

**RESPONSE TO PUBLIC COMMENTS ON DRAFT
STANDARD REVIEW PLAN 19.0: PROBABILISTIC RISK ASSESSMENT AND SEVERE
ACCIDENT EVALUATION FOR NEW REACTORS**

- On October 1, 2012, a Notice of Opportunity for Public Comment was published in the Federal Register (77 FR 24759) on the proposed Revision 3 to NUREG-0800, Standard Review Plan (SRP) Section 19.0. This revision updates review guidance for the U.S. Nuclear Regulatory Commission (NRC) staff based on experience gained from using the previous version in review activities. This revision also incorporates previously issued interim guidance in (1) Interim Staff Guidance (ISG) DC/COL-ISG-3, “PRA Information to Support Design Certification and Combined License Applications,” (2) ISG DC/COL-ISG-20, “Seismic Margin Analysis for New Reactors Based on Probabilistic Risk Assessment” and (3) ISG DI&C-ISG-03, “Interim Staff Guidance on Review of New Reactor Digital Instrumentation and Control Probabilistic Risk Assessments.” Sixty-one (61) Comments were received from the two (2) organizations listed below.
- The NRC staff’s review and disposition of these comments are provided in the Table 1. After reviewing these comments and preparing the disposition for each comment, the NRC staff determined the need to incorporate additional guidance in proposed Revision 3 to SRP Section 19.0 regarding the following three specific areas of focus: (1) deletion of considerations for an application for certification of a standard design, (2) proposed acceptance criteria and review procedures for the NRC staff review of an applicant’s assessment of risk from accidents that could affect multiple modules in facilities with small modular integral pressurized water reactors, and (3) procedures for the NRC staff review of probabilistic risk assessment (PRA) results for non-power modes of operation.
- On December 8, 2014, a Notice of Opportunity for Public Comment on the guidance in the three specific areas of focus listed above was published in the Federal Register (79 FR 72709). The NRC did not receive any comments on this guidance. The NRC received unsolicited comments from one of the original commenters (Nuclear Energy Institute) on guidance previously published for comment in the Federal Register (77 FR 24759) on October 12, 2012. After reviewing these comments, the NRC determined that, based on one of the comments, a statement in the draft SRP section intended as factual is incomplete and warrants revision. This comment and the change to proposed Revision 3 to SRP Section 19.0 stemming from this comment are provided in Table 2.

Public Entities providing comments on SRP 19.0, Draft Revision 3

<p>1. Nuclear Energy Institute (NEI) 1776 I Street, NW Washington, DC, 20006 (ADAMS Accession No.</p>	<p>2. Ameren Missouri P.O. Box 620 Fulton, MO 65251 (ADAMS Accession No. ML12306A029)</p>
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Table 1 – Comments on October 12, 2012 Federal Register Notice

No	Section of draft SRP 19.0	Originator	Specific Comment	NRC Resolution
1.	Section II. ACCEPTANCE CRITERIA, Footnote 1 on page 19.0-13	NEI	<p>The NRC has stated, in DC/COL-ISG-3, that peer reviews are not required prior to DC applications, but that self-assessments would be helpful. The footnote on page 13 implies that self-assessments would be helpful, but doesn't specifically state this.</p> <p>Suggest specifically stating in footnote 1 that "PRA self-assessments are an acceptable approach to assessing the technical adequacy of the PRA."</p>	<u>Staff Agrees:</u> footnote has been revised.
2.	Section II ACCEPTANCE CRITERIA Footnote 2 on page 19.0.18	NEI	<p>Footnote 2 on the Min-Max approach used in determining the functional and accident sequence level of fragility is not clear. Replace footnote 2 as follows:</p> <p>"A Min-Max method is used to determine the HCLPF capacity of an accident sequence from the HCLPF capacities of the contributing SSC failures, or the HCLPF capacity of the plant as a whole from the HCLPF capacities of a group of seismic-initiated accident sequences. The overall HCLPF capacity of two or more SSCs that contribute to a sequence using OR Boolean logic is equal to the lowest individual HCLPF capacity of the constituents of the group. If AND Boolean logic is used, the HCLPF capacity of the group is equal to the highest individual HCLPF capacity of the constituents. When evaluating several accident sequences to determine the "plant level HCLPF capacity," the plant-level HCLPF capacity is equal to the lowest of the sequence-level HCLPF capacities."</p>	<u>Staff Agrees:</u> footnote has been revised.
3.	Section VI, REFERENCES	NEI	EPRI Report 1002988, "Seismic Fragility Application Guide" from DC/COL-ISG-20, is not included in the list of references. Add this reference to Section VI, REFERENCES	<u>Staff Agrees:</u> Reference has been added

