



**DESIGN CERTIFICATION/COMBINED LICENSE
DC/COL-ISG-028**

**Assessing the Technical Adequacy of the Advanced
Light-Water Reactor Probabilistic Risk Assessment for the
Design Certification Application and Combined License
Application**

Interim Staff Guidance

November 2016

(Final)

Interim Staff Guidance on Assessing the Technical Adequacy of the Advanced Light-Water Reactor Probabilistic Risk Assessment for the Design Certification Application and Combined License Application DC/COL-ISG-028

Issuance Status

Final

Purpose

The purpose of this document is to provide Interim Staff Guidance (ISG) for assessing the technical adequacy of the probabilistic risk assessment (PRA) needed for an application for design certification (DC) of an advanced light-water reactor (ALWR) under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," specifically 10 CFR 52.47(a)(27), as well as an application for a combined license (COL) under 10 CFR 52.79(a)(46). Specifically, this guidance addresses how these applicants can use American Society of Mechanical Engineers/American Nuclear Society (ASME/ANS) RA-Sa-2009, "Addenda to ASME/ANS RA-S-2008 Standard for Level 1/ Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications," (the PRA Standard), as endorsed by Regulatory Guide (RG) 1.200, Revision 2, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities."

This guidance is needed because the PRA Standard was developed for currently operating reactors. As a result, for PRAs developed for the DC and COL application stages, some supporting requirements in the PRA Standard are not applicable or cannot be achieved as written, while other supporting requirements need some clarification to understand how they can be achieved.

The current version of RG 1.200, which endorses the PRA Standard, was also developed for currently operating light-water reactors and does not specifically address how to apply the PRA Standard to an ALWR design at the DC or COL application stage. The next revision of RG 1.200 is expected to be issued following the development of the next edition of the PRA Standard, which is not expected to be completed for a number of years. This guidance has been developed to convey the staff position on the use of the PRA Standard for an ALWR DC or COL application until these positions are reflected in the next revisions of RG 1.200, RG 1.206, "Combined License Applications for Nuclear Power Plants," and Section 19.0, "Probabilistic Risk Assessment and Severe Accident Evaluation for New Reactors," of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," (SRP Section 19.0), as appropriate.

Background

The staff developed this guidance in a manner generally consistent with Section 1-3 of the PRA Standard. The staff evaluated the applicability of the supporting requirements of the PRA

Standard to PRAs developed for the DC and COL application stages. The staff also evaluated the feasibility of meeting the applicable supporting requirements, as written at the Capability Category I level.¹ For the applicable supporting requirements that needed some clarification or enhancement, or if a new supporting requirement was determined to be necessary to address the specific conditions of an application for a DC or COL, this guide provides supplemental guidance for addressing these supporting requirements at the Capability Category I level. This will ensure that the PRA relied on by the applicant is sufficient to provide confidence in the results and risk insights.

This guidance supplements RG 1.200 as an acceptable approach for applicants to demonstrate that the PRA used in the DC or COL application has a sufficient level of technical adequacy to support certification and licensing of reactors under 10 CFR Part 52. This interim guidance document is intended to provide the staff's position on using the PRA Standard for the DC and COL application until the guidance can be incorporated in a future revision of RG 1.200 and associated staff guidance, such as SRP Section 19.0 and Section C.I.19, "Probabilistic Risk Assessment and Severe Accident Evaluation" of RG 1.206.

This guidance only addresses the typical conditions for the DC and COL application. For example, the guidance is based on the expectation that DC applicants addressing the 10 CFR 52.47(a)(27) requirement will not have site-specific information, while the COL applicant addressing the 10 CFR 52.79(a)(46) requirement will have site-specific information. Applicants for DCs and applicants for COLs are also not expected to have detailed design and operational information, such as cable routing information, operating and maintenance procedures, and design-specific or plant-specific operating experience and data. If an applicant has more detailed information, this enhanced capability should be reflected in its PRA and application.

The positions presented in this guidance should not be relied on to address other types of applications that use PRA results and insights (e.g., risk-informed inservice inspections) or to address PRA requirements for COL holders/licensees (e.g., 10 CFR 50.71(h)(1)). Such applications need to directly address the application-specific regulations and guidance, including the evaluation of the technical adequacy of the PRA needed for the specific application using the PRA Standard, as endorsed by RG 1.200.

Regulatory Basis

The following regulations explicitly require the development and/or update of a PRA for a DC or COL application under 10 CFR Part 52:

10 CFR 52.47(a)(27) requires applicants for a DC under 10 CFR Part 52 to provide a description of the design-specific PRA and its results.

¹ The PRA Standard distinguishes the "capability" of the PRA using three categories. The delineation of the Capability Categories within the supporting requirements is generally, but not exclusively, that the degree of scope and level of detail, the degree of plant-specificity, and the degree of realism increase from Capability Category I to Capability Category III. In very general terms the Capability Categories can be considered to progress from "less detailed, more generic" (Capability Category I) to "state-of-practice," (Capability Category II) to "state-of-art" (Capability Category III).

10 CFR 52.79(a)(46) requires applicants for a COL under 10 CFR Part 52 to provide a description of the plant-specific PRA and its results.

10 CFR 52.79(d)(1) requires COL applications that reference a standard DC to provide an update of the DC PRA information to account for site-specific design information and any design changes or departures.

10 CFR 52.79(e)(1) requires COL applications that reference a manufactured nuclear power reactor licensed under subpart F of 10 CFR Part 52 to provide an update of the PRA information for the manufactured reactor to account for site-specific design information and any design changes or departures.

The staff review guidance for the DC application PRA and COL application PRA are contained in Revision 3 of SRP Section 19.0. The technical changes incorporated in Revision 3 of SRP Section 19.0 include:

1. guidance previously contained in Interim Staff Guidance DC/COL-ISG-003, “Probabilistic Risk Assessment Information to Support Design Certification and Combined License Applications,” concerning the review of PRA information and severe accident assessments submitted to support the DC and COL applications,
2. guidance previously contained in Interim Staff Guidance DC/COL-ISG-020, “Seismic Margin Analysis for New Reactors Based on Probabilistic Risk Assessment,” concerning the review of information from the PRA-based seismic margin analysis (SMA) submitted in support of the DC and COL applications,
3. guidance previously contained in Interim Staff Guidance DI&C/COL-ISG-003, “Interim Staff Guidance on Review of New Reactor Digital Instrumentation and Control Probabilistic Risk Assessments,” concerning the review of digital instrumentation and control system PRA models,
4. guidance on addressing modular designs if the applicant seeks approval for multiple modules,² and
5. additional guidance for the review of the PRA information and severe-accident assessments developed during the U.S Nuclear Regulatory Commission (NRC) reviews of DC and COL applications completed after Revision 2 of SRP Section 19.0 was issued.

Typically, the means for endorsing standards related to the technical adequacy of PRAs is provided by RG 1.200, which currently endorses ASME/ANS RA-Sa-2009 with a number of qualifications and clarifications. The guidance in RG 1.206, Section C.I.19.5, states that the applicant should adhere to the recommendations provided in RG 1.200. In addition, SRP Section 19.0 states that the staff will determine if the technical adequacy of the PRA is sufficient

² This ISG does not discuss any additional considerations for PRAs for multiple module designs. SRP Section 19.0 provides guidance on the additional considerations related to developing risk insights for multiple module designs.

to justify the specific results and risk insights that are used to support the DC or COL application. It further refers to RG 1.200 for ensuring that an applicant's PRA is consistent with the prevailing PRA Standard, guidance, and good practices. Finally, Regulatory Issue Summary 2007-06, "Regulatory Guide 1.200 Implementation," dated March 22, 2007, states that PRAs required per 10 CFR Part 52 should use NRC-endorsed consensus standards to the extent practicable.

Issue Discussion

The regulatory requirements and current guidance documents discussed in the above section establish a basis for demonstrating the technical adequacy of a PRA. This basis is primarily documented in RG 1.200, with staff review guidance associated with the DC and COL application in SRP Section 19.0. However, the PRA Standard and other PRA-related guidance documents endorsed by RG 1.200 were developed for currently operating reactors that have decades of operating experience. As a result, many supporting requirements assume that plant-specific operating experience and guidance are available to the PRA analyst, such as plant-specific equipment performance data, operators and trainers with plant-specific experience, and plant-specific procedures. Many of the supporting requirements refer to the plant-specific experience and documents directly instead of using more general terms for experience and operational guidance. This approach is also reflected in a number of supporting requirements that discuss "plant-specific" features, when the purpose of the supporting requirement is to address design or site features. Ambiguity is created in the application of these supporting requirements to ALWR designs when developing and submitting a DC or COL application. In addition, for an ALWR design at the DC or COL application stage, there are other challenges to developing, documenting, and reviewing a PRA in ways consistent with the PRA Standard because of the status of the site, design, operational, and maintenance information and data. Specific challenges for the PRA developed for the DC or COL application include:

- DC applications do not include site-specific information related to site features and characteristics.
- The events/hazards screening criteria in the PRA Standard can be orders of magnitude above the total plant risk because the improved safety of ALWR designs potentially results in screening significant risk contributors (relative to total plant risk) from the analysis.
- The specific layouts and routing of cabling and equipment and the capability of the equipment might not be fully known.
- There is no plant-specific operating experience and data.
- There is no plant-specific operating guidance (e.g., procedures, maintenance practices, testing frequencies, and equipment realignment frequencies).

- There are no trainers or operations staff with plant-specific experience to support interviews, reviews, or assessments.
- Walkdowns cannot be performed to confirm information and/or identify site-specific and plant-specific conditions.
- Uncertainties associated with the PRA are greater because of the lack of plant-specific information and experience, as identified above, and these additional uncertainties might affect other risk-informed applications of the PRA.

In turn, the above challenges create additional review and risk-informed application challenges. For example, the lack of specific knowledge and experience with a new reactor design, beyond the design organization, creates challenges associated with the ability to perform “peer reviews” that are fully consistent with the PRA Standard guidance.

Interim Staff Guidance

This section discusses how the PRA Standard should be used in determining the technical adequacy of the PRA for the DC application and COL application and addresses:

- PRA scope and capability
- PRA configuration control
- peer reviews
- operational guidance and practices
- large release frequency

In addition, this section includes a summary table, Table 1, “Challenges to Meeting Capability Category I of the PRA Standard for an ALWR DC Application and COL Application,” that identifies, for each of the challenges presented above, the affected supporting requirements and the associated general staff position on how the challenges should be addressed. Further, this section provides detailed tables, Tables 2 through 9 that parallel each numbered part of the PRA Standard containing the individual supporting requirements. The detailed tables address each supporting requirement, including qualifications and clarifications, for the DC application and COL application, as appropriate.

Scope and Capability of PRA for DC Application and COL Application

The first issue to discuss is the scope and capability of the PRA for the DC application and COL application. Consistent with SRP Section 19.0, meeting the applicable supporting requirements for Capability Category I and the high-level requirements in the PRA Standard should generally be sufficient for achieving a PRA scope and capability that is acceptable for the DC and COL applications. The vast majority of the supporting requirements through Part 5 of the PRA Standard explicitly address Capability Category I. There are a few situations in which no action is required to achieve Capability Category I. In some cases, not taking an action is conservative (e.g., not crediting recovery actions) and acceptable. In other cases, not taking the action is not necessarily conservative or appropriate for an ALWR DC application or COL application (e.g.,

not limiting the use of expert judgment) and the supporting requirement should be addressed in a way consistent with the Capability Category II level (or Capability Category III if no actions are required in Capability Category II either). These specific situations are identified in the detailed tables that address the individual supporting requirements.

Further, Part 6 of the PRA Standard addresses screening and conservative analysis for external hazards other than internal fire and seismic events. This part is followed by specific guidance for high winds (Part 7), external floods (Part 8), and other hazards (Part 9). The supporting requirements in Part 9 parallel the supporting requirements in Part 7 (high winds) and Part 8 (external floods), and is the general approach to addressing external hazards other than internal fires (of Part 4) and seismic events (of Part 5). Part 9 recognizes that a simplified and/or conservative approach might be appropriate in achieving Capability Category I for other hazards. The staff notes that Parts 7 and 8 do not define supporting requirements for Capability Category I in most cases; because they assume that if a hazard group passed through the Part 6 screening the user would need to perform the analysis to achieve Capability Category II. This assumption is generally acceptable for currently operating reactors that use the PRA Standard for voluntary risk-informed licensing actions, because these applications typically require the PRA to address the supporting requirements at Capability Category II. However, this assumption need not be a restriction for ALWRs. For the PRA required for the DC application and COL application, it is acceptable to address the PRA Standard supporting requirements at the Capability Category I level. Therefore, if it is necessary to address these hazards, DC and COL application PRAs should use the more generally applicable supporting requirements in Part 9 for achieving Capability Category I. These supporting requirements augment the development and technical adequacy evaluation of PRAs for high winds (Part 7) and external flood (Part 8). The approach each application should use for addressing the specific supporting requirements of each of these parts of the PRA Standard is provided in the detailed tables in this guidance.

Part 10 of the PRA Standard addresses SMA. The NRC explicitly states in RG 1.200 that this part of the PRA Standard is not endorsed by the NRC. For the DC and COL application PRAs, the staff has accepted the PRA-based SMA approach, which is described in Interim Staff Guidance DC/COL-ISG-020 and SRP Section 19.0. The PRA-based SMA approach uses the framework of Part 5 of the PRA Standard, but uses values for the seismic capacity of structures, systems, and components for which there is high confidence of a low probability of failure (referred to as the HCLPF values). The PRA-based SMA model is quantified to derive a plant-level HCLPF. This is in contrast to using failure probabilities (with uncertainty distributions) to calculate a seismic core damage frequency (CDF) or large release frequency (LRF). That being the case, the staff position is that DC applicants and COL applicants should not use Part 10 of the PRA Standard in the development or review of their PRA-based SMA. Rather, the applicant should use the guidance contained in Interim Staff Guidance DC/COL-ISG-020 and SRP Section 19.0 for developing and reviewing the PRA-based SMA. Therefore, this guidance does not evaluate the specific supporting requirements of Part 10.

PRA Configuration Control

The applicant's configuration control program should be consistent with Section 1-5 of the PRA Standard, as endorsed by RG 1.200, which includes the following elements:

1. a process for monitoring PRA inputs and collecting new information
2. a process that maintains and upgrades the PRA to be consistent with the as-built, as-operated plant
3. a process that ensures that the cumulative impact of pending changes is considered when applying the PRA
4. a process that maintains configuration control of computer codes used to support PRA quantification

In addressing element 2 above for the DC and COL application, the PRA configuration control program addresses the “as-to-be-built” and “as-to-be-operated” plant, based on the available design, site, operational, maintenance, and procedural information and guidance. The applicant’s PRA configuration control program should include guidance addressing when the PRA needs to be updated and/or upgraded consistent with the regulations and the PRA Standard. In particular, the PRA configuration control program should include guidance on addressing design or plant conditions that differ from the PRA model consistent with elements 2 and 3 above, such as those identified by design, site, or plant-specific change evaluations.

Peer Reviews or Self Assessments

As stated in SRP Section 19.0, the applicant must justify why the PRA is adequate in terms of scope, level of detail, and technical acceptability. While RG 1.200 contains the staff's guidance concerning peer reviews, SRP Section 19.0 states that the DC application’s PRA is not required to have a peer review. SRP Section 19.0 further states that if a peer review or self-assessment is conducted before the application, the staff should examine the documented results of the review. If certain aspects of the PRA deviates from accepted good practices, then the applicant should justify that the deviations do not impact the PRA results or risk insights. Otherwise, the applicant needs to revise the PRA to incorporate accepted good practices and resubmit the PRA results and risk insights.

The staff recognizes that when the applicant seeks an independent assessment of the technical adequacy of its PRA for the DC or COL application, the independent review team will likely not have specific knowledge of all aspects of the design in detail, but should have familiarity with the general design and operating philosophy based on the design and operating guidance available for that stage. In addition, the review documentation should identify any limitations associated with the review (e.g., aspects of the PRA that were not able to be fully reviewed) due to the status of the design, site, operational, and maintenance information or data that would impact the use of the risk results and insights. Further, the review documentation should identify the specific technical elements that need additional future reviews when the information becomes available.

Addressing Operational Guidance and Practices

As stated previously, the current regulatory guidance for demonstrating the technical adequacy of a PRA for use in risk-informed decision-making, as documented in RG 1.200, was developed for currently operating reactors that have decades of operating experience. As a result, many of the supporting requirements in the PRA Standard refer directly to using plant-specific guidance (e.g., plant-specific procedures and operating practices) in developing various aspects of the PRA. For the ALWR designs at the DC and COL application stages, this plant-specific guidance might not exist. In these cases, the applicant should develop the PRA based on the available general design and operational guidance and general industry practices. The staff considers this approach to meet the objective of these supporting requirements for the pre-operational phase.

When general design and guidance information and general industry practice is used, the PRA will contain more inherent assumptions and increased uncertainty. As a result, the applicant should document the limitations and impacts on the use of the risk results and insights and should document the sources of uncertainty and assumptions resulting from the use of general operational information. In the individual detailed tables, Tables 2 through 9, that address the supporting requirements for each part of the PRA Standard, new supporting requirements are included for each of the technical elements to capture the documentation of the assumptions, uncertainties, and their impacts on the use of the risk results and insights due to the status of the design, site, operational, and maintenance information or data.

