i>CC I-II-III</i>	No change in Addendum B. The SPID provides guidance for documentation of some aspects of the seismic PRA. The SPRA would be expected to satisfy this requirement.	This SR governs, supplemented by review guidance in Topic #15 and the documentation described in Section 6.8 of the SPID.

Standard Element	Requirements from Addendum A	Requirements from Addendum B	Relevant Intent of Guidance in SPID	NRC staff review guidance
SPR-F2	Error in Addendum A corrected in the supporting requirement in Addendum B.	DOCUMENT the process used in the seismic plant response analysis and quantification. <i>CC I-II-III</i>	The SPID provides guidance for documentation of some aspects of the seismic PRA. The SPRA would be expected to satisfy this requirement.	This SR governs, supplemented by review guidance in Topic #15 and the documentation described in Section 6.8 of the SPID.
SPR-F3	DOCUMENT the sources of model uncertainty and related assumptions associated with the seismic plant response model development. <i>CC I-II-III</i>	DOCUMENT the sources of model uncertainty and related assumptions associated with the seismic plant response model development. <i>CC I-II-III</i>	No change in Addendum B. The SPID provides guidance for documentation of some aspects of the seismic PRA. The SPRA would be expected to satisfy this requirement.	This SR governs, supplemented by review guidance in Topic #15 and the documentation described in Section 6.8 of the SPID.