4.	Section III, REVIEW PROCEDURES, "Design-Specific PRA (Procedures for Specific PRA Audit Topics)", Item 3.B., page 19.0-28	NEI	Item 3.B: Recommend integrating this with DSRS Chapter 7, Appendix A "Hazards Analysis" Integrate Item 3.B with the DSRS Chapter 7, Appendix A "Hazards Analysis" (for integral pressurized water reactors).	<u>Staff Disagrees:</u> This is a PRA topic and therefore belongs in SRP 19.0. This item was previously included in Interim Staff Guidance (ISG) DI&C-ISG-03 which addressed treatment of digital I&C systems in PRAs.
5.	Section III, REVIEW PROCEDURES, "Design-Specific PRA (Procedures for Specific PRA Audit Topics)," Item 3.F, page 19.0-29	NEI	Item 3.F: Suggest clarification on which NRC technical branch (I&C, PRA, etc.) should review the I&C systems susceptibility to external events. Additionally, the integrated hazards analysis review for Chapter 7, Appendix A of the DSRS should cover all applicable external events. Clarify, in Item 3.F, which NRC technical branch reviews the I&C systems susceptibility to external events.	<u>Staff Agrees:</u> Staff will clarify that the I&C reviewer will review I&C systems susceptibility to external events.
6.	Section III, REVIEW PROCEDURES, "Design-Specific PRA (Procedures for Specific PRA Audit Topics)", Item A-C, page 19.0-30	NEI	Item A-C: Suggest integrating the review for CCFs with digital I&C systems with DSRS Chapter 7, Section 7.0 which covers the fundamental design principles. This requires clear coordination between the I&C and PRA NRC review staff. Clarify, in Item A-C, coordination of review for CCFs with digital I&C systems in DSRS Section 7.1, Fundamental Design Principles (for integral pressurized water reactors).	<u>Staff Agrees:</u> Review Interfaces section of SRP 19.0 has been revised to identify this as a key interface.

7.	Section III, REVIEW PROCEDURES, General Principles, page 19.0-18 and Severe Accident Evaluation (FSAR Section 19.2), page 19.0-34	NEI	<p>Appendix A of RG 1.206, "Standard Format and Content for FSAR Chapter 19," provides a section numbering scheme that is different than SRP Section 19.0 and other SRP Chapter 19 Sections. For example, there is a distinct section for Severe Accident Evaluations (19.2) in RG 1.206; however, SRP Section 19.2 is designated as "Review of Risk Information Used to Support Permanent Plant-Specific Changes to the Licensing Basis: General Guidance."</p> <p>The FSAR section numbering for presenting PRA and Severe Accident Evaluation should be clarified in the Affected Section. [It would be helpful to align RG 1.206 with the SRP Chapter 19 Sections. – low priority].</p>	<i>Staff will consider changes when RG 1.206 is updated. No change to SRP 19.0 have been made at this time.</i>
8.	Section I, AREAS OF REVIEW, last paragraph on page 19.0-4	NEI	Section I, AREAS OF REVIEW, 3rd paragraph before Section II, ACCEPTANCE CRITERIA, "hapter 19" should be "Chapter 19".	<i>Error has been corrected</i>
10.	Section III, REVIEW PROCEDURES, subheading "Design-Specific PRA (Procedures Specific to Passive Designs)," 1.B., Page 19.0-22	NEI	Section III, REVIEW PROCEDURES, subheading "Design-Specific PRA (Procedures Specific to Passive Designs)," 1.B., "phenomana" should be "phenomena".	<i>Error has been corrected</i>

11.	REVIEW RESPONSIBILITIES, page 19.0-1	NEI	<p>If the missions of the PRA/Severe Accident branch and the Containment branches are aligned in regard to review responsibilities then under REVIEW RESPONSIBILITIES, Secondary, include "Organization responsible for the review of containment integrity" or similar statement.</p> <p>Clarify division of responsibility between PRA/Severe Accidents/Structural and Containment branches and acknowledge responsibilities accordingly in Affected Section. (See also next comment/ recommendation).</p>	<p><i>The Staff Agrees that close coordination is necessary in the review for compliance with 10 CFR 50.44 under SRP 6.2.5 and the review of containment performance under severe accident conditions performed under SRP section 19.0. Such coordination has been the norm in recent reviews of new reactor applications. Organizational structures and work processes are in place to assure that it continues. The staff has added a section to the review interface section of SRP 19.0 to identify the necessary coordination.</i></p>
12.	Section I, AREAS OF REVIEW, Review Interfaces, pages 19.0-4 and 19.0-5	NEI	<p>It appears that overlapping NRC reviews from NRC technical branches (PRA/Severe Accidents/Structural branches in Chapter 19 and Containment Integrity/Systems branches in Chapter 6) could occur between SRP Sections 6.2.5 and Section 19.0 in the interpretation of 10 CFR 50.44.</p> <p>Clarify the division of responsibility and coordination between the various branches in Section I, AREAS OF REVIEW.</p>	<p><i>The Staff Agrees that close coordination is necessary in the review for compliance with 10 CFR 50.44 under SRP 6.2.5 and the review of containment performance under severe accident conditions performed under SRP section 19.2. Such coordination has been the norm in recent reviews of new reactor applications. Organizational structures and work processes are in place to assure that it continues. The staff has added a section to the review interface section of SRP 19.0 to identify the coordination necessary.</i></p>