Addressing Large Release Frequency

The fact that the PRA Standard was developed for currently operating reactors means that the risk metrics considered in the standard are CDF and large early release frequency (LERF). For the DC application and COL application, the LERF metric is replaced by the LRF metric. The approach and factors considered in calculating the LRF are essentially the same as used for calculating the LERF. Therefore, these applications should use the LERF supporting requirements in assessing and reviewing the technical acceptability of the LRF approach.

Summary of PRA Technical Challenges and Associated Staff Positions

Table 1 contains a summary of the main PRA technical issues that are the most challenging to address at the DC and COL application stage, as described previously. For each issue, the affected supporting requirements are identified and the general staff position is presented. These staff positions are in addition to the regulatory positions already provided in Appendix A, "NRC Regulatory Position on ASME/ANS PRA Standard," of RG 1.200 on the NRC-endorsed PRA Standard. Similar to the RG 1.200, Appendix A approach, the staff's position on each supporting requirement is designated as either "no objection," "clarification," or "qualification" and when applied in the context of the PRA used for the application for a DC or COL are defined as follows:

No Objection: The staff has no technical objection to the supporting requirement as written in the PRA Standard when used in the context of an application for a DC or COL beyond any clarification or qualification already provided in Appendix A of RG 1.200.

Clarification: The staff has no technical objection to the supporting requirement beyond any clarification or qualification already provided in Appendix A of RG 1.200. However, certain aspects of the supporting requirement need to be clarified when considered in the context of an application for a DC or COL. This clarification may include the recognition that additional assumptions may be needed or that the supporting requirement is conditioned, directly or by implication, on an activity or input that does not exist or is not performed at these application stages. As part of the clarification, the staff has provided a discussion that addresses any lack of clarity or ambiguity in the supporting requirement in the context of an application for a DC or COL, consistent with Section 1-3.4 of the PRA Standard.

Qualification: The staff has a technical concern with the supporting requirement in the context of an application for a DC or COL. This technical concern may be due to a number of factors in the context of the application for a DC or COL, including that the supporting requirement, as written, cannot be met or is not appropriate for use for either or both of these types of applications. As part of the qualification, the staff has provided a discussion and resolution of the technical concern in the context of the application for a DC or COL, consistent with Section 1-3.4 of the PRA Standard. This resolution may include enhancing or replacing the existing supporting requirement, creating a new supporting requirement, or providing other guidance for addressing the supporting requirement.

For each of the technical issues presented in Table 1, the staff position is provided to establish, in general terms, how the applicant should address this challenge. The detailed tables that follow Table 1 provide specific positions associated with each individual supporting requirement within the specific parts of the PRA Standard. Not every situation can be foreseen and, as a result, Table 1 and the detailed tables (Tables 2 through 9) represent the typically expected conditions for most applicants. In some unique situations, an applicant might have information available to meet a supporting requirement in a manner different from that designated herein. Therefore, the user of this guidance should evaluate their conditions against the information presented in Tables 2 through 9 to determine whether conditions support a different assessment than what is provided in these tables; if so, they should document these conditions.

Table 1. Challenges to Meeting Capability Category I of the PRA Standard for an ALWR DC Application and COL Application

TECHNICAL ISSUE	AFFECTED SUPPORTING REQUIREMENTS	GENERAL POSITION
Site-Specific Features and Characteristics	<p>Clarification: SFR-C2, SFR-C4, SFR-C5, SFR-C6, EXT-C2, XHA-A1</p> <p>Qualification: SHA-A1, SHA-A2, SHA-A3, SHA-A4, SHA-A5, SHA-B1, SHA-B2, SHA-B3,</p>	The staff recognizes that DC applications will not have regional or site-specific information on which to base their external hazard PRA/analysis or to ensure the information characterizes all credible hazards/sources at the site. DC applicants will typically establish site characteristics and site interface requirements upon which the specific hazards analysis will be performed. For COL applications, site-specific information will be available to address the supporting requirement

Table 1. Challenges to Meeting Capability Category I of the PRA Standard for an ALWR DC Application and COL Application

TECHNICAL ISSUE	AFFECTED SUPPORTING REQUIREMENTS	GENERAL POSITION
	SHA-C1, SHA-C2, SHA-C3, SHA-C4, SHA-D1, SHA-D2, SHA-D3, SHA-D4, SHA-E1, SHA-E2, SHA-F1, SHA-F2, SHA-F3, SHA-G1, SHA-H, SHA-I, SFR-C1, EXT-A2, WHA-A1, WHA-A2, WHA-A3, WHA-A4, WHA-A5, SPR-B1, WPR-B2, XFHA-A1, XFHA-A2, XFHA-A3, XFHA-A4, XFHA-A5, XFHA-A6, XFPR-B1, XFPR-B2	directly and/or confirm that the DC analysis bounds the actual site and regional characteristics.
Screening Events/Hazards for Analysis	<p>Clarification: EXT-B4</p> <p>Qualification: IE-C6, QU-D8, LE-F2, IFSN-A12, IFSN-A13, IFSN-A14, IFSN-A15, IFSN-A16, IFQU-A12, QNS-A1, QNS-C1, EXT-B1, EXT-B2, EXT-B3, EXT-C1, WPR-A6, XFPR-A6, XPR-A6</p>	<p>The staff recognizes that DC applications will not have regional or site-specific information on which to base the screening of external hazards or to ensure the information characterizes all credible hazards/sources at the site. DC applicants will establish site characteristics and site interface requirements on which specific hazards will be screened from further analysis. For COL applications, the site-specific conditions can be assessed to determine if there are additional hazards to consider.</p> <p>However, when performing this screening analysis, the qualitative and quantitative criteria (provided directly or as implied) in the PRA Standard should not be used for internal and external events/hazards. This is because of the potentially low plant CDF and LRF. Screening based on the PRA Standard's cited CDF criteria is not appropriate for ALWRs because it infers a CDF of up to about 1×10^{-6}/year and some qualitative criteria for screening external hazards can be even higher, which might be orders of magnitude greater than the base CDF at the site. The current version of the PRA standard does not identify unique screening criteria for new reactor designs that can have substantially lower risk profiles (e.g., plants with internal events CDF well below 1×10^{-6}/year). As</p>

Table 1. Challenges to Meeting Capability Category I of the PRA Standard for an ALWR DC Application and COL Application

TECHNICAL ISSUE	AFFECTED SUPPORTING REQUIREMENTS	GENERAL POSITION
		<p>stated in RG 1.200, the quantitative screening value should be adjusted according to the relative baseline risk value. Therefore, screening values lower than those in the PRA Standard need to be used commensurate with the lower CDF and LRF estimates expected for ALWRs. A number of supporting requirements are identified as not applicable and should not be used for screening purposes or are identified as needing to be replaced or enhanced with the criteria provided in the clarification. In addition, to ensure that internal and external hazard screening does not result in the screened out contribution being significant relative to the risk of the hazard group, a number of supporting requirements were enhanced (or new supporting requirements created) to check for this condition.</p>
<p>Plant-Specific Layouts and Capabilities</p>	<p>Clarification: FSS-F1, FSS-F3</p> <p>Qualification: CS-A2, CS-A3, CS-A4, CS-A5, CS-A6, CS-A7, CS-A8, CS-A9, CS-B1, FSS-F2</p>	<p>If the DC or COL applicant has specific information regarding equipment locations and layouts and cable routing, then these supporting requirements can be achieved. However, the staff recognizes that DC and COL applications might not have some plant-specific information; particularly associated with equipment layout and locations and cable routing. Under these conditions, the applicant will likely use design and operational guidance documents, general good engineering practices, and “exclusion” approaches in their analyses, which are acceptable to the staff.</p>
<p>Plant-Specific Operating Experience and Data</p>	<p>Clarification: IE-A3, IE-C2, IE-C4, DA-C4, DA-C10, DA-C11, DA-C12, DA-C13, DA-C16, DA-D8, IGN-A6, IGN-B4</p> <p>Qualification: DA-C2, DA-C3, DA-C5, DA-C6</p>	<p>The staff recognizes that DC and COL applications will not have plant-specific operating experience and associated data on which to base component failure rates and maintenance, surveillance, testing, and train realignment frequencies. That being the case, applicants either cannot meet the supporting requirement or, for cases in which the supporting requirement is conditioned on another supporting requirement, it is not applicable. The applicants should address these supporting requirements using generic data and general industry operating practices and documenting the assumptions used in developing their PRA.</p>
<p>Plant-Specific Guidance</p>	<p>Clarification: IE-C3, IE-C11, IE-C14,</p>	<p>The staff recognizes that for the DC and COL application stages, plant-specific procedures and</p>

Table 1. Challenges to Meeting Capability Category I of the PRA Standard for an ALWR DC Application and COL Application

TECHNICAL ISSUE	AFFECTED SUPPORTING REQUIREMENTS	GENERAL POSITION
(Procedures, Operating Practices, etc.)	<p>AS-A5, SC-A6, SY-A2, SY-A3, SY-A19, SY-A20, SY-B12, SY-B15, HR-A1, HR-A2, HR-A3, HR-D4, HR-D5, HR-E1, HR-E2, HR-F2, HR-G4, HR-G6, HR-H2, QU-D2, LE-D6, IFSN-A3, ES-A1, HRA-A2, HRA-B3</p> <p>Qualification: WPR-A11, XFPR-A11, XPR-A11</p>	<p>operating practices will not exist. The staff recognizes that the PRA at these stages will be based on design and operational guidance documents and typical industry practices, appropriate for that stage. That being the case, the staff believes applicants can meet these supporting requirements using general industry practices and design and operational guidance.</p>
Interviews	<p>Clarification: SY-A2, SY-A4, HR-E3, HRA-A4</p> <p>Qualification: HR-E4, SF-A5</p>	<p>There appear to be only a few supporting requirements that specifically require interviews or reviews to achieve CC I in the PRA Standard (and one other, SY-A2, identifies interviews as part of a list of sources of information).</p> <p>Most of the supporting requirements that require the review of procedure interpretations or confirmation that the system model reflects the design of the system can be achieved through interviews of knowledgeable design and/or plant personnel, appropriate for that stage. The staff also recognizes that, for DC and COL applications, the model will be based on design and guidance documents.</p> <p>Only SF-A5, which involves the review of plant fire brigade training procedure to establish the extent to which these procedures have prepared the personnel to respond to a fire, is not feasible at these application stages.</p>
Walkdowns	<p>Clarification: PP-B7, FSS-D10, FSS-D11, FSS-H10, SFR-E1, SFR-E2, SFR-E3, EXT-D1, EXT-D2,</p> <p>Qualification IFPP-A5, IFSO-A6,</p>	<p>The staff recognizes that, for DC and COL applications, walkdowns will not be able to be performed in most cases to collect or verify the information regarding specific site and design characteristics and features. The information considered in the PRA should be based on the available design and operational information for that stage.</p>

Table 1. Challenges to Meeting Capability Category I of the PRA Standard for an ALWR DC Application and COL Application

TECHNICAL ISSUE	AFFECTED SUPPORTING REQUIREMENTS	GENERAL POSITION
	IFSN-A17, IFQU-A11, SFR-D1, SFR-E4, SFR-E5, SPR-B11, WFR-A1, XFFR-A1, XFR-A2	
Treatment of Uncertainties	<p>Qualification: IE-D1, IE-D3, AS-C1, AS-C3, SC-C1, SC-C3, SY-C1, SY-C3, HR-I1, HR-I3, DA-E1, DA-E3, QU-F1, QU-F4, LE-G1, LE-G4, IFPP-B1, IFPP-B3, IFSO-B1, IFSO-B3, IFSN-B1, IFSN-B3, IFEV-B1, IFEV-B3, IFQU-B1, IFQU-B3, PP-C1, PP-C3, ES-D1, ES-D2, CS-C1, CS-C2, CS-C3, CS-C4, CS-C5, QLS-B2, QLS-B4, PRM-C1, PRM-C2, FSS-H9, FSS-H11, IGN-B1, IGN-B3, IGN-B5, QNS-D1, QNS-D2, QNS-D3, CF-B1, CF-B2, HRA-E1, HRA-E2, SF-B1, SF-B2, FQ-F1, FQ-F3, UNC-B1, UNC-B2, SHA-J1, SHA-J3, SFR-G1, SFR-G3, SPR-F1, SPR-F3, EXT-E1, EXT-E3, WHA-B1, WHA-B3, WFR-B1, WFR-B3, WPR-C1, WPR-C3, XFHA-B1, XFHA-B3, XFFR-B1, XFFR-B3, XFPR-C1, XFPR-C3, XHA-B1, XHA-B3, XFR-B1, XFR-B3, XPR-C1, XPR-C3</p>	<p>The staff recognizes that both increased uncertainty and reliance on more assumptions are associated with these application stages because of the status of the site, design, operational, and maintenance information and data. This additional uncertainty needs to be addressed in two aspects of how the supporting requirements are documented. First, by enhancing the existing supporting requirement related to documenting aspects that facilitate PRA applications, upgrades, and peer reviews, with the requirement to document limitations, and their bases, which would impact risk-informed applications because of the status of the site, design, operational, and maintenance information and data. (This might also include a discussion of sensitivity studies performed to provide a perspective on these impacts.) Second, by enhancing the existing supporting requirement related to characterizing the sources of model uncertainty and related assumptions with the requirement to document the additional sources of uncertainty and assumptions specifically related to the status of the design, site, operational, and maintenance information or data. For a few technical elements, it was necessary to develop a new supporting requirement to capture one or both of these enhancements.</p>

Addressing Specific Supporting Requirements of the PRA Standard

In addressing 10 CFR 52.47(a)(27), DC applicants will not have regional or site-specific information on which to base their analysis. In this case, DC applicants will likely establish site characteristics and site-interface requirements, typically described in Chapter 2 of the DC as part of the site selection criterion, to bound the analysis. As a result, supporting requirements that require the use of regional and/or site-specific information cannot be met for the DC application. Instead, the determination of acceptability of the analyses should be based on a bounding approach and results. This lack of regional and site-specific information will also impact the ability of the DC applicant to perform and confirm (e.g., by walkdowns) the systems analyses that require the use of site-specific information. For these cases, the DC application will likely rely on generic information and general design documents in developing the systems analyses. The system models will also not be fully developed because the operational aspects and design details might not be fully established at the DC application stage. As a result, the system models will be based on guidance documents instead of plant-specific procedures and operating experience.

In addressing 10 CFR 52.79(a)(46), the COL applicants will have regional and site-specific information on which to base their analyses. The COL applicants will either confirm and maintain the DC bounding analyses for their specific site or use the site-specific information in updating the analyses. If the COL applicant decides to rely on the DC bounding analysis and confirms it bounds the site parameters, then the supporting requirements for the use of regional and/or site-specific information will not be met, but the PRA may instead be determined to be acceptable based on the confirmation of the bounding results.

Many aspects of the systems analyses might also still not be fully developed and cannot be confirmed (e.g., by walkdowns) at the time of the COL application. As a result, the COL application may continue to rely on generic information and general design documents in the systems analyses. The system models will also not be fully complete because the operational aspects and details might not be fully established at the COL application stage. As a result, the system models will be based on guidance documents instead of plant-specific procedures and operating experience. The COL application should reflect the latest design and guidance, which may involve an update to the system models to reflect changes made since the DC application.

The detailed, supporting requirement-by-supporting requirement, evaluation is provided in the following tables, Tables 2 through 9, for each Part of the PRA Standard. Not every situation can be foreseen and, as a result, Table 1 and the detailed tables represent the typically expected conditions for most applicants. Unique situations might occur in which the applicant has information available to meet a supporting requirement in a manner different from that designated herein. Therefore, the applicant should evaluate their conditions against the information presented in the following detailed tables to determine whether conditions support a

different assessment than what is provided in these tables, if so, the applicant should document these conditions.

Addressing Part 2, Internal Events, Supporting Requirements

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
Initiating Events		
HLR-IE-A		The initiating event analysis shall provide a reasonably complete identification of initiating events.
IE-A1	No Objection	
IE-A2	Clarification	DC applicants may make assumptions regarding the design of some of the support systems (e.g., service water ultimate heat sink) to address the special initiators, while the COL applicant can more directly address the site-specific support system initiators if the design information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
IE-A3	Clarification	No plant-specific experience is available during these application stages. Because the objective of this supporting requirement is to ensure that the list of initiators is as complete as possible, and IE-A4 addresses the review of generic analysis of similar plants, this supporting requirement is Not Applicable. Therefore, the applicant does not need to address this supporting requirement.
IE-A4	Clarification	For most DC and COL applicants, there may be generic analysis of similar plants at the application stage. The supporting requirement is using this information to ensure that the list of initiators is as complete as possible in reflecting relevant industry experience. If there is no similar plant generic analysis, then the supporting requirement is Not Applicable and these applications do not need to address this supporting requirement. If there is similar plant generic analysis available, then the supporting requirement is feasible to meet as written.
IE-A5	Clarification	DC applicants may make assumptions regarding the design of some of the support systems though the impact of the loss of the system (or train of the system) can still be evaluated. The COL applicant can more directly address the site-specific support system design if the design information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
IE-A6	Clarification	DC applicants may make assumptions regarding the design of some of the support systems though the impact of the loss of the system (or train of the system) can still be evaluated. The COL applicant can

³ In Tables 2 through 9, where the supporting requirement has no action defined to achieve Capability Category I, the staff evaluated the lowest capability category with a defined action (and, for Tables 7 and 8, the parallel supporting requirement of Part 9) to determine if it was appropriate to be addressed for the DC or COL application. This determination is provided in the "Position" column of the table.

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
		more directly address the site-specific support-system design if the design information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
IE-A7	Clarification	For most DC and COL applicants, there will be no plant-specific experience, but there may be generic experience, to draw from at the application stage. The supporting requirement is using this information to ensure that the list of initiators is as complete as possible in reflecting relevant experience. If there is no relevant experience (including similar plant experience), then the supporting requirement is Not Applicable and these applications do not need to address this supporting requirement. If relevant generic experience (including similar plant experience) is available, then the supporting requirement is feasible to meet as written.
IE-A8	Qualification	CC I contains no requirement for interviewing plant personnel, while interviews are needed to achieve CC II. The DC application and COL application PRAs should include interviews of personnel familiar with the design, analysis, and expected operations appropriate for that stage to ensure no potential initiating events have been overlooked; recognizing that the interviews will not reflect plant-specific experiences, but design and general experiences.
IE-A9	Clarification	CC I contains no requirement for performing a precursor review using plant-specific operating experience, while such a review is needed to achieve CC II and a review of industry precursor events is needed to achieve CC III. It is not feasible to have plant-specific operating experience at these application stages. Therefore, these applicants are not expected to perform additional precursor reviews and this supporting requirement is met at CC I with no action.
IE-A10	Clarification	If the DC or COL is for a single unit or for a site in which there are no shared systems (including for example, separate switchyards and service water), then this supporting requirement is Not Applicable. For multi-unit designs, a DC may include assumptions regarding shared support system arrangements, while a COL can more directly address the designs for the alignment of site-specific shared support systems if the design information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
HLR-IE-B	The initiating event analysis shall group the initiating events so that events in the same group have similar mitigation requirements (i.e., the requirements for most events in the group are less restrictive than the limiting mitigation requirements for the group) to facilitate an efficient but realistic estimation of CDF.	
IE-B1	No Objection	
IE-B2	No Objection	
IE-B3	No Objection	
IE-B4	No Objection	

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
IE-B5	Clarification	If the DC or COL is for a single unit or for a site in which there are no shared systems (including for example, separate switchyards and service water), then this supporting requirement is Not Applicable. For multi-unit designs, a DC may make assumptions regarding shared support system arrangements, while a COL can more directly address the designs for the alignment of site-specific shared support systems if the design information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
HLR-IE-C	The initiating event analysis shall estimate the annual frequency of each initiating event or initiating event group.	
IE-C1	Clarification	The supporting requirement directs the use of relevant generic and plant-specific data. Because plant-specific data will not be available for these application stages, the initiating event frequency will be calculated from relevant generic data. This approach meets the supporting requirement as written.
IE-C2	Clarification	Because plant-specific data will not exist during these application stages it is not necessary to provide a justification for their use. That being the case, this supporting requirement is Not Applicable. Therefore, the applicant does not need to address this supporting requirement.
IE-C3	Clarification	For DC and COL applications, the justification for credited recovery actions will likely be based on design and guidance documents and good engineering practices; not procedures or training. These sources provide sufficient evidence to meet the supporting requirement as written for these applications.
IE-C4	Clarification	Because plant-specific data will not exist during these application stages, and thus generic and plant-specific data are not combined, it is not necessary to use a Bayesian update process to include plant-specific data or justify a generic prior. That being the case, this supporting requirement is Not Applicable. Therefore, the applicant does not need to address this supporting requirement.
IE-C5	Clarification	The supporting requirement requires that the frequency be calculated on a reactor year basis, which can be performed. However, because no operating experience data will exist for these application stages on which to estimate plant availability, an assumed expected availability will need to be used, with an appropriate justification. If 100% availability is used, which maximizes the at-power risk estimates, this availability should not be assumed for assessing the low power/shutdown risk estimate (i.e., for the low power/shutdown risk estimate a lower plant availability should be used and justified).
IE-C6	Qualification	The current version of the PRA standard does not identify unique screening criteria for new reactor designs that can have substantially lower risk profiles (e.g., internal events CDF well below 1×10^{-6} /year). RG 1.200 states the quantitative screening value should be adjusted according to the relative baseline risk value.

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
		<p>Lower screening values may need to be used commensurate with the lower CDF and LRF estimates expected from ALWRs. As a result, this supporting requirement should be replaced with the following:</p> <p>USE the following screening criteria to eliminate initiating events or groups from further evaluation:</p> <ul style="list-style-type: none"> (a) the mean frequency of the initiating event is less than 1×10^{-6} per reactor year (/ry) and core damage could not occur unless at least two trains of mitigating systems are failed independent of the initiating event, or (b) the mean frequency of the initiating event is less than 1×10^{-7}/ry and the initiating event does not involve or create an ISLOCA [interfacing systems loss-of-coolant accident], containment bypass, containment failure, or direct core damage (e.g., reactor pressure vessel rupture), or (c) the mean frequency of the initiating event is less than 1×10^{-8}/ry, or (d) the event does not result in a plant trip (manual or automatic) or a controlled manual shutdown. If credit is taken for operator actions to correct the condition to avoid a plant trip or controlled shutdown, then ENSURE that the credited operator actions and associated equipment have an exceedingly low probability of failure (i.e., collectively less than or equal to 1×10^{-5}) following the applicable supporting requirements of this part (e.g., Human Reliability Analysis – Subsection 2-2.5). <p>ENSURE that the value specified in the criterion meets the applicable requirements in the Data Analysis (Subsection 2-2.6) and Level 1 Quantification (Subsection 2-2.7).</p> <p>If additional screening criteria are applied, DEFINE the applied criteria and PROVIDE a basis that demonstrates internal initiating events that are screened out using the criteria are not significant contributors to internal events risk.</p>
IE-C7	Clarification	<p>CC I and CC II contain no requirement for performing time trend analysis; only CC III contains this requirement. At these application stages the initiating event frequencies should be based on generic information. That being the case, this supporting requirement is met at CC I with no action.</p>
IE-C8	Clarification	<p>If fault tree modeling is not used, then the supporting requirement is Not Applicable. If fault tree modeling is used, then meeting the supporting requirement is feasible. For DC and COL applicants some support systems may not be amenable to developing fault tree models because of the lack of site-specific information, so applicants instead might use generic data or bounding analyses or will assume</p>

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
		specific aspects of the design to enable modeling. The COL applicant may be able to use fault tree modeling approaches for addressing some of these site-specific support systems if additional design and site information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
IE-C9	Clarification	If fault tree modeling is not used, then the supporting requirement is Not Applicable. If fault tree modeling is used, then meeting the supporting requirement is feasible. For DC and COL applicants some support systems might not be amenable to developing fault tree models because of the lack of site-specific information, so applicants instead might use generic data or bounding analyses or will assume specific aspects of the design to enable modeling. The COL applicant may be able to use fault tree modeling approaches for these site-specific support systems if additional design and site information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
IE-C10	Clarification	If fault tree modeling is not used, then the supporting requirement is Not Applicable. If fault tree modeling is used, then meeting the supporting requirement is feasible. For DC and COL applicants some support systems may not be amenable to developing fault tree models because of the lack of site-specific information, so applicants instead might use generic data or bounding analyses or will assume specific aspects of the design to enable modeling. The COL applicant may be able to use fault tree modeling approaches for these site-specific support systems if additional design and site information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
IE-C11	Clarification	If fault tree modeling is not used, then the supporting requirement is Not Applicable. If fault tree modeling is used, then meeting the supporting requirement is feasible. For DC and COL applicants some support systems might not be amenable to developing fault tree models because of the lack of site-specific information, so applicants instead might use generic data or bounding analyses or will assume specific aspects of the design to enable modeling. The COL applicant may be able to use fault tree modeling approaches for these site-specific support systems if additional design and site information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems. Further, for DC and COL applicants, plant-specific information, such as procedures and operating experience, will not be available, but the applicants should use the available design and guidance documents to inform the assessment of recovery actions.
IE-C12	No Objection	

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
IE-C13	Clarification	For DC applicants, plant-specific features related to support systems may be assumed (e.g., service water ultimate heat sink). For COL applicants, if additional design information is available these features may be considered directly in determining the most applicable generic data to use for rare events; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
IE-C14	Clarification	For DC and COL applicants, the procedures will not be available, but design and guidance documents and good engineering practices may be used in assessing the influences on ISLOCA frequency. Similarly, plant-specific features may be assumed. For COL applicants, if additional design information is available these features may be considered directly; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
IE-C15	No Objection	
HLR-IE-D		Documentation of the initiating event analysis shall be consistent with the applicable supporting requirements.
IE-D1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and their bases, resulting from the status of the design, site, operational, and maintenance information or data that would affect applications.
IE-D2	No Objection	
IE-D3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of design, site, operational, and maintenance information or data.
Accident Sequence Analysis		
HLR-AS-A		The accident sequence analysis shall describe the plant-specific scenarios that can lead to core damage following each modeled initiating event. These scenarios shall address system responses and operator actions, including recovery actions that support the key safety functions necessary to prevent core damage.
AS-A1	No Objection	
AS-A2	No Objection	
AS-A3	No Objection	
AS-A4	No Objection	

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
AS-A5	Clarification	For DC and COL applications, the justification will likely be based on design and guidance documents; not on emergency or abnormal procedures.
AS-A6	No Objection	
AS-A7	No Objection	
AS-A8	No Objection	
AS-A9	Clarification	For DC and initial COLs, the thermal hydraulics will be primarily based on the design-related (deterministic and probabilistic) thermal hydraulics, although there might also be some similar plant analyses that could be utilized.
AS-A10	No Objection	
AS-A11	No Objection	
HLR-AS-B	Dependencies that can impact the ability of the mitigating systems to operate and function shall be addressed.	
AS-B1	No Objection	
AS-B2	No Objection	
AS-B3	No Objection	
AS-B4	Clarification	If the conditional split fraction method is not used, then this supporting requirement is Not Applicable.
AS-B5	No Objection	
AS-B6	Clarification	For DC and COL applications, non-normal plant configurations and maintenance practices might not be established, so dependencies between system alignments might not be completely recognized. Those aspects recognized at DC and COL stages should be defined and modeled in accordance with the supporting requirement.
AS-B7	No Objection	
HLR-AS-C	Documentation of the accident sequence analysis shall be consistent with the applicable supporting requirements.	
AS-C1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations and bases, resulting from the status of the design, site, operational, and maintenance information or data that would affect applications.
AS-C2	No Objection	
AS-C3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
Success Criteria		
HLR-SC-A		The overall success criteria for the PRA and the system, structure, component, and human action success criteria used in the PRA shall be defined and referenced, and shall be consistent with the features, procedures, and operating philosophy of the plant.
SC-A1	No Objection	
SC-A2	Clarification	If core damage is defined based on the simplified definitions of NUREG/CR-4550, then a justification should be provided that establishes the appropriateness of the definition for the particular design.
SC-A3	No Objection	
SC-A4	Clarification	If the DC or COL is for a single unit site or for a site in which there are no shared systems (including e.g., separate switchyards and service water) then this supporting requirement is Not Applicable. For multi-unit designs, a DC may make assumptions regarding shared support system arrangements, while a COL can more directly address the designs for the alignment of site-specific shared support systems if the design information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
SC-A5	No Objection	
SC-A6	Clarification	For DC and COL applications, the justification will likely be based on design and guidance documents that reflect the “operating philosophy;” not on procedures.
HLR-SC-B		The thermal/hydraulic, structural, and other supporting engineering bases shall be capable of providing success criteria and event timing sufficient for quantification of CDF and LERF [LRF], determination of the relative impact of success criteria on structures, systems, or components (SSC) and human actions, and impact of uncertainty on this determination.
SC-B1	No Objection	
SC-B2	Qualification	CC I contains no restriction regarding the use of expert judgment, while restriction is placed on the use of expert judgment to achieve CC II/III. The applicant should use expert judgment only in those situations for which there is a lack of available information or methods, consistent with CC II/III.
SC-B3	No Objection	
SC-B4	No Objection	
SC-B5	Clarification	For DC and initial COL applications there might be no similar plants against which to check results, though this is identified as an approach within the example list. The objective of the supporting requirement is to check for reasonableness and acceptability of analysis results, which could also be achieved by comparison against the traditional design engineering analysis results and other means.

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
		That being the case, meeting this supporting requirement is feasible for these application stages.
HLR-SC-C		Documentation of the success criteria shall be consistent with the applicable supporting requirements.
SC-C1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would affect applications.
SC-C2	No Objection	
SC-C3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
Systems Analysis		
HLR-SY-A		The systems analysis shall provide a reasonably complete treatment of the causes of system failure and unavailability modes represented in the initiating events analysis and sequence definition.
SY-A1	No Objection	
SY-A2	Clarification	For the DC application and COL application, the pertinent information used for the systems analysis will be that which reflects the “as-to-be-built” and “as-to-be-operated” design appropriate for that application stage.
SY-A3	Clarification	For DCs and COLs the procedures will not be available and some limits might not be established, but design and guidance documents may be used to enable the systems modeling.
SY-A4	Clarification	For the DC application and COL application, the pertinent information used for the systems analysis will be that which reflects the “as-to-be-built” and “as-to-be-operated” design appropriate for that application stage. The confirmation that the system model reflects the design of the system can be achieved through interviews of knowledgeable design and/or plant personnel, appropriate for that application stage. This confirmatory supporting requirement will be enhanced if additional system design information is available at the COL application stage.
SY-A5	Clarification	For these application stages, the system alignments might be known for most, but not all systems.

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
SY-A6	Clarification	DC applicants may make assumptions regarding the design of some of the support systems. The COL applicant can more directly address the site-specific support system design if the design information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
SY-A7	No Objection	
SY-A8	No Objection	
SY-A9	Clarification	If “super components” are not used, then the supporting requirement is Not Applicable. If “super components” are used, then it is feasible to meet the supporting requirement.
SY-A10	No Objection	
SY-A11	No Objection	
SY-A12	No Objection	
SY-A13	No Objection	
SY-A14	No Objection	
SY-A15	No Objection	
SY-A16	No Objection	
SY-A17	No Objection	
SY-A18	No Objection	
SY-A19	Clarification	For these application stages actual practices and plant history will not be available to develop component and train unavailabilities, especially those related to corrective maintenance. Therefore, the applicants should use general industry practices and the available design information for identifying component and train unavailabilities in the system models.
SY-A20	Clarification	For these application stages the system models should consider specific design features that allow and the simultaneous unavailability of redundant equipment and trains. In these cases, the applicant should use general industry practices and the available design information to model when redundant components or trains are expected to be unavailable at the same time.
SY-A21	No Objection	
SY-A22	Clarification	This supporting requirement is met at CC I if no credit is taken for equipment operability when the potential exists for rated or design capabilities to be exceeded. That being the case, it is feasible to meet this supporting requirement at CC I.
SY-A23	No Objection	
SY-A24	Clarification	For these application stages, this supporting requirement is met by not modeling the repair of hardware faults. If repairs are modeled, then, consistent with DA-C15 and DA-D9, this supporting requirement is feasible in these application stages, though the utilization of industry experience will need to be justified.
HLR-SY-B		The systems analysis shall provide a reasonably complete treatment of common cause failures and intersystem and intra-system dependencies.

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
SY-B1	Clarification	The supporting requirement allows the use of generic data in modeling intra-system common cause failures. That being the case, the supporting requirement is feasible for systems modeling.
SY-B2	Qualification	CC I and CC II contain no requirement for modeling inter-system common cause failures. Therefore, this supporting requirement is met without considering inter-system common cause failure. For a design that has similar systems providing the same function, the DC or COL applicant should consider inter-system common cause failure potential if it is supported by generic data (either modeling it, showing that it has no significant impact on the results, or justifying why there is no design feature susceptible to common cause failure) and for which inter-system common cause failure has been traditionally considered (e.g., RCIC and HPCI for a BWR).
SY-B3	No Objection	
SY-B4	No Objection	
SY-B5	Clarification	DC applicants may make assumptions regarding the design of some of the support systems. The COL applicant can more directly address the site-specific support system design if the design information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
SY-B6	Clarification	DC applicants may make assumptions regarding the design of some of the support systems. The COL applicant can more directly address the site-specific support system design if the design information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
SY-B7	Clarification	DC applicants may make assumptions regarding the design of some of the support systems. The COL applicant can more directly address the site-specific support system design if the design information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
SY-B8	Clarification	This supporting requirement requires the identification, and accounting for, impacts of spatial and environmental hazards. This is feasible for these application stages, but likely only to a limited extent, that is consistent with the level of information available for that stage.
SY-B9	Clarification	DC applicants may make assumptions regarding the design of some of the support systems. The COL applicant can more directly address the site-specific support system design if the design information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
SY-B10	No Objection	
SY-B11	No Objection	

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
SY-B12	Clarification	This supporting requirement establishes that systems should not be eliminated from modeling simply because a recovery procedure exists. Rather, the systems should be modeled, with the recovery actions included in the model quantification. That being the case, the supporting requirement is feasible to meet, though recovery actions will likely be addressed using design and operational guidance documents for the DC and COL application stages. Further, DC applicants may make assumptions regarding the design of some of the support systems, while the COL applicant can more directly address the site-specific support system design if the design information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
SY-B13	No Objection	
SY-B14	Clarification	This supporting requirement requires the identification of harsh environments, and inclusion of related dependent failures of multiple SSCs. This is feasible for these application stages, but likely only to a limited extent, that is consistent with the level of information available for that stage.
SY-B15	Clarification	This supporting requirement requires the inclusion of operator interface dependencies. This is feasible for these application stages based on the information available for that stage.
HLR-SY-C	Documentation of the systems analysis shall be consistent with the applicable supporting requirements.	
SY-C1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
SY-C2	No Objection	
SY-C3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
Human Reliability Analysis		

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
HLR-HR-A		A systematic process shall be used to identify those specific routine activities that, if not completed correctly, may impact the availability of the equipment necessary to perform system function modeling in the PRA.
HR-A1	Clarification	For DC and COL applications, the identification of activities that require realignment of equipment will likely be based on general design and guidance documents because test, inspection, and maintenance procedures and practices might not be developed.
HR-A2	Clarification	For DC and COL applications, the identification of calibration activities that could adversely impact automatic system initiation will likely be based on general design and guidance documents because calibration procedures and practices might not be developed.
HR-A3	Clarification	This supporting requirement uses the results of the identification activities of HR-A1 and HR-A2. For DC and COL applications, the determination of impacts will likely be based on general design and guidance documents because test, inspection, maintenance, and calibration procedures and practices might not be developed.
HLR-HR-B		Screening of activities that need not be addressed explicitly in the model shall be based on an assessment of how plant-specific operational practices limit the likelihood of errors in such activities.
HR-B1	Clarification	This supporting requirement is to establish rules for screening classes of activities. Though the example in the supporting requirement is not feasible for DC and COL applications because practices will not be established, screening criteria could be established based on design and guidance documents.
HR-B2	No Objection	
HLR-HR-C		For each activity that is not screened, an appropriate human failure event (HFE) shall be defined to characterize the impact of the failure as an unavailability of a component, system, or function modeled in the PRA.
HR-C1	No Objection	
HR-C2	No Objection	
HR-C3	No Objection	
HLR-HR-D		The assessment of the probabilities of the pre-initiator HFEs shall be performed by using a systematic process that addresses the plant-specific and activity-specific influences on human performance.
HR-D1	No Objection	
HR-D2	No Objection	
HR-D3	Clarification	There is no requirement at CC I to perform an evaluation of the quality of the written procedures, administrative controls, or human-machine interfaces. The staff expects these aspects of the design and operation will not be fully developed and only guidance would be relied upon in developing the PRA. That being the case, this supporting requirement can be met with no action.
HR-D4	Clarification	For DC and COL applications, the determination of recoveries will likely be based on general design and guidance documents because

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
		test, inspection, maintenance, and calibration procedures and practices might not be developed.
HR-D5	Clarification	The objective of this supporting requirement is to evaluate the potential for dependencies between HFES. For DC and COL applications, the determination will likely be based on general design and guidance documents because specific practices might not be developed.
HR-D6	No Objection	
HR-D7	Clarification	There is no requirement at CC I/II to check the reasonableness of the human-error probabilities (HEPs) in light of plant experiences. Further, at the DC and COL application stages, there will not be the plant experience available to check the HEPs. Therefore, this supporting requirement is met at CC I/II with no action needed.
HLR-HR-E		A systematic review of the relevant procedures shall be used to identify the set of operator responses required for each of the accident sequences.
HR-E1	Clarification	For DC and COL applications, the determination of key human response actions will likely be based on general design and guidance documents because procedures and operations might not be developed.
HR-E2	Clarification	For DC and COL applications, the identification of operator actions will likely be based on general design and guidance documents.
HR-E3	Clarification	This supporting requirement requires the review of the procedure interpretations with plant operations and training personnel to verify that they reflect the operations and training practices. For DC and COL applications, the model will likely be based on design and guidance documents; because procedures will not be available. In addition, the reviews should involve the design and/or plant disciplines responsible for developing and implementing the operational guidance.
HR-E4	Qualification	There is no requirement at CC I to use simulator observations or talk-throughs with operators to confirm the response models. The staff expects that in most cases the DC and COL applicant will not be able to use plant-specific simulator observations to make these confirmations and this supporting requirement can be met at CC I with no additional action. However, talk-throughs should be performed with the appropriate design and/or plant disciplines to confirm the response models for the scenarios modeled are consistent with the design and operational expectations.
HLR-HR-F		Human failure events shall be defined that represent the impact of not properly performing the required responses, in a manner consistent with the structure and level of detail of the accident sequences.
HR-F1	No Objection	
HR-F2	Clarification	For DC and COL applications, the timing, procedural, cues/indications, and complexity aspects will likely be based on design and guidance documents and analyses.

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
HLR-HR-G		The assessment of the probabilities of the post-initiator HFES shall be performed using a well-defined and self-consistent process that addresses the plant-specific and scenario-specific influences on human performance, and addresses potential dependencies between HFES in the same accident sequence.
HR-G1	No Objection	
HR-G2	No Objection	
HR-G3	Clarification	This supporting requirement requires that the approach for HEP estimation have the capability to account for the information defined in HR-F2. That being the case, this supporting requirement is feasible because it is a requirement on the approach.
HR-G4	Clarification	For these application stages, the timing aspects will likely be based on design and guidance documents and analyses and will be updated, as appropriate.
HR-G5	Clarification	This supporting requirement allows the estimation of time required to complete actions to achieve CC I. That being the case, this supporting requirement is feasible at CC I.
HR-G6	Clarification	Though plant history and experience will not be available and procedures and practices will not be available for these application stages, the supporting requirement is feasible because the check is for consistency and reasonableness in the HEPs relative to each other, which can be achieved.
HR-G7	Clarification	The evaluation for dependencies for the DC and COL applications will likely be based on design and guidance documents and analyses.
HR-G8	No Objection	
HLR-HR-H		Recovery actions (at the cutset or scenario level) shall be modeled only if it has been demonstrated that the action is plausible and feasible for those scenarios to which they are applied. Estimates of probabilities of failure shall address dependency on prior human failures in the scenario.
HR-H1	No Objection	
HR-H2	Clarification	For DC and COL applications, neither procedures nor training will be available on which to credit operator recovery actions. However, this supporting requirement allows the justification for not having these aspects. That being the case, for DC and COL applications the credit for operator recovery actions will likely be based on design and guidance documents and analyses.
HR-H3	No Objection	
HLR-HR-I		Documentation of the human reliability analysis shall be consistent with the applicable supporting requirements.
HR-I1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
HR-I2	No Objection	
HR-I3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
Data Analysis		
HLR-DA-A	Each parameter shall be clearly defined in terms of the logic model, basic event boundary, and the model used to evaluate event probability.	
DA-A1	No Objection	
DA-A2	No Objection	
DA-A3	No Objection	
DA-A4	No Objection	
HLR-DA-B	Grouping components into a homogeneous population for parameter estimation shall consider both the design, environmental, and service conditions of the components in the as-built [as-to-be-built] and as-operated [as-to-be-operated] plant.	
DA-B1	No Objection	
DA-B2	No Objection	
HLR-DA-C	Generic parameter estimates shall be chosen, and collection of plant-specific data shall be consistent with the parameter definitions of high level requirements (HLR)-DA-A and the grouping rationale of HLR-DA-B.	
DA-C1	Clarification	This supporting requirement relates to the collection of generic data, which is feasible. Though the supporting requirement includes a caution against using generic data for test, maintenance, and repair unavailability, it does allow the use of generic data with justification. That being the case, for these application stages, the applicant will need to justify the appropriateness of the generic data used for test, maintenance, and repair unavailabilities.
DA-C2	Qualification	Because plant-specific data will not be available, meeting the supporting requirement is not feasible in these application stages and any estimates will be developed using general industry experience data and design information consistent with DA-C1.
DA-C3	Qualification	Because plant-specific data will not be available, meeting the supporting requirement is not feasible in these application stages and any estimates will be developed using general industry experience data and design information consistent with DA-C1.
DA-C4	Clarification	This supporting requirement is conditioned on evaluating maintenance or other relevant records. Because there will not be maintenance or other operating experience records from which to extract plant-specific data, the supporting requirement is Not Applicable for these application stages and does not need to be addressed. Any estimates will be developed using general industry

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
		experience data and design information consistent with DA-C1. Therefore, the applicant does not need to address this supporting requirement.
DA-C5	Qualification	Because there will not be operating experience records from which to extract plant-specific data, meeting the supporting requirement is not feasible in these application stages and any estimates will be developed using general industry experience data and design information consistent with DA-C1.
DA-C6	Qualification	Because there will not be operating experience records from which to extract plant-specific data, meeting the supporting requirement is not feasible in these application stages and any estimates will be developed using general industry experience data and design information consistent with DA-C1.
DA-C7	Clarification	To meet CC I, this supporting requirement allows the estimation of the surveillance tests and planned maintenance activities using plant requirements information, which might be available in design and guidance documents. For these application stages, it is feasible to meet this supporting requirement at CC I based on estimations using design and guidance documents.
DA-C8	Clarification	To meet CC I, this supporting requirement allows the estimation of component standby times. For these application stages, it is feasible to meet this supporting requirement at CC I based on estimations using design and guidance documents.
DA-C9	Clarification	The objective of this supporting requirement is to derive the operational time for standby components and is essentially the opposite estimation of DA-C8, which is for estimation of components' standby time. That being the case, even though the operational data will not be available for these application stages, an estimate of the operational time for standby components can be provided to meet CC I/II.
DA-C10	Clarification	This supporting requirement is conditioned on using surveillance test data. For these application stages, actual plant surveillance test data will not be available. As such, this supporting requirement is Not Applicable for these application stages and any estimates will be developed using general industry experience data and design information consistent with DA-C1. Therefore, the applicant does not need to address this supporting requirement.
DA-C11	Clarification	This supporting requirement is conditioned on using data on maintenance and testing durations. For these application stages, actual plant maintenance and test durations will not be available. As such, this supporting requirement is Not Applicable for these application stages and any estimates will be developed using general industry experience data and design information consistent with DA- C1. Therefore, the applicant does not need to address this supporting requirement.

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
DA-C12	Clarification	This supporting requirement is conditioned on using unavailability data from operating experience. For these application stages, actual unavailability data will not be available. As such, this supporting requirement is Not Applicable for these application stages and any estimates will be developed using general industry experience data and design information consistent with DA-C1. Therefore, the applicant does not need to address this supporting requirement.
DA-C13	Clarification	This supporting requirement is conditioned on using operating experience to determine the duration of equipment unavailability. For these application stages, actual data will not be available. As such, this supporting requirement is Not Applicable for these application stages and any estimates will be developed using general industry experience data and design information consistent with DA-C1. Therefore, the applicant does not need to address this supporting requirement.
DA-C14	Clarification	For these application stages if an applicant determines redundant components are allowed to be unavailable at the same time (see SY-A19 and SY-A20), then the applicant should estimate these simultaneous unavailabilities using general industry experience and design information consistent with DA-C1.
DA-C15	Clarification	This supporting requirement allows the use of applicable industry experience when plant-specific experience is not sufficient to estimate repair modeling. That being the case, meeting this supporting requirement is feasible for these application stages, though any industry experience credited must be justified as being applicable to the component.
DA-C16	Clarification	For these application stages, plant-specific data for recovery of loss of power, loss of service water, etc., will not exist and generic information will likely be used, if any information is available or even credited (e.g., recovery of loss of service water may not be credited). That being the case, this supporting requirement is Not Applicable for these application stages. Therefore, the applicant does not need to address this supporting requirement.
HLR-DA-D		The parameter estimates shall be based on relevant generic industry or plant-specific evidence. Where feasible, generic and plant-specific evidence shall be intergraded using acceptable methods to obtain plant-specific parameter estimates. Each parameter estimate shall be accompanied by a characterization of the uncertainty.
DA-D1	Clarification t	This supporting requirement allows the use of generic information. As such, this supporting requirement is feasible for these application stages at CC I.
DA-D2	No Objection	
DA-D3	No Objection	
DA-D4	Clarification	There is no requirement for Bayesian updating to achieve CC I. Because generic information sources will typically be used, the need to perform Bayesian updates is not expected in these application

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
		stages. Therefore, this supporting requirement is met at CC I with no additional action.
DA-D5	No Objection	
DA-D6	No Objection	
DA-D7	No Objection	
DA-D8	Clarification	For these application stages, design changes may occur from DC through COL. However, this supporting requirement relates to plant-specific historical data for components becoming non-applicable because of design or operational changes. Because plant-specific data will not be available for these application stages, this supporting requirement is Not Applicable. Therefore, the applicant does not need to address this supporting requirement.
DA-D9	Clarification	This supporting requirement is added by Regulatory Guide 1.200 and requires the estimation of the probability of failure to repair components in time to prevent core damage based on the data collected in DA-C15. Consistent with DA-C15, this supporting requirement is feasible in these application stages, though it will be utilizing industry experience that will need to be justified.
HLR-DA-E		Documentation of the data analysis shall be consistent with the applicable supporting requirements.
DA-E1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
DA-E2	No Objection	
DA-E3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
Quantification		
HLR-QU-A		The level 1 quantification shall quantify core damage frequency and shall support the quantification of LERF [LRF].
QU-A1	No Objection	
QU-A2	No Objection	
QU-A3	No Objection	
QU-A4	No Objection	
QU-A5	No Objection	

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
QU-B		The quantification shall use appropriate models and codes, and shall account for method-specific limitations and features.
QU-B1	No Objection	
QU-B2	No Objection	
QU-B3	No Objection	
QU-B4	No Objection	
QU-B5	No Objection	
QU-B6	No Objection	
QU-B7	No Objection	
QU-B8	No Objection	
QU-B9	No Objection	
QU-B10	Clarification	If the aspects cited in the supporting requirement are not used, then this supporting requirement is Not Applicable. If these aspects are used, then this supporting requirement is feasible.
HLR-QU-C		Model quantification shall determine that all identified dependencies are addressed appropriately.
QU-C1	No Objection	
QU-C2	No Objection	
QU-C3	Clarification	If event tree linking is not used, then this supporting requirement is Not Applicable. If linking event trees is used, then this supporting requirement is feasible.
HLR-QU-D		The quantification results shall be reviewed, and significant contributors to CDF (and LERF [LRF]), such as initiating events, accident sequences, and basic events (equivalent unavailabilities and human failure events), shall be identified. The results shall be traceable to the inputs and assumptions made in the PRA.
QU-D1	No Objection	
QU-D2	Clarification	This supporting requirement involves the review of the results for modeling and operational consistency. Though there will not be procedures and no plant-specific experience for the DC and COL application stages, the review for operational consistency review can still be achieved by considering the plant configurations and any pertinent industry experience and considering the design and procedural guidance information.
QU-D3	No Objection	
QU-D4	Clarification	There is no requirement to compare results to similar plants to achieve CC I. Further, there are likely different design features for DC and COL applications that would make comparisons to other plants not practical. Therefore, the supporting requirement is met at CC I with no additional action.
QU-D5	No Objection	
QU-D6	No Objection	
QU-D7	No Objection	
QU-D8	Qualification	As stated in RG 1.200, the quantitative screening value should be adjusted according to the relative baseline risk value. Screening values lower than those in ASME/ANS RA-Sa-2009 need to be used commensurately with the lower CDF and LRF estimates expected

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
		<p>from ALWRs. As a result, this supporting requirement is added to ensure that the cumulative impacts of screened internal initiating events per IE-C6 are not a significant contributor to CDF, consistent with the definition of significant contributor in the PRA Standard, as follows:</p> <p>ENSURE that the sum of the frequencies of the internal initiating events that have been screened out is less than 5% of the total mean CDF for internal events.</p>
HLR-QU-E	Uncertainties in the PRA results shall be characterized. Sources of model uncertainty and related assumptions shall be identified, and their potential impact on the results understood.	
QU-E1	No Objection	
QU-E2	No Objection	
QU-E3	No Objection	
QU-E4	No Objection	
HLR-QU-F	Documentation of the quantification shall be consistent with the applicable supporting requirements.	
QU-F1	Qualification	<p>DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement:</p> <p>DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.</p>
QU-F2	No Objection	
QU-F3	No Objection	
QU-F4	Qualification	<p>DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement:</p> <p>DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.</p>
QU-F5	No Objection	
QU-F6	No Objection	

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
LERF [LRF] Analysis		
GENERAL CLARIFICATION: The approach in the standard for addressing LERF is also generally applicable for addressing LRF. Thus, reference in the standard to large early release or LERF should be interpreted as large release or LRF, respectively, for application to ALWRs. High Level Requirements that use the phrases large early release or LERF have been modified by including the bracketed phrase large release or LRF, as appropriate.		
HLR-LE-A		Core damage sequences shall be grouped into plant damage states based on their accident progression attributes.
LE-A1	No Objection	
LE-A2	No Objection	
LE-A3	No Objection	
LE-A4	No Objection	
LE-A5	No Objection	
HLR-LE-B		The accident progression analysis shall include an evaluation of contributors (e.g., phenomena, equipment failures, and human actions) to a large early release [large release].
LE-B1	Clarification	A correction to the supporting requirement is that the table cross reference should be to Table 2-2.8-9. In addition, if NUREG/CR-6595 is used, it should be justified as being applicable.
LE-B2	Clarification	If NUREG/CR-6595 is used, it should be justified as being applicable.
LE-B3	Clarification	A correction to the supporting requirement is that the cross reference should be to Table 2-2.3-3(b) related to success criteria thermal hydraulic and other engineering analyses.
HLR-LE-C		The accident progression analysis shall include identification of those sequences that would result in a large early release [large release].
LE-C1	Clarification	If NUREG/CR-6595 is used, it should be justified as being applicable.
LE-C2	Clarification	If NUREG/CR-6595 is used, it should be justified as being applicable.
LE-C3	Clarification	There is no requirement to address repair of equipment for CC I, while credit for repair is allowed for CC II/III. This supporting requirement is met by not modeling the repair of hardware faults, which is appropriate given the information available for these application stages. Though the requirement is met at CC I by taking no action, if repairs are modeled, then the applicant needs to address the supporting requirement at Capability Category II/III consistent with SY-A24, DA-C15, and DA-D9; the applicant should recognize that it will only be utilizing industry experience that will need to be justified.
LE-C4	Clarification	If NUREG/CR-6595 is used, it should be justified as being applicable.
LE-C5	No Objection	
LE-C6	No Objection	
LE-C7	No Objection	

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
LE-C8	No Objection	
LE-C9	Clarification	The applicant can achieve CC I by not taking any credit for equipment operations or operator actions in adverse environments. If NUREG/CR-6595 is used, it should be justified as being applicable.
LE-C10	Clarification	There is no requirement for CC I because it is supporting LE-C9. Though this supporting requirement is met at CC I by taking no action, if an applicant does take credit for continued operation or actions in adverse conditions and provides justification in LE-C9, then the applicant must also meet at least CC II for LE-C10.
LE-C11	Clarification	The applicant can achieve CC I by not taking any credit for equipment operations or operator actions that could be impacted by containment failure. If NUREG/CR-6595 is used, it should be justified as being applicable.
LE-C12	Clarification	There is no requirement for CC I because it is supporting LE-C11. Though this supporting requirement is met at CC I, if an applicant does take credit for continued operation or actions that could be impacted by containment failure and thus, provides justification in LE-C11, then the applicant must also meet at least CC II for LE-C12.
LE-C13	Clarification	If NUREG/CR-6595 is used, it should be justified as being applicable.
HLR-LE-D		The accident progression analysis shall include an evaluation of the containment structural capability for those containment challenges that would result in a large early release [large release].
LE-D1	Clarification	If NUREG/CR-6595 is used, it should be justified as being applicable.
LE-D2	Clarification	If NUREG/CR-6595 is used, it should be justified as being applicable.
LE-D3	Clarification	If NUREG/CR-6595 is used, it should be justified as being applicable.
LE-D4	No Objection	
LE-D5	No Objection	
LE-D6	Clarification	DC and COL applicants will rely on design and guidance documents, rather than plant-specific procedures to support the analysis of steam-generator (SG) tube rupture. If NUREG/CR-6595 is used, it should be justified as being applicable.
LE-D7	No Objection	
HLR-LE-E		The frequency of different containment failure modes leading to a large early release [large release] shall be quantified and aggregated.
LE-E1	No Objection	
LE-E2	Clarification	If NUREG/CR-6595 is used, it should be justified as being applicable.
LE-E3	Clarification	If NUREG/CR-6595 is used, it should be justified as being applicable.
LE-E4	Clarification	Note a correction to the supporting requirement is that the cross referenced tables should be 2-2.7-2(a), 2-2.7-3(b), and 2-2.7-4(c)

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
HLR-LE-F		The quantification results shall be reviewed, and significant contributors to LERF [LRF], such as plant damage states, containment challenges, and failure modes, shall be identified. Sources of model uncertainty and related assumptions shall be identified, and their potential impact on the results understood.
LE-F1	No Objection	
LE-F2	Qualification	<p>As stated in RG 1.200, the quantitative screening value should be adjusted according to the relative baseline risk value. Screening values lower than those in ASME/ANS RA-Sa-2009 need to be used commensurately with the lower CDF and LRF estimates expected from ALWRs. As a result, this supporting requirement is enhanced, as follows, to ensure that the cumulative impacts of screened internal initiating events per IE-C6 are not a significant contributor to LRF, consistent with the definition of significant contributor in the PRA Standard.</p> <p>ENSURE that the sum of the frequencies of the internal initiating events that have been screened out is less than 5% of the total mean LRF for internal events.</p>
LE-F3	Clarification	A correction to the supporting requirement is that the cross referenced tables should be 2-2.7-5(d) and 2-2.7-6(e).
HLR-LE-G		Documentation of the LERF [LRF] analysis shall be consistent with the applicable supporting requirements.
LE-G1	Qualification	<p>DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement:</p> <p>DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.</p> <p>If the NUREG/CR-6595 approach is used to meet a supporting requirement, DOCUMENT the basis for the use of NUREG/CR-6595 for each affected supporting requirement.</p>
LE-G2	No Objection	
LE-G3	No Objection	
LE-G4	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement:

Table 2. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 2, Internal Events at Power³

Supporting Requirement	Position	Discussion
		DOCUMENT the additional sources of uncertainty and related assumptions and limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data.
LE-G5	No Objection	
LE-G6	No Objection	

Addressing Part 3, Internal Flood, Supporting Requirements

In addition to the general limitations, DC applications addressing 10 CFR 52.47(a)(27) and COL applications addressing 10 CFR 52.79(a)(46) might not have developed the specific pipe routing and flooding protection/mitigation information. This might impact the manner in which the applicant models internal floods. Where specific information is lacking, the applicant will likely rely on the design guidelines and on good engineering practices. Further, the supporting requirements requiring walkdowns are not feasible for these application stages.

Many supporting requirements refer back to the internal events PRA supporting requirements. As such, these supporting requirements should also consider the evaluation of the applicability and feasibility of the referenced supporting requirement, including any pertinent comments or clarifications.

Table 3. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 3, Internal Flood at Power

Supporting Requirement	Position	Discussion
Internal Flood Plant Partitioning		
HLR-IFPP-A		A reasonably complete set of flood areas of the plant shall be identified.
IFPP-A1	No Objection	
IFPP-A2	No Objection	
IFPP-A3	Clarification	If the DC or COL is for a single unit or for a site in which there are no shared systems or structures (including e.g., separate service water) then this supporting requirement is Not Applicable. For multi-unit designs, a DC may make assumptions regarding shared support system arrangements, while a COL can more directly address the designs for the alignment of site-specific shared support systems if the design information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
IFPP-A4	Clarification	DC and COL applications will likely rely on design and guidance documents to reflect the as-to-be-built, as-to-be-operated plant.

Table 3. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 3, Internal Flood at Power

Supporting Requirement	Position	Discussion
IFPP-A5	Qualification	For DC and COL applications, walkdowns will not be able to be performed to verify the information collected in IFPP-A1 through A4. General design and guidance documents will likely be relied upon to address spatial information and plant design features.
IFPP-		Documentation of the internal flood plant partitioning shall be consistent with the applicable supporting requirements.
IFPP-B1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
IFPP-B2	No Objection	
IFPP-B3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
Internal Flood Source Identification		
HLR-IFSO-A		The potential flood sources in the flood areas, and their associated internal flood mechanisms, shall be identified and characterized.
IFSO-A1	Clarification	DC and COL applications might have physical layout information for most components, but might need to assume physical layouts for some components.
IFSO-A2	Clarification	If the DC or COL is for a single unit or for a site in which there are no shared systems or structures (including e.g., separate service water) then this supporting requirement is Not Applicable. For multi-unit designs, a DC may make assumptions regarding shared support system arrangements, while a COL can more directly address the designs for the alignment of site-specific shared support systems if the design information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
IFSO-A3	No Objection	
IFSO-A4	No Objection	
IFSO-A5	Can Meet	DC and COL applications will likely rely on design and guidance documents to determine the release characteristics for the flooding sources.

Table 3. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 3, Internal Flood at Power

Supporting Requirement	Position	Discussion
IFSO-A6	Qualification	For DC and COL applications, walkdowns will not be able to be performed to verify the information collected in IFSO-A1 through A5. General design and guidance documents will likely be relied upon to determine flood source locations and in-leakage pathways.
HLR-IFSO-B		Documentation of the internal flood sources shall be consistent with the applicable supporting requirements.
IFSO-B1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
IFSO-B2	No Objection	
IFSO-B3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
Internal Flood Scenario Development		
HLR-IFSN-A		The potential internal flood scenarios shall be developed for each flood source by identifying the propagation path(s) of the source and the affected SSCs.
IFSN-A1	Clarification	DC and COL applications will likely rely on design and guidance documents to determine the propagation pathways.
IFSN-A2	Clarification	DC and COL applications will likely rely on design and guidance documents to determine the design features that can terminate or contain the flooding. In some cases, these features may be assumed based on general practices of good engineering.
IFSN-A3	Clarification	DC and COL applications will likely rely on design and guidance documents to determine the automatic and operator responses that can terminate or contain the flooding. In some cases, these features/actions may be assumed based on general practices of good engineering.
IFSN-A4	Clarification	DC and COL applications will likely rely on design and guidance documents to determine these design features. In some cases, these features may be assumed based on general practices of good engineering.
IFSN-A5	No Objection	
IFSN-A6	No Objection	
IFSN-A7	No Objection	

Table 3. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 3, Internal Flood at Power

Supporting Requirement	Position	Discussion
IFSN-A8	Clarification	There is no requirement to address intra-area propagation to achieve CC I because it is conditioned on meeting CC I for supporting requirement IFPP-A2 in which the definition of flood areas results in no propagation to other modeled areas. This supporting requirement is met at CC I with no action, if IFPP-A2 is also met at CC I. However, if IFPP-A2 is addressed by achieving CC II/III, then this supporting requirement must also be performed (and evaluated) at CC II/III.
IFSN-A9	No Objection	
IFSN-A10	Clarification	This supporting requirement is feasible to the extent of limitations and issues identified in the previous IFSN supporting requirements.
IFSN-A11	Clarification	If the DC or COL is for a single unit or for a site in which there are no shared systems or structures (including e.g., separate service water) then this supporting requirement is Not Applicable. For multi-unit designs, a DC may make assumptions regarding shared support system arrangements, while a COL can more directly address the designs for the alignment of site-specific shared support systems if the design information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
IFSN-A12	Qualification	<p>Consistent with the replacement clarification for supporting requirement IE-C6, operator actions credited in correcting a condition to avoid a plant trip or shutdown should be demonstrated to have a low probability of failure. In addition, any other criteria used in screening should be demonstrated to not screen out flood events/areas that are significant contributors to flood risk. As a result, this supporting requirement should be replaced with the following criteria:</p> <p>SCREEN OUT flood areas where flooding of the area does not cause an initiating event or result in a plant trip (manual or automatic) or a controlled manual shutdown. If credit is taken for operator actions to correct the condition to avoid a plant trip or controlled shutdown, then ENSURE the credited operator actions and associated equipment have an exceedingly low probability of failure (i.e., collectively less than or equal to 1×10^{-5}) following the applicable supporting requirements of Part 2 (e.g., Human Reliability Analysis – Subsection 2-2.5) AND either of the following applies:</p> <p>(a) the flood area (including adjacent areas where flood sources can propagate) contains no mitigating equipment modeled in the PRA; OR</p> <p>(b) the flood area has no flood sources sufficient (e.g., through spray, immersion, or other applicable mechanism) to cause failure of the equipment identified in IFSN-A5.</p>

Table 3. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 3, Internal Flood at Power

Supporting Requirement	Position	Discussion
		<p>DO NOT USE failure of a barrier against inter-area propagation to justify screening (i.e., for screening, do not credit such failures as a means of beneficially draining the area).</p> <p>If additional qualitative screening criteria are applied, DEFINE the applied criteria and PROVIDE a basis that demonstrates internal flooding events that are screened out using the criteria are not significant contributors to internal flood risk.</p>
IFSN-A13	Qualification	<p>Given that drains can be plugged or covered and sump pumps can fail, qualitative screening should not credit this capability, but rather address the flood events quantitatively considering mitigation system performance and potential failures. That being the case, at this stage of screening of internal flood events, this supporting requirement should be considered Not Applicable and should not be used.</p>
IFSN-A14	Qualification	<p>Consistent with the replacement clarification for supporting requirement IE-C6 and IFSN-A12, operator actions credited in screening out a flood area should be demonstrated to have an exceedingly low probability of failure. Therefore, this supporting requirement should be replaced as follows:</p> <p>Use potential human mitigative actions as additional criteria for screening out flood areas if it can be demonstrated that the credited actions and associated equipment have an exceedingly low probability of failure (i.e., collectively less than or equal to 1×10^{-5}) following the applicable supporting requirements of Part 2 (e.g., Human Reliability Analysis – Subsection 2-2.5) for the worst flooding initiator.</p>
IFSN-A15	Qualification	<p>Consistent with the previous qualifications and clarifications related to screening flood areas (IFSN-A12 through IFSN A-14), this supporting requirement related to screening flood sources should also be replaced with the following criteria:</p> <p>SCREEN OUT flood sources if it can be shown that</p> <ul style="list-style-type: none"> (a) the flood source is insufficient (e.g., through spray, immersion, or other applicable mechanism) to cause failure of equipment identified in IFSN-A5, OR (b) the flood only affects the system that is the flood source, and the systems analysis addresses this per SY-A13 and SY-A14 and need not be treated as a separate internal flood event. <p>DO NOT USE failure of a barrier against inter-area propagation to justify screening (i.e., for screening, do not credit such failures as a means of beneficially draining the area).</p>

Table 3. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 3, Internal Flood at Power

Supporting Requirement	Position	Discussion
		If additional qualitative screening criteria are applied, DEFINE the applied criteria and PROVIDE a basis that demonstrates internal flooding events that are screened out using the criteria are not significant contributors to internal flood risk.
IFSN-A16	Qualification	Consistent with the previous qualifications and clarifications related to screening flood areas (IFSN-A12 through IFSN A-14), this supporting requirement related to screening flood sources should also be replaced with the following criteria: Use potential human mitigative actions as additional criteria for screening out flood sources if it can be demonstrated that the credited actions and associated equipment have an exceedingly low probability of failure (i.e., collectively less than or equal to 1×10^{-5}) following the applicable supporting requirements of Part 2 (e.g., Human Reliability Analysis – Subsection 2-2.5) for the worst flooding initiator.
IFSN-A17	Qualification	For DC and COL applications, walkdowns will not be able to be performed to verify the information collected in IFSN-A1 through A16. General design and guidance documents will likely be relied upon to address SSCs located within each defined flood area, mitigative features, and pathways.
HLR-IFSN-B		Documentation of the internal flood scenarios shall be consistent with the applicable supporting requirements.
IFSN-B1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
IFSN-B2	No Objection	
IFSN-B3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
Internal Flood-Induced Initiating Event Analysis		
HLR-IFEV-A		Plant initiating events caused by internal flood shall be identified and their frequencies estimated.
IFEV-A1	No Objection	

Table 3. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 3, Internal Flood at Power

Supporting Requirement	Position	Discussion
IFEV-A2	No Objection	
IFEV-A3	No Objection	
IFEV-A4	Clarification	If the DC or COL is for a single unit or for a site in which there are no shared systems or structures (including e.g., separate service water) then this supporting requirement is Not Applicable. For multi-unit designs, a DC may make assumptions regarding shared support system arrangements, while a COL can more directly address the designs for the alignment of site-specific shared support systems if the design information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
IFEV-A5	No Objection	
IFEV-A6	No Objection	
IFEV-A7	Clarification	DC and COL applications will likely rely on design and guidance documents to determine human-induced flood potentials during maintenance.
IFEV-A8	Clarification	Note that the reference for the quantitative screening criteria is incorrect in the supporting requirement and should be to IE-C6 of Part 2, as applied to flooding events.
HLR-IFEV-B	Documentation of the internal flood-induced initiating events shall be consistent with the applicable supporting requirements.	
IFEV-B1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
IFEV-B2	No Objection	
IFEV-B3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
Internal Flood Accident Sequences and Quantification		
HLR-IFQU-A	Internal flood-induced accident sequences shall be quantified.	
IFQU-A1	No Objection	
IFQU-A2	No Objection	
IFQU-A3	No Objection	
IFQU-A4	No Objection	
IFQU-A5	No Objection	

Table 3. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 3, Internal Flood at Power

Supporting Requirement	Position	Discussion
IFQU-A6	No Objection	
IFQU-A7	No Objection	
IFQU-A8	No Objection	
IFQU-A9	No Objection	
IFQU-A10	No Objection	
IFQU-A11	Qualification	For DC and COL applications, walkdowns will not be able to be performed to verify the information collected in IFQU-A1 through A11. General design and guidance documents will likely be relied upon to obtain or verify inputs to engineering analyses, human reliability analyses, impact assessments, and screening decisions..
IFQU-A12	Qualification	To be consistent with the screening criteria across the hazard groups, a new supporting requirement is needed to verify and ensure any screening does not eliminate potentially significant contributors to internal flooding risk. Therefore, the following new supporting requirement is added: If internal flood events (areas or scenarios) have been screened, ENSURE that the sum of the frequencies of the internal flood events (areas and scenarios) that have been screened out is less than 5% of the total mean CDF for internal floods and less than 5% of the total mean LRF for internal floods.
HLR-IFQU-B		Documentation of the internal flood accident sequences and quantification shall be consistent with the applicable supporting requirements.
IFQU-B1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
IFQU-B2	No Objection	
IFQU-B3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.

Addressing Part 4, Fires, Supporting Requirements

In addition to the general limitations, DC applications addressing 10 CFR 52.47(a)(27) and COL applications addressing 10 CFR 52.79(a)(46) might not have specific cable routing, ignition sources, and target locations in each fire plant analysis unit. This might impact the manner in which the applicant models internal fires. Consistent with the fire PRA methods, where information is lacking, the “exclusion approach,” consistent with CS-A11 (and its associated note), can be used. Further, the approach to analyzing internal fires for these application stages will likely be more general and simplified for most areas (e.g., performing “full room burnout” to demonstrate acceptably low impacts instead of identifying specific ignition sources). Supporting requirements are considered herein in light of this more general approach. Further, for these stages the supporting requirements requiring walkdowns are not feasible.

Many supporting requirements refer back to the internal events PRA supporting requirements and some refer to other supporting requirements within this Part. As such, these supporting requirements should also consider the evaluation of the applicability and feasibility of the referenced supporting requirement, including any pertinent comments or clarifications.

Table 4. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 4, Fires at Power

Supporting Requirement	Position	Discussion
Plant Partitioning		
HLR-PP-A		The Fire PRA shall define the global boundaries of the analysis so as to include all plant locations relevant to the plant-wide Fire PRA.
PP-A1	No Objection	
HLR-PP-B		The Fire PRA shall perform a plant partitioning analysis to identify and define the physical analysis units to be considered in the Fire PRA.
PP-B1	No Objection	
PP-B2	Clarification	Because CC I is met if no credit is taken for partitioning elements that lack a fire resistance rating, this supporting requirement is met at CC I by not taking any credit. If partitioning is credited, then it must be performed (and evaluated) to CC II/III.
PP-B3	Clarification	Because CC I is met if no credit is taken for partitioning based on spatial separation, this supporting requirement is met at CC I by not taking any credit. If spatial separation is credited, then it must be performed (and evaluated) to CC II/III.
PP-B4	Clarification	Because this supporting requirement is met if no credit is taken for the cited partitioning elements, this supporting requirement is met by not taking the credit. If credit is taken for any of the cited elements, then the supporting requirement is not met because this limitation on credit spans all three capability categories.
PP-B5	Clarification	Because CC I is met if no credit is taken for partitioning elements based on active fire barrier elements (unless these are credited in the regulatory fire protection program), this supporting requirement is met at CC I by not taking the credit. If active elements are credited, then it must be performed (and evaluated) to CC II/III.
PP-B6	No Objection	

Table 4. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 4, Fires at Power

Supporting Requirement	Position	Discussion
PP-B7	Clarification	For DC and COL applications, walkdowns will not be able to be performed to verify the information collected in PP-B1 through B6. Therefore, the applicant does not need to address this supporting requirement.
HLR-PP-C		The Fire PRA shall document the results of the plant partitioning analysis in a manner that facilitates Fire PRA applications, upgrades, and peer review.
PP-C1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
PP-C2	No Objection	
PP-C3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the sources of model uncertainty and related assumptions associated with internal fire plant partitioning, including those additional uncertainties and assumptions resulting from the status of the design, site, operational, and maintenance information or data.
PP-C4	No Objection	
Equipment Selection		
HLR-ES-A		The Fire PRA shall identify equipment whose failure, caused by an initiating fire including spurious operation, will contribute to or otherwise cause an initiating event.
ES-A1	Clarification	For the DC and COL applications, the identification of equipment resulting in manual trip will likely be based on design and general operational guidance documents, instead of specific procedures.
ES-A2	Clarification	Because this supporting requirement supports ES-A1 in identifying additional equipment that could adversely affect the equipment identified in ES-A1, the same consideration applies to this supporting requirement. Further, DC applicants may make assumptions regarding the design of some of the support systems, while the COL applicant can more directly address the site-specific support system design if the design information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
ES-A3	Clarification	The objective of this supporting requirement is applicable (i.e., include equipment whose fire-induced failures contribute to or cause unique fire-induced initiating events not already identified). For the DC and COL applications, the fire safe shutdown/Appendix R

Table 4. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 4, Fires at Power

Supporting Requirement	Position	Discussion
		analysis might not be fully established. That being the case, the applicant will likely identify equipment based on the internal events PRA. In addition, note that the reference to supporting requirement IE-C4 is incorrect; the reference should be to IE-C6.
ES-A4	Clarification	The objective of this supporting requirement is applicable (i.e., include equipment whose fire-induced failures contribute to or cause unique fire-induced initiating events not already identified). For the DC and COL applications, the fire safe shutdown/Appendix R analysis might not be fully established. That being the case, the applicant will likely identify equipment based on the internal events PRA and general design documentation. In addition, note that the reference to supporting requirement IE-C4 is incorrect and is supposed to be to IE-C6.
ES-A5	No Objection	
ES-A6	No Objection	
HLR-ES-B		The Fire PRA shall identify equipment whose failure including spurious operation would adversely affect the operability/functionality of that portion of the plant design to be credited in the Fire PRA.
ES-B1	Clarification	This supporting requirement is conditioned on having a fire safe shutdown/Appendix R equipment list, which may be established at these application stages. As stated in the notes, this is the starting point for identifying mitigating equipment. The identification of SSCs to include in the Fire PRA is expected to be an iterative process and use other means of identifying mitigating equipment, including the equipment identified for mitigation in the internal events PRA.
ES-B2	No Objection	
ES-B3	No Objection	
ES-B4	Clarification	Because this supporting requirement supports ES-B1 through B3 in identifying additional equipment that could adversely affect the equipment identified previously, the same consideration applies to this supporting requirement. Further, DC applicants may make assumptions regarding the design of some of the support systems, while the COL applicant can more directly address the site-specific support system design if the design information is available; recognizing that even at this stage some assumptions will be made regarding the design and operations of systems.
ES-B5	No Objection	
HLR-ES-C		The Fire PRA shall identify instrumentation whose failure including spurious operation would impact the reliability of operator actions associated with that portion of the plant design to be credited in the Fire PRA.
ES-C1	No Objection	
ES-C2	No Objection	

Table 4. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 4, Fires at Power

Supporting Requirement	Position	Discussion
HLR-ES-D		The Fire PRA shall document the Fire PRA equipment selection, including that information about the equipment necessary to support the other Fire PRA tasks (e.g., equipment identification; equipment type; normal, desired, failed states of equipment; etc.) in a manner that facilitates Fire PRA applications, upgrades, and peer review.
ES-D1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
ES-D2	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following new supporting requirement is added: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
Cable Selection		
HLR-CS-A		The Fire PRA shall identify and locate the plant cables whose failure could adversely affect credited equipment or functions included in the Fire PRA plant response model, as determined by the equipment selection process.
CS-A1	Clarification	The notes for this supporting requirement recognize the explicit identification of individual cables is not required if CS-A11 is used. That being the case, meeting this supporting requirement is feasible at a general level for the DC and COL applications.
CS-A2	Qualification	For the DC and COL applications, cable and circuit information might not be available and the applicant will likely use design and operational guidance documents, general good practices of engineering, and the “exclusion approach” consistent with CS-A11.
CS-A3	Qualification	For the DC and COL applications, cable and circuit information might not be available and the applicant will likely use design and operational guidance documents, general good practices of engineering, and the “exclusion approach” consistent with CS-A11.
CS-A4	Qualification	For the DC and COL applications, cable and circuit information might not be available and the applicant will likely use design and operational guidance documents, general good practices of engineering, and the “exclusion approach” consistent with CS-A11. If no additional cables are selected, then this supporting requirement is Not Applicable.
CS-A5	Qualification	For the DC and COL applications, cable and circuit information might not be available and the applicant will likely use design and operational guidance documents, general good practices of engineering, and the “exclusion approach” consistent with CS-A11.

Table 4. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 4, Fires at Power

Supporting Requirement	Position	Discussion
CS-A6	Qualification	For the DC and COL applications, cable and circuit information might not be available and the applicant will likely use design and operational guidance documents, general good practices of engineering, and the “exclusion approach,” consistent with CS-A11.
CS-A7	Qualification	For the DC and COL applications, cable and circuit information might not be available and the applicant will likely use design and operational guidance documents, general good practices of engineering, and the “exclusion approach,” consistent with CS-A11.
CS-A8	Qualification	For the DC and COL applications, cable and circuit information might not be available and the applicant will likely use design and operational guidance documents, general good practices of engineering, and the “exclusion approach,” consistent with CS-A11.
CS-A9	Qualification	For the DC and COL applications, cable and circuit information might not be available and the applicant will likely use design and operational guidance documents, general good practices of engineering, and the “exclusion approach,” consistent with CS-A11.
CS-A10	Clarification	For the DC and COL applications, complete cable and circuit routing information might not be available and the applicant will likely use design and operational guidance documents, general good practices of engineering, and the “exclusion approach,” consistent with CS-A11. The notes for this supporting requirement recognize the exclusion approach may be used.
CS-A11	No Objection	
HLR-CS-B		The Fire PRA shall (a) perform a review for additional circuits that are either required to support a credited circuit (i.e., per HLR-CS-A) or whose failure could adversely affect a credited circuit. (b) identify any additional equipment and cables related to these additional circuits in a manner consistent with the other equipment and cable selection requirements of this standard.
CS-B1	Qualification	For the DC and COL applications, the electrical overcurrent coordination and protection analysis might not be available and the applicant will likely use design and operational guidance documents, general good practices of engineering, and the “exclusion approach,” consistent with CS-A11 in identifying additional circuits and cables.
HLR-CS-C		The Fire PRA shall document the cable selection and location process and results in a manner that facilitates Fire PRA applications, upgrades, and peer review.
CS-C1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.

Table 4. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 4, Fires at Power

Supporting Requirement	Position	Discussion
CS-C2	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
CS-C3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
CS-C4	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
CS-C5	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following new supporting requirement is added: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
Qualitative Screening		
HLR-QLS-A	The Fire PRA shall identify those physical analysis units that screen out as individual risk contributors without quantitative analysis.	
QLS-A1	Clarification	For the DC and COL applications, the cable and circuit information might not be available and the applicant will likely rely on the “exclusion approach,” consistent with CS-A11. As a result, the physical analysis units retained for quantification will be based on this approach and thus, the supporting requirement is feasible.
QLS-A2	Clarification	This supporting requirement is based on the results from ES, in particular ES-A1. As a result, the physical analysis units retained for quantification will be based on these results, so meeting the supporting requirement is feasible.
QLS-A3	No Objection	

Table 4. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 4, Fires at Power

Supporting Requirement	Position	Discussion
QLS-A4	Clarification	If no additional criteria are used for screening, then this supporting requirement is Not Applicable.
HLR-QLS-B		The Fire PRA shall document the results of the qualitative screening analysis in a manner that facilitates Fire PRA applications, upgrades, and peer review.
QLS-B1	No Objection	
QLS-B2	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
QLS-B3	No Objection	
QLS-B4	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following new supporting requirement is added: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
Plant Response Model		
HLR-PRM-A		The Fire PRA shall include the Fire PRA plant response model capable of supporting the HLR requirements of Fire Quantification (FQ).
PRM-A1	No Objection	
PRM-A2	No Objection	
PRM-A3	No Objection	
PRM-A4	No Objection	
HLR-PRM-B		The Fire PRA plant response model shall include fire-induced initiating events, both fire-induced and random failures of equipment, fire-specific as well as non-fire-related human failures associated with safe shutdown, accident progression events (e.g., containment failure modes), and the supporting probability data (including uncertainty) based on the supporting requirements provided under this HLR that parallel, as appropriate, Part 2 for Internal Events PRA.
PRM-B1	No Objection	
PRM-B2	Clarification	This supporting requirement involves the consideration of peer review findings on the internal events PRA, which may not exist for these application stages at the level expected per the Standard (in particular the expected level of knowledge of the specific design). However, it is likely that there will be internal and independent reviews of the internal events PRA that follows the same peer review guidance of the PRA Standard. As such, this supporting requirement is feasible when using the results and findings of these independent reviews.
PRM-B3	No Objection	

Table 4. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 4, Fires at Power

Supporting Requirement	Position	Discussion
PRM-B4	Clarification	Note that the cross-reference should be to supporting requirement PRM-B3 instead of supporting requirement PRM-B2.
PRM-B5	Clarification	For DC and COL applications the information relied on will likely be design and general operational guidance and good engineering practices for fire response.
PRM-B6	Clarification	For DC and COL applications the information relied on will likely be design and general operational guidance and good engineering practices for fire response.
PRM-B7	No Objection	
PRM-B8	No Objection	
PRM-B9	No Objection	
PRM-B10	No Objection	
PRM-B11	No Objection	
PRM-B12	No Objection	
PRM-B13	No Objection	
PRM-B14	No Objection	
PRM-B15	No Objection	
HLR-PRM-C	The Fire PRA shall document the Fire PRA plant response model in a manner that facilitates Fire PRA applications, upgrades, and peer review.	
PRM-C1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
PRM-C2	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following new supporting requirement is added: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
Fire Scenario Selection and Analysis		
HLR-FSS-A	The Fire PRA shall select one or more combinations of an ignition source and damage target set to represent the fire scenarios in terms of fire ignition sources and target sets for each unscreened physical analysis unit upon which estimation of the risk contribution (CDF and LERF [LRF]) of the physical analysis unit will be based.	
FSS-A1	Clarification	For DC and COL applications, this identification will likely be general, especially as it relates to transient fire sources, and to the level of analysis. In many cases, the analysis will likely rely on bounding approaches, such as “full room burnout,” to demonstrate insignificant

Table 4. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 4, Fires at Power

Supporting Requirement	Position	Discussion
		or acceptably low results to support addressing this supporting requirement at a general level.
FSS-A2	No Objection	
FSS-A3	No Objection	
FSS-A4	No Objection	
FSS-A5	Clarification	Feasible within the limitations and constraints of FSS-A1.
FSS-A6	No Objection	
HLR-FSS-B	The Fire PRA shall include an analysis of potential fire scenarios leading to the MCR abandonment.	
FSS-B1	No Objection	
FSS-B2	No Objection	
HLR-FSS-C	The Fire PRA shall characterize the factors that will influence the timing and extent of fire damage for each combination of an ignition source and damage target sets selected per HLR-FSS-A.	
FSS-C1	No Objection	
FSS-C2	No Objection	
FSS-C3	No Objection	
FSS-C4	No Objection	
FSS-C5	No Objection	
FSS-C6	No Objection	
FSS-C7	Clarification	If multiple suppression paths are not credited, then the supporting requirement is Not Applicable.
FSS-C8	Clarification	For DC and COL applications, the determination that fire wrap will be used in specific areas will likely be based on general design and operational guidance documents and the results from early analysis results recognizing the iterative nature of the development of the internal fire PRA. If fire wraps are not credited, then the supporting requirement is Not Applicable, which is the likely approach for most DC and COL applicants.
HLR-FSS-D	The Fire PRA shall quantify the likelihood of risk-relevant consequences for each combination of an ignition source and damage target sets selected per HLR-FSS-A.	
FSS-D1	No Objection	
FSS-D2	No Objection	
FSS-D3	No Objection	
FSS-D4	No Objection	
FSS-D5	No Objection	
FSS-D6	No Objection	
FSS-D7	No Objection	
FSS-D8	No Objection	
FSS-D9	Clarification	No action is required to achieve CC I. At these application stages the fire analysis will typically assume widespread damage. That being the case, the fire analysis would generally capture potential smoke damage within the limits of the assumed fire damage (e.g., assuming the loss of all equipment in an analysis unit given a fire). Therefore, this supporting requirement is met at CC I with no additional action.

Table 4. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 4, Fires at Power

Supporting Requirement	Position	Discussion
FSS-D10	Clarification	For DC and COL applications, walkdowns will not be able to be performed to confirm that the combination of fire sources and target sets that were selected according to supporting requirement FSS-A5 appropriately reflect the as-to-be-built plant conditions. Therefore, the applicant does not need to address this supporting requirement.
FSS-D11	Clarification	For DC and COL applications, walkdowns will not be able to be performed to verify that other aspects of the selected fire scenarios not covered by supporting requirement FSS-D10 have been characterized appropriately for each analyzed fire scenario. Therefore, the applicant does not need to address this supporting requirement.
HLR-FSS-E	The parameter estimates used in fire modeling shall be based on relevant generic industry and plant-specific information. Where feasible, generic and plant-specific evidence shall be integrated using acceptable methods to obtain plant-specific parameter estimates. Each parameter estimate shall be accompanied by a characterization of the uncertainty.	
FSS-E1	Clarification	Feasible with generic information only.
FSS-E2	No Objection	
FSS-E3	No Objection	
FSS-E4	No Objection	
HLR-FSS-F	The Fire PRA shall search for and analyze risk-relevant scenarios with the potential for causing fire-induced failure of exposed structural steel.	
FSS-F1	Clarification	For DC and COL applications, locations of exposed structural steel are likely not known. The applicants may rely on general design documents and good engineering practices to exclude this condition in all locations to meet this supporting requirement. If that approach is relied on, then it should be documented (as well as for the related supporting requirements FSS-F2 and FSS-F3). If locations of exposed structural steel are known or assumed, then these locations should be evaluated consistent with CC I/II.
FSS-F2	Qualification	Even though this supporting requirement has no requirement identified to achieve CC I, it is conditioned on FSS-F1. If no scenarios are selected in accordance with FSS-F1, then this supporting requirement is Not Applicable and the applicant does not need to address it. However, if FSS-F1 is addressed at CC I/II, then this supporting requirement needs to also be addressed (and evaluated) at CC II/III.
FSS-F3	Clarification	If no scenarios are selected in accordance with FSS-F1, then this supporting requirement is Not Applicable and the applicant does not need to address it. However, if FSS-F1 is addressed at CC I/II, then this supporting requirement needs to be addressed (and evaluated) at CC I or greater.
HLR-FSS-G	The Fire PRA shall evaluate the risk contribution of multi-compartment fire scenarios.	
FSS-G1	Clarification	Feasible within the limitations and conditions of supporting requirements FSS-C1 through FSS-C8.
FSS-G2	No Objection	

Table 4. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 4, Fires at Power

Supporting Requirement	Position	Discussion
FSS-G3	No Objection	
FSS-G4	Clarification	If no passive fire barriers are credited, then the supporting requirement is Not Applicable.
FSS-G5	No Objection	
FSS-G6	No Objection	
HLR-FSS-H		The Fire PRA shall document the results of the fire scenario and fire modeling analyses including supporting information for scenario selection, underlying assumptions, scenario descriptions, and the conclusions of the quantitative analysis, in a manner that facilitates Fire PRA applications, upgrades, and peer review.
FSS-H1	No Objection	
FSS-H2	No Objection	
FSS-H3	No Objection	
FSS-H4	No Objection	
FSS-H5	No Objection	
FSS-H6	No Objection	
FSS-H7	No Objection	
FSS-H8	No Objection	
FSS-H9	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
FSS-H10	Clarification	Because plant-specific walkdowns cannot be performed at these application stages, it is not feasible to address this supporting requirement. Therefore, the applicant does not need to address this supporting requirement.
FSS-H11	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following new supporting requirement is added: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data associated with the analyses as documented in FSS-H1 through H8 that would impact applications.
Ignition Frequency		
HLR-IGN-A		The Fire PRA shall develop fire ignition frequencies for every physical analysis unit that has not been qualitatively screened.
IGN-A1	No Objection	
IGN-A2	No Objection	
IGN-A3	No Objection	

Table 4. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 4, Fires at Power

Supporting Requirement	Position	Discussion
IGN-A4	Clarification	There is no requirement for performing a review of plant-specific experience to achieve CC I. It is not feasible to have plant-specific operating experience at these application stages and therefore, the staff does not expect these applicants to perform additional reviews; this supporting requirement is met with no additional action.
IGN-A5	Clarification	The supporting requirement requires that the frequency be calculated on a reactor year basis, which can be performed. However, because no operating experience data will exist for these application stages upon which to estimate plant availability, an assumed availability will need to be used, with an appropriate justification, consistent with Part 2, IE-C5.
IGN-A6	Clarification	Because there is no plant-specific data for these application stages, it is not necessary to use a Bayesian update process because only generic data will be used and, that being the case, it is not necessary to justify any distribution for a prior. As a result, this supporting requirement is Not Applicable. Therefore, the applicant does not need to address this supporting requirement.
IGN-A7	No Objection	
IGN-A8	No Objection	
IGN-A9	No Objection	
IGN-A10	No Objection	
HLR-IGN-B		The Fire PRA shall document the frequency estimation in a manner that facilitates Fire PRA applications, upgrades, and peer review.
IGN-B1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
IGN-B2	No Objection	
IGN-B3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
IGN-B4	Clarification	Because plant-specific data will not exist during these application stages, and thus generic and plant-specific data are not combined, it is not necessary to document the update process. That being the case, this supporting requirement is Not Applicable. Therefore, the applicant does not need to address this supporting requirement.

Table 4. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 4, Fires at Power

Supporting Requirement	Position	Discussion
IGN-B5	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
Quantitative Screening		
HLR-QNS-A		If quantitative screening is performed, the Fire PRA shall establish quantitative screening criteria to ensure that the estimated cumulative impact of screened physical analysis units on CDF and LERF [LRF] is small.
QNS-A1	Qualification	This supporting requirement identifies the need to establish quantitative screening criteria. This supporting requirement needs to be consistent with the screening criteria in supporting requirement IE-C6. That being the case, add the following to this supporting requirement: If any quantitative screening is performed, USE supporting requirement IE-C6, of Part 2, as applied to fires, for screening fires (i.e., physical analysis units, fire compartments, and fire areas).
HLR-QNS-B		If quantitative screening is performed, the Fire PRA shall identify those physical analysis units that screen out as individual risk contributors.
QNS-B1	No Objection	
QNS-B2	No Objection	
HLR-QNS-C		VERIFY that the cumulative impact of screened physical analysis units on CDF and LERF [LRF] is small.
QNS-C1	Qualification	To be consistent with the approach for Internal Events, this supporting requirement should be enhanced as follows: ENSURE that the sum of the frequencies of the fire events (i.e., physical analysis units, fire compartments, and fire areas) that have been screened out is less than 5% of the total mean CDF for fires and less than 5% of the total mean LRF for fires.
HLR-QNS-D		The Fire PRA shall document the results of quantitative screening in a manner that facilitates Fire PRA applications, upgrades, and peer review.
QNS-D1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.

Table 4. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 4, Fires at Power

Supporting Requirement	Position	Discussion
QNS-D2	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
QNS-D3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following new supporting requirement is added: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
Circuit Failures		
HLR-CF-A	The Fire PRA shall determine the applicable conditional probability of the cable and circuit failure mode(s) that would cause equipment functional failure and/or undesired spurious operation based on the credited function of the equipment in the Fire PRA.	
CF-A1	No Objection	
CF-A2	No Objection	
HLR-CF-B	The Fire PRA shall document the development of the elements above in a manner that facilitates Fire PRA applications, upgrades, and peer review.	
CF-B1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
CF-B2	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following new supporting requirement is added: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
Human Reliability Analysis		
HLR-HRA-A	The Fire PRA shall identify human actions relevant to the sequences in the Fire PRA plant response model.	
HRA-A1	No Objection	
HRA-A2	Clarification	For DC and COL applications, the determination of key human response actions will likely be based on general design and guidance

Table 4. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 4, Fires at Power

Supporting Requirement	Position	Discussion
		documents because procedures and operations might not be developed.
HRA-A3	Qualification	There is no requirement to identify new, undesired operator actions due to spurious indications to achieve CC I. It is recognized that plant procedures will not be available at these application stages and only operational guidance will be available. Though this supporting requirement may be met at CC I with no additional action, it is related to ES-C1 and ES-C2 and it should be performed (and evaluated) consistent with (i.e., at the same capability category level of) these supporting requirements.
HRA-A4	Clarification	This supporting requirement requires the review of the procedure interpretations with plant operations and training personnel to verify it reflects the operations and training practices. For DC and COL applications, the model will likely be based on design and guidance documents; procedures will not be available. In addition, the review should involve the design and/or plant disciplines responsible for developing and implementing the operational guidance.
HLR-HRA-B		The Fire PRA shall include events where appropriate in the Fire PRA that represents the impacts of incorrect human responses associated with the identified human actions.
HRA-B1	No Objection	
HRA-B2	No Objection	
HRA-B3	Clarification	For DC and COL applications, the timing, procedural, cues/indications, and complexity aspects will likely be based on design and guidance documents and analyses.
HRA-B4	Qualification	There is no requirement to include in the PRA undesired operator actions that could be taken in response to fire-induced instrumentation failure in order to achieve CC I. It is recognized that plant procedures will not be available at these application stages and only operational guidance will be available. Though this supporting requirement may be met at CC I with no additional action, it is related to ES-C1 and ES-C2 and it should be performed (and evaluated) consistent with (i.e., at the same capability category level of) these supporting requirements.
HLR-HRA-C		The Fire PRA shall quantify HEPs associated with the incorrect responses accounting for the plant-specific and scenario-specific influences on human performance, particularly including the effects of fires.
HRA-C1	No Objection	
HLR-HRA-D		The Fire PRA shall include recovery actions only if it has been demonstrated that the action is plausible and feasible for those scenarios to which it applies, particularly accounting for the effects of fires.
HRA-D1	No Objection	
HRA-D2	No Objection	
HLR-HRA-E		The Fire PRA shall document the HRA, including the unique fire-related influences of the analysis, in a manner that facilitates Fire PRA applications, upgrades, and peer review.

Table 4. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 4, Fires at Power

Supporting Requirement	Position	Discussion
HRA-E1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact risk-informed applications, upgrades, and peer review.
HRA-E2	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following new supporting requirement is added: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
Seismic Fire		
HLR-SF-A	The Fire PRA shall include a qualitative assessment of potential seismic/fire interaction issues in the Fire PRA.	
SF-A1	No Objection	
SF-A2	Clarification	For DC and COL applications, available design information will be used in considering fire detection and suppression systems and the potential impacts from seismic events.
SF-A3	Clarification	For DC and COL applications, available design information will be used in considering fire detection and suppression systems and the potential impacts from seismic events.
SF-A4	Clarification	For DC and COL applications, the response to seismic events will likely be based on design and operational guidance documents.
SF-A5	Qualification	For DC and COL applications, specific fire brigade training procedures will likely not be available and, that being the case, it will not be possible to assess the extent that training addresses seismic event impacts on fire response. In addition, the storage and placement of firefighting equipment and routes likely will not be known. As a result, it will not be possible to assess how a seismic event might impact these features. If training procedures and storage and placement of equipment are not available, typical or expected fire brigade training procedures should be reviewed with knowledgeable design staff.
HLR-SF-B	The Fire PRA shall document the results of the seismic/fire interaction assessment in a manner that facilitates Fire PRA applications, upgrades, and peer review.	
SF-B1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement:

Table 4. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 4, Fires at Power

Supporting Requirement	Position	Discussion
		DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
SF-B2	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following new supporting requirement is added: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
Fire Risk Quantification		
HLR-FQ-A	Quantification of the Fire PRA shall quantify the fire-induced CDF.	
FQ-A1	No Objection	
FQ-A2	No Objection	
FQ-A3	No Objection	
FQ-A4	No Objection	
HLR-FQ-B	The fire-induced CDF quantification shall use appropriate models and codes and shall account for method-specific limitations and features.	
FQ-B1	No Objection	
HLR-FQ-C	Model quantification shall determine that all identified dependencies are addressed appropriately.	
FQ-C1	No Objection	
HLR-FQ-D	The frequency of different containment failure modes leading to a fire-induced large early release [large release] shall be quantified and aggregated, thus determining the fire-induced LERF [LRF].	
FQ-D1	No Objection	
HLR-FQ-E	The fire-induced CDF and LERF [LRF] quantification results shall be reviewed, and significant contributors to CDF and LERF [LRF], such as fires and their corresponding plant initiating events, fire locations, accident sequences, basic events (equipment unavailabilities and human failure events), plant damage states, containment challenges, and failure modes, shall be identified. The results shall be traceable to the inputs and assumptions made in the Fire PRA.	
FQ-E1	No Objection	
HLR-FQ-F	The documentation of CDF and LERF [LRF] analyses shall be consistent with the applicable SRs.	
FQ-F1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact risk-informed applications, upgrades, and peer review.

Table 4. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 4, Fires at Power

Supporting Requirement	Position	Discussion
FQ-F2	No Objection	
FQ-F3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following new supporting requirement is added: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
Uncertainty and Sensitivity Analysis		
HLR-UNC-A	The Fire PRA shall identify sources of CDF and LERF [LRF] uncertainties and related assumptions and modeling approximations. These uncertainties shall be characterized such that their potential impacts on the results are understood.	
UNC-A1	No Objection	
UNC-A2	Clarification	Feasible within the limitations and constraints of the cited sections in the fire analysis.
HLR-UNC-B	The Fire PRA shall document the identified sources of CDF and LERF [LRF] uncertainties and related assumptions and modeling approximations in a manner that facilitates Fire PRA applications, upgrades, and peer review.	
UNC-B1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following new supporting requirement is added: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
UNC-B2	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following new supporting requirement is added: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.

Addressing Part 5, Seismic Events, Supporting Requirements

The seismic event analyses used to support DC applications addressing 10 CFR 52.47(a)(27) and COL applications addressing 10 CFR 52.79(a)(46) will likely be based on the “PRA-based seismic margins,” approach. Information on the use of this approach for DC and COL applications is provided in Interim Staff Guidance DC/COL-ISG-020 and SRP Section 19.0. In addition, DC applications will not have regional or site-specific information on which to base their analyses. The DC applicants will establish site characteristics and site interface

requirements on which the seismic hazard analysis will be performed. As a result, the seismic hazard portion of the PRA Standard is considered not applicable for the DC application stage and the development and review of this aspect should use the Interim Staff Guidance DC/COL-ISG-020 and associated portions of SRP Section 19.0. For COL applications, the Interim Staff Guidance DC/COL-ISG-020 states that the COL applicant should ensure that the PRA-based seismic margin analysis results remain valid and reflect the site-specific and plant-specific information. Therefore, the COL applicant will need to adequately incorporate site-specific and plant-specific information. This information may include site-specific effects, such as seismically induced liquefaction settlements and slope stability, as well as site-specific features, such as underground piping and intake structures, and the ultimate heat sink. However, at the COL stage there is no requirement to upgrade the DC application PRA-based seismic margins analysis to a seismic PRA. Therefore, the seismic hazard portion of the PRA Standard is also likely not applicable for the COL stage and the review of this aspect would also use the Interim Staff Guidance DC/COL-ISG-020 and associated portions of SRP Section 19.0. If a COL applicant chooses to upgrade from a PRA-based seismic margins to a seismic PRA, then the supporting requirements for the seismic hazard portion would be feasible and would need to be addressed.

Further, the seismic fragility analyses in the PRA-based seismic margins approach uses high confidence of low probability of failure (HCLPF) values, typical of margins-type analyses. These HCLPF values will likely be developed from generic data sources. The basic events using the HCLPF values will be incorporated into the plant response model similar to how other PRA basic events are incorporated, except that the HCLPF value is represented by a capacity (e.g., peak ground acceleration) instead of a mean failure probability with an uncertainty distribution. The quantification will also be performed using margins-type approaches, such as applying “min-max” rules or convolution techniques, to derive a plant-level HCLPF.

In addition to the general limitations, DC and COL applications might not contain specific information that may impact the manner in which the applicant models seismic events. Further, for these stages the supporting requirements requiring walkdowns are not feasible.

Many supporting requirements refer back to the internal events PRA supporting requirements. As such, these supporting requirements for which this is the case, reviewers should also consider the evaluation of the applicability and feasibility of the referenced supporting requirement, including any pertinent comments or clarifications.

Table 5. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 5, Seismic Events at Power

Supporting Requirement	Position	Discussion
Seismic Hazard Analysis		
HLR-SHA-A		The frequency of earthquakes 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	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. A probabilistic seismic hazard analysis will not be performed and DC applications will not have regional or site-specific information on which to base their PRA-based seismic margins analysis. DC applicants will establish site characteristics and site interface requirements on which the seismic hazard for the analysis will be performed. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement. Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could meet this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p>
SHA-A2	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement. Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p>
SHA-A3	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3,</p>

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Supporting Requirement	Position	Discussion
		<p>is still used instead of addressing this supporting requirement. Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p>
SHA-A4	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement. Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p>
SHA-A5	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement. Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p>
HLR-SHA-B		<p>To provide inputs to the probabilistic seismic hazard analysis, a comprehensive up-to-date database, including geological, seismological, and geophysical data; local site topography; and surficial geologic and geotechnical site properties shall be compiled. A catalog of historical, instrumental, and paleoseismicity information shall also be compiled.</p>
SHA-B1	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate.</p>

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Supporting Requirement	Position	Discussion
		<p>However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement. Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p>
SHA-B2	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement. Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p>
SHA-B3	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement. Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p>
HLR-SHA-C		<p>To account for the frequency of occurrence of earthquake ground motions in the site region, the probabilistic seismic hazard analysis shall examine all credible sources of potentially damaging earthquakes. Both the aleatory and epistemic uncertainties shall be addressed in characterizing the seismic sources.</p>
SHA-C1	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate.</p>

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Supporting Requirement	Position	Discussion
		<p>However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement. Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p>
SHA-C2	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement. Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p>
SHA-C3	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement. Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p>
SHA-C4	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement.</p>

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Supporting Requirement	Position	Discussion
		<p>Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p>
HLR-SHA-D		<p>The probabilistic seismic hazard analysis shall examine mechanisms influencing vibratory ground motion that can occur at a site given the occurrence of an earthquake of a certain magnitude at a certain location. Both the aleatory and epistemic uncertainties shall be addressed in characterizing the ground motion propagation.</p>
SHA-D1	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement. Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p>
SHA-D2	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement. Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p>
SHA-D3	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement.</p>

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Supporting Requirement	Position	Discussion
		<p>Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p>
SHA-D4	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement. Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p>
HLR-SHA-E	The probabilistic	seismic hazard analysis shall account for the effects of local site response.
SHA-E1	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement. Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p>
SHA-E2	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement.</p>

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Supporting Requirement	Position	Discussion
		<p>Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p>
HLR-SHA-F		<p>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.</p>
SHA-F1	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement. Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA..</p>
SHA-F2	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement. Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p>
SHA-F3	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3,</p>

Table 5. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 5, Seismic Events at Power

Supporting Requirement	Position	Discussion
		<p>is still used instead of addressing this supporting requirement. Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p> <p>Additionally note that the mean hazard curve reference in the supporting requirement is needed for <u>either</u> a peak ground acceleration <u>or</u> a spectral acceleration; not necessarily both.</p>
HLR-SHA-G		<p>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 (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.</p>
SHA-G1	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement. Therefore, the COL applicant does not need to address this supporting requirement.</p> <p>Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.</p>
HLR-SHA-H		<p>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.</p>
SHA-H	Qualification	<p>These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement.</p>

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Supporting Requirement	Position	Discussion
		Therefore, the COL applicant does not need to address this supporting requirement. Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.
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-I	Qualification	These applications will follow the seismic-related guidance of SRP Section 19.0, Revision 3. Therefore, the DC applicant does not need to address this supporting requirement. For COL applications, site-specific hazard information will be available to confirm that the DC hazard bounds the actual site and regional characteristics and update the analysis, if appropriate. However, the PRA-based SMA approach per SRP 19.0, Revision 3, is still used instead of addressing this supporting requirement. Therefore, the COL applicant does not need to address this supporting requirement. Though not required, a COL applicant could address this supporting requirement directly if they upgrade their analysis to a seismic PRA.
HLR-SHA-J		Documentation of the probabilistic seismic hazard analysis shall be consistent with the applicable supporting requirements.
SHA-J1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
SHA-J2	No Objection	
SHA-J3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.

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Supporting Requirement	Position	Discussion
Seismic Fragility Analysis		
HLR-SFR-A		The seismic-fragility evaluation shall be performed to estimate plant-specific, realistic seismic fragilities of SSCs whose failure may contribute to core damage or large early release [large release], or both.
SFR-A1	Clarification	For DC and COL applications, basic events will use HCLPF values (in terms of acceleration) to represent the seismic fragilities of SSCs.
SFR-A2	No Objection	
HLR-SFR-B		If screening of high-seismic-capacity components is performed, the basis for the screening shall be fully described.
SFR-B1	Clarification	If screening is not performed, this supporting requirement is Not Applicable. However, it is likely that some level of screening will be performed for high-seismic-capacity SSCs.
SFR-B2	No Objection	
HLR-SFR-C		The seismic-fragility evaluation shall be based on realistic seismic response that SSCs experience at their failure levels.
SFR-C1	Qualification	DC applications will not have regional or site-specific information on which to base their analysis or ensure the spectral shape reflects or bounds the site-specific conditions. DC applicants will establish site characteristics and site interface requirements on which the seismic response analysis will be performed. Though the objective of most DC applicants will be to bound most sites and the note indicates an allowance for using a general spectral shape if site-specific shapes are not available, this cannot be ensured to bound the site until actual sites are identified and evaluated. For COL applications, site-specific response spectra information will be available to address the supporting requirement directly and/or confirm that the DC response spectra bounds the actual site characteristics.
SFR-C2	Clarification	If the conditional activity cited in this supporting requirement is not performed, then the supporting requirement is Not Applicable and the applicant does not need to address this supporting requirement.
SFR-C3	Clarification	If the conditional activity cited in this supporting requirement is not performed, then the supporting requirement is Not Applicable and the applicant does not need to address this supporting requirement. Because design response analysis will be available, even for DC applications, the applicant can meet this supporting requirement.
SFR-C4	Clarification	If a new analysis is not performed, then the supporting requirement is Not Applicable. This will be the case for the DC applications because regional or site-specific information will not be available to make this judgment. Rather, DC applicants will establish site characteristics and site interface requirements on which the seismic response

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Supporting Requirement	Position	Discussion
		<p>analysis will be performed. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, if a new analysis is determined not necessary to perform (e.g., the DC analysis adequately bounds or addresses the response and site-specific input motion), then the supporting requirement is Not Applicable and the applicant does not need to address the supporting requirement. If the COL applicant determines it is necessary to perform the new analysis, then the applicant can use their site-specific information to address the supporting requirement directly.</p>
SFR-C5	Clarification	<p>If the median-centered response analysis approach is not performed, then the supporting requirement is Not Applicable. DC applicants will establish site characteristics and site interface requirements on which the seismic response analysis will be performed, which might involve this approach, as well as for COL applications.</p>
SFR-C6	Clarification	<p>If the soil-structure interaction analysis is not performed, then the supporting requirement is Not Applicable. This will be the case for the DC applications since regional or site-specific information will not be available to conduct this analysis. Therefore, the DC applicant does not need to address this supporting requirement.</p> <p>For COL applications, if soil-structure interaction analysis is determined not necessary to perform, then the supporting requirement is Not Applicable and the applicant does not need to address the supporting requirement. If the COL applicant determines it is necessary to perform the soil-structure interaction analysis, then the applicant can use their site-specific information to address the supporting requirement directly.</p>
HLR-SFR-D		<p>The seismic-fragility evaluation shall be performed for critical failure modes of SSCs 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 walkdown.</p>
SFR-D1	Qualification	<p>For DC and COL applications, walkdowns will not be able to be performed to verify the information or identify additional failure modes. However, failure modes can be identified from design documents.</p>
SFR-D2	Clarification	<p>Though the applicant can meet this supporting requirement, for DC and COL applications, the evaluation will be somewhat limited due to the status of the design.</p>
HLR-SFR-E		<p>The seismic-fragility evaluation shall incorporate the findings of a detailed walkdown of the plant focusing on the anchorage, lateral seismic support, and potential systems interactions.</p>
SFR-E1	Clarification	<p>For DC and COL applications, walkdowns will not be able to be performed to verify the information or identify additional failure</p>

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Supporting Requirement	Position	Discussion
		modes. Therefore, the applicant does not need to address this supporting requirement.
SFR-E2	Clarification	For DC and COL applications, walkdowns will not be able to be performed to verify the information or identify additional failure modes, so observations and conclusions cannot be documented. Therefore, the DC applicant does not need to address this supporting requirement.
SFR-E3	Clarification	For DC and COL applications, screening components based on walkdowns cannot be performed since walkdowns cannot be performed at these stages. Therefore, this supporting requirement is Not Applicable and the applicant does not need to address this supporting requirement. However, If components are screened out, then a justification for the screening needs to be provided and documented.
SFR-E4	Qualification	For DC and COL applications, walkdowns will not be able to be performed to identify the potential for seismically-induced fires and flooding. However, these considerations will need to be based on general design information, including consideration of the information from the internal flooding and internal fire PRAs.
SFR-E5	Qualification	For DC and COL applications, walkdowns will not be able to be performed to identify the potential for sources of interactions and their consequences. However, these considerations will need to be based on general design information, including layout drawings.
HLR-SFR-F		The calculation of seismic fragility parameters such as median capacity and variabilities shall be based on plant-specific data supplemented as needed by earthquake experience data, fragility test data, and generic qualification test data. Use of such generic data shall be justified.
SFR-F1	Clarification	For DC and COL applications, the component seismic fragility will not have plant-specific data. That being the case, these applicants will rely on the supplemental sources in establishing HCLPF values (instead of median capacities with variabilities) for the components, similar to the discussion in the note to this supporting requirement.
SFR-F2	Clarification	For DC and COL application, this supporting requirement will use the exception clause in the supporting requirement and justify the use of generic fragility information for the analysis.
SFR-F3	Clarification	For DC and COL applications, the screening for low-ruggedness relays will rely on design documentation that will likely establish that low-ruggedness relays will not be used in the design. That being the case, the analysis will not identify any relays for this evaluation.
SFR-F4	Clarification	The objective of this supporting requirement is to establish seismic fragilities that address LERF aspects. For ALWRs in addressing LRF, the applicant can meet this supporting requirement, recognizing the limitations and conditions identified for the prior supporting requirements in SFR.

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Supporting Requirement	Position	Discussion
HLR-SFR-G		Documentation of the seismic-fragility evaluation shall be consistent with the applicable supporting requirements.
SFR-G1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
SFR-G2	No Objection	
SFR-G3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
Seismic Plant Response Analysis		
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	No Objection	
SPR-A2	No Objection	
SPR-A3	No Objection	
SPR-A4	No Objection	
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 full-power, internal-events PRA systems model.
SPR-B1	No Objection	
SPR-B2	No Objection	
SPR-B3	Clarification	If screening is not performed, the supporting requirement is Not Applicable. For these application stages, the applicant can meet this supporting requirement.
SPR-B4	No Objection	
SPR-B5	No Objection	
SPR-B6	Clarification	This supporting requirement is closely related to SFR-F3.
SPR-B7	No Objection	
SPR-B8	No Objection	
SPR-B9	No Objection	
SPR-B10	No Objection	

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Supporting Requirement	Position	Discussion
SPR-B11	Qualification	This supporting requirement is closely related to SFR-E4. For DC and COL applications, walkdowns will not be able to be performed to identify the potential for seismically-induced fires and flooding. These considerations will need to be based on general design information, including consideration of the information from the internal flooding and internal fire PRAs.
HLR-SPR-C	The seismic-PRA systems model shall reflect the as-built [as-to-be-built] and as-operated [as-to-be-operated] plant being analyzed.	
SPR-C1	Clarification	For the DC application and COL application, the pertinent information used for the systems analysis will be that which reflects the “as-to-be-built” and “as-to-be-operated” design appropriate for that application stage.
HLR-SPR-D	The list of SSCs selected for seismic-fragility analysis shall include the SSCs that participate in accident sequences included in the seismic-PRA systems model.	
SPR-D1	No Objection	
HLR-SPR-E	The analysis to quantify core damage frequency and large early release [large release] frequency shall appropriately integrate the seismic hazard, the seismic fragilities, and the systems-analysis aspects.	
SPR-E1	Clarification	For the DC and COL applications, this integration will use margins-type approaches to result in a plant-level HCLPF value.
SPR-E2	No Objection	
SPR-E3	No Objection	
SPR-E4	No Objection	
SPR-E5	Clarification	For the DC and COL applications, this integration will use margins-type approaches. As a result, the integration will result in a plant-level HCLPF value.
SPR-E6	No Objection	
HLR-SPR-F	Documentation of the seismic plant response analysis and quantification shall be consistent with the applicable supporting requirements.	
SPR-F1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
SPR-F2	No Objection	
SPR-F3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement:

Table 5. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 5, Seismic Events at Power

Supporting Requirement	Position	Discussion
		DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.

Addressing Part 6, Screening and Conservative Analysis of Other External Hazards, Supporting Requirements

In addition to the general limitations, DC applications addressing 10 CFR 52.47(a)(27) and COL applications addressing 10 CFR 52.79(a)(46) might not have specific information that could impact the manner in which the applicant can screen external hazards. In particular, DC applications will not have regional or site-specific information on which to base their analyses. In this case, DC applicants will likely establish site characteristics and site interface requirements, typically described in Chapter 2 of the DC as part of the site selection criterion, to bound the analysis. This information may be relied on in screening some external hazards at the DC application stage and can be confirmed and/or reassessed at the COL application stage. The DC and COL applications will likely rely on general design information, good engineering practices, and generic data in addressing the capabilities of structures and components. Further, for these stages the supporting requirements requiring walkdowns are not feasible.

The screening of external hazards for ALWRs also needs to consider the overall CDF and LRF. That being the case, some of the Supporting Requirements in this Part might need to be adjusted to ensure significant contributors to overall CDF and LRF are not screened out.

Some supporting requirements refer back to the internal events PRA supporting requirements. As such, these supporting requirements should also consider the evaluation of the applicability and feasibility of the referenced supporting requirement, including any pertinent comments or clarifications.

Table 6. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 6, Screening and Conservative Analysis Of Other External Hazards at Power

Supporting Requirement	Position	Discussion
Screening and Conservative Analysis		
HLR-EXT-A	All potential external hazards (i.e., all natural and man-made hazards) that may affect the site shall be identified.	
EXT-A1	No Objection	
EXT-A2	Qualification	In DC applications, given that a site is not identified, bounding site parameters can be assessed or siting criteria presented to eliminate hazards, but unique site hazards would not be known.

Table 6. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 6, Screening and Conservative Analysis Of Other External Hazards at Power

Supporting Requirement	Position	Discussion
		<p>In COL applications, the site-specific conditions can be assessed to determine whether there are additional hazards to consider.</p>
HLR-EXT-B	Preliminary screening, if used, shall be performed using a defined set of screening criteria.	
EXT-B1	Qualification	<p>In DC applications, given that a site is not identified, only bounding site parameters can be assessed or siting criteria presented to eliminate hazards. In COL applications, the site-specific conditions can be assessed to determine whether there are additional hazards to consider.</p> <p>In screening out hazards, meeting specific design criteria for some structures and components (similar to relying on meeting the SRP or GDC) should not be the basis for screening. Events within the design criteria may have a higher frequency of occurrence with similar effects as that of the design basis and events greater than the design criteria may have significant effects with only a slightly less frequency of occurrence. Further, not all structures, systems, and components (SSCs) at the site are designed to the same criterion and the screening would need to consider the potential impact of SSCs that have lower design criteria (e.g., non-safety structures) and their potential impacts from the specific hazard event in considering any screening. With that clarification, the applicant can consider the capability of the design of the SSCs, including the lower capability of some SSCs onsite, to support the determination of the frequency of events that will exceed these capabilities. Similarly, a slow developing hazard should not be the basis for screening, but timing can be a consideration in the evaluation of the hazard, which is addressed by the new Criterion 2. That being the case, the original Criteria 1 and 5 should not be used. Further, the original Criterion 2 (now Criterion 1) also needed to be clarified regarding what is inferred by “significantly lower.” Finally, the staff added that the use of any criterion must take into account the range of magnitudes of the hazard for the frequencies of interest.</p> <p>Based on the above discussion, the following replacement supporting requirement should be used:</p> <p>Initial Preliminary Screening: For screening out an external hazard, any one of the following screening criteria provides an acceptable basis:</p> <p><i>Criterion 1:</i> The hazard has a significantly lower mean frequency of occurrence than another hazard, taking into account the uncertainties in the estimates of both frequencies, and the hazard could not result</p>

Table 6. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 6, Screening and Conservative Analysis Of Other External Hazards at Power

Supporting Requirement	Position	Discussion
		<p>in worse consequences than the consequences from the other hazard. The phrase “significantly lower “implies that the screened hazard has a mean frequency of occurrence that is at least two orders of magnitude less than (that is, 1% or less of) the mean frequency of occurrence of the other event.</p> <p><i>Criterion 2:</i> The hazard does not result in a plant trip (manual or automatic) or a controlled manual shutdown and does not impact any SSCs that are required for accident mitigation from at-power transients or accidents. If credit is taken for operator actions to correct the condition to avoid a plant trip or controlled shutdown, then ENSURE the credited operator actions and associated equipment have an exceedingly low probability of failure (i.e., collectively less than or equal to 1×10^{-5}) following the applicable supporting requirements of this part (e.g., Human Reliability Analysis – Subsection 2-2.5).</p> <p><i>Criterion 3:</i> The impacts of the hazard cannot occur close enough to the plant to affect it.</p> <p><i>Criterion 4:</i> The hazard is included in the definition of another hazard.</p> <p>Application of any screening criterion must take into account the range of magnitudes of the hazard for the recurrence frequencies of interest.</p>
EXT-B2	Qualification	<p>Screening based solely on meeting the 1975 Standard Review Plan design criteria is not appropriate because it infers a CDF that might be orders of magnitude greater than the base CDF at the site. At this stage of screening of external hazards, this supporting requirement should be considered Not Applicable and not used. Therefore, applicants should not use this supporting requirement.</p>
EXT-B3	Qualification	<p>In DC applications, given that a site is not identified, only bounding site parameters can be assessed or siting criteria presented to eliminate hazards. In COL applications, the site-specific conditions can be assessed to determine whether there are additional hazards to consider.</p> <p>Because this supporting requirement interfaces with EXT-B1 in using the design or licensing basis hazards information, it needs to be replaced with the following text that focuses on the specific site and regional conditions:</p> <p>BASE the application of the screening criteria for a given external hazard on a review of information on the site characteristics and on</p>

Table 6. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 6, Screening and Conservative Analysis Of Other External Hazards at Power

Supporting Requirement	Position	Discussion
		the surrounding area/regional features, characteristics, and facilities/operations relevant to that event.
EXT-B4	Clarification	This supporting requirement is Not Applicable to DC or COL applications, because it addresses changes to site parameters and characteristics since the issuance of the original operating license, which has not occurred at these application stages. Therefore, the applicant does not need to address this supporting requirement.
HLR-EXT-C	A bounding or demonstrably conservative analysis, if used for screening, shall be performed using defined quantitative screening criteria.	
EXT-C1	Qualification	<p>In DC applications, given that a site is not identified, only bounding site parameters can be assessed or siting criteria presented to eliminate hazards. In COL applications, the site-specific conditions can be assessed to determine whether there are additional hazards to consider.</p> <p>Screening based on the cited criteria is not appropriate because it might yield a CDF that is orders of magnitude greater than the base CDF at the site. The current version of the PRA standard does not identify unique screening criteria for new reactor designs that can have substantially lower risk profiles (e.g., plants with internal events CDF well below 1×10^{-6}/year). As stated in RG 1.200, the quantitative screening value should be adjusted according to the relative baseline risk value. Lower screening values need to be used that are commensurate with the lower CDF and LRF estimates expected from ALWRs.</p> <p>Therefore, replace this supporting requirement with the following:</p> <p>SCREEN OUT external hazards if</p> <ul style="list-style-type: none"> (a) the quantitative screening criteria in SR IE-C6 of Part 2, as applied to the external hazard, are met, OR (b) the external hazard affects, directly and indirectly, only components in a single system, AND it can be shown that the product of the frequency of the external hazard and the probability of SSC failure given the hazard is at least two orders of magnitude lower than the product of the non-hazard (i.e., internal events) frequency for the corresponding initiating event in the PRA, and the random (non-external hazard) failure probability of the same SSCs that are assumed failed by the external hazard. <p>If the external hazard impacts multiple systems, directly or indirectly, DO NOT screen on this basis.</p>

Table 6. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 6, Screening and Conservative Analysis Of Other External Hazards at Power

Supporting Requirement	Position	Discussion
EXT-C2	Clarification	In DC applications, given that a site is not identified, only generic and/or bounding frequencies and parameters can be established based on the site characteristics and site interface requirements. In COL applications, the site-specific frequencies and parameters can be established or the DC information confirmed as bounding.
EXT-C3	No Objection	
EXT-C4	No Objection	
EXT-C5	No Objection	
EXT-C6	No Objection	
EXT-C7	No Objection	
HLR-EXT-D	The basis for the screening out of an external hazard shall be confirmed through a walkdown of the plant and its surroundings.	
EXT-D1	Clarification	In DC applications, given that a site is not identified, a confirmatory site walkdown is not possible. In COL applications, the site-specific conditions can be assessed by a walkdown. Therefore, the applicant does not need to address this supporting requirement.
EXT