13.	Section II, ACCEPTANCE CRITERIA, subheading "SRP Acceptance Criteria, <i>Background</i> ", pages 19.0-9 and 19.0-10	NEI	<p>In SRP Section 6.2.5, Regulatory Guide (RG) 1.7, "Control of Combustible Gas Concentrations in Containment," is cited, whereas it is not cited in the proposed SRP Section 19.0. RG 1.7 was revised in March 2007 to reflect the revision to 10 CFR 50.44.</p> <p>RG 1.7 is very relevant to the staff's review of Section 19.0 content in new plant applications</p> <p>Add RG 1.7 to the list of 11 supporting documents appearing on pages 19.0-9 and -10.</p> <p>This also should be added to reference section (i.e., Section VI).</p>	<u>Staff Agrees:</u> References to RG 1.7 have been added.
14.	Section I, AREAS OF REVIEW, Section II, ACCEPTANCE CRITERIA, Section III, REVIEW PROCEDURES, and Section IV, Evaluation Findings	NEI	<p>Both RG 1.7 and 1.216 represent regulatory guidance that is an acceptable means of meeting 10 CFR 50.44. Greater value is gained from these RGs when they are specifically and repeatedly cited in the SRP. Further, the evaluation methodologies addressing 10 CFR 50.44 are expected to incorporate both RGs.</p> <p>Include in the each of the Sections the expected role of both RGs.</p> <p>Review the specific reference callouts to SECY-93-087 to determine whether it would be more appropriate to reference either RG 1.7 or RG 1.216 rather than the SECY.</p>	<u>Staff Agrees:</u> Both RGs have been cited explicitly in the acceptance criteria section of the SRP with a description of their specific roles in the review of the containment performance assessment. A Review procedure for the containment performance assessment has been added to the Review Procedure section of the SRP.

15.	Section II, ACCEPTANCE CRITERIA, under subheading “Acceptance Criteria,” 2.B., bottom of page 19.0-11 continuing to page 19.0-12.	NEI	<p>Structural engineering evaluates the containment’s strength relative to combustion loads per 10 CFR 50.44(c)(5). A key assumption in related analyses is the set of scenarios developed addressing the “more likely severe accident challenges.” RG 1.216 describes an acceptable definition of the term “more likely severe accident scenarios” as:</p> <p><i>“The staff will review the technical basis for identifying the more likely severe accident challenges on a case-by-case basis. An example of an acceptable way to identify the more likely severe accident challenges is to consider the sequences or plant damage states.”</i></p> <p>Include the RG 1.216 clarification of “more likely severe accident scenarios” in the “Acceptance Criteria,” item 2.B, on pages 19.0-11 and -12. This could be incorporated by specific reference to RG 1.216 in 2.B or using a footnote phrased as identified in the italicized paragraph.</p>	<u>Staff Agrees:</u> footnote with reference to RG 1.216 has been added.
16.	Section II, ACCEPTANCE CRITERIA, Subheadings “SRP Acceptance Criteria” and <i>Background</i> , pages 19.0-9 and -10	NEI	<p>SECY-00-0198 is not cited in the proposed SRP Section 19.0 list of Commission direction and staff guidance. In RG 1.7, SECY-00-0198 is cited and in Section 5.3 of the SECY, it is stated that:</p> <p><i>“The risk-informed analytical requirements are: (1) full core melt accidents must be considered, (2) combustible gas generation from metal/water reaction and core/concrete interaction must be accounted for, and (3) realistic rates and amounts of combustible gas should be assessed.”</i></p> <p>Add SECY-00-0198 to the list of 11 supporting documents on pages 19.0-9 and -10 (Affected Section, subheading “SRP Acceptance Criteria,” sub-subheading “Background”).</p> <p>Include the SECY-00-0198 italicized statement in the SRP Section 19.0 under the list.</p>	<u>Staff Disagrees:</u> Staff has included reference to RG 1.7 in SRP 19.0. RG 1.7 provides the appropriate reference back to SECY-00-0198.

17.	Section II, ACCEPTANCE CRITERIA, subheadings "Requirements for DC Applicants," ('3.' on page 19.0-5), and "Requirements for COLA Applications" ('3.' on page 19.0-7)	NEI	<p>In Requirements for DC Applicants, 3. (page 19.0-5), the following statement is made: 10 CFR 52.47(a)(2) states that it is expected that the standard plant will reflect through its design, construction, and operation an <i>extremely low probability</i> for accidents that could result in the release of radioactive fission products.</p> <p>[this statement also applies in Requirements for COLA Applications (3. on page 19.0-7)]</p> <p>The phrase "extremely low probability" is vague; however, later on page 19.0-12, under subheading "Acceptance Criteria," 2. A., the Commission's goals for core damage frequency (CDF) of less than 10⁻⁴ per year and large release frequency (LRF) less than 10⁻⁶ per year are identified.</p> <p>Insert, under the subheading "Acceptance Criteria," 2. A., on page 19.0-11, "extremely low and" as follows: "The risk associated with the design is <i>extremely low and</i> compares favorably against the Commission's goals of less..."</p>	<p><u>Staff Disagrees:</u> the SRP instructions to reviewers are to consider the information in the application relating to individual accident sequences so as to avoid dominant contributors to risk. The SRP already clearly indicates the acceptance guidelines for total core damage frequency.</p>
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18	Section III, REVIEW PROCEDURES, subheading "Severe Accident Evaluation (FSAR Section 19.2)," item 3. (page 19.0-34)	NEI	<p>On page 19.0-34, under subheading "Severe Accident Evaluation (FSAR Section 19.2)" item 3, the phrase "high tolerance for severe accidents when compared to that of the operating plants" is used. This phrase is vague and could set requirements beyond that otherwise specified in the regulations. The robustness of a plant has already been quantified in this proposed SRP Section 19.0 in the form of the Commission's goals for CDF (10-4) and large release frequency (LRF) (10-6).</p> <p>Under subheading "Severe Accident Evaluation (FSAR Section 19.2)" on page 19.0-34, suggest replacing item 3 with "The reviewer compares the design features that affect containment performance and the calculated performance of the containment with published results for operating plants. The reviewer evaluates whether or not the design under review is robust and has a high tolerance for severe accidents when compared to that of the operating plants by confirming that the related CDF and LRF meet the Commission's goals of 10-4 and 10-6, respectively. The comparison and conclusions are documented in the safety evaluation report."</p>	<p><i><u>Staff Disagrees:</u> staff examines more than numerical results from PRA to evaluate whether or not the design under review is robust and has a high tolerance for severe accidents when compared to that of the operating plants. For example, the staff compares the important design features of the plant used to prevent or mitigate severe accidents. The staff also examines, among other things, how operating experience has been addressed, especially whether or not significant contributors to risk have been eliminated or been reduced to small contributors.</i></p>
19.	List Item 3 page 11	Ameren Missouri	<p>It is stated here that the FIVE method for fire PRA is acceptable but statements on page 25 indicate that fire PRAs need to be developed in accordance with NUREG/CR-6850.</p>	<p><i>Either method may be acceptable depending upon the application for which it is being used and conformity with guidance in RG 1.200. The discussion of review procedures for fire PRA has been revised to make it clear that other approaches besides NUREG/CR-6850, including FIVE, can be acceptable.</i></p>
20.	List Item 2-A on Page 11	Ameren Missouri	<p>Should the numerical goal for LRF be 1E-05/year rather than 1E-06/year?</p>	<p><i>No. 1E-06/year is correct.</i></p>

21.	List Item 9 on page 13	Ameren Missouri	[PRA] information in Chapter 19 [of the FSAR] needs to be left at a high/ programmatic level and the modeling details and insights controlled under a licensee controlled document not subject to FSAR revision requirements.	<i>The <u>Staff Agrees</u> that most modeling details do not need to be submitted with the FSAR. However, risk insights are considered an important result of the PRA and therefore, should be reported as a part of the description of the PRA and its results required under 10 CFR Part 52.</i>
22.	Footnote on page 27	Ameren Missouri	Information in footnote is redundant to information in previous text and should be removed	<i><u>Staff Agrees:</u> footnote has been removed.</i>

Table 2 – Comments on December 8, 2014 Federal Register Notice

No	Section of draft SRP 19.0	Originator	Specific Comment	NRC Resolution
1.	Page 19.0-8, Requirements for COL Applicants, 5.	NEI	10 CFR 52.79(a)(17) provides exception from 10 CFR 50.34 (f)(2)(xxv) as well. Does exception from 10 CFR 50.34 (f)(2)(xxv) apply to requirement 5 for COL applicants?	<i>Yes. The exception from 10 CFR 50.34 (f)(2)(xxv) applies to requirement 5 for COL applicants. The statement on Page19.0-8 has been changed to correctly state the requirements in 10 CFR 50.34(f) that apply.</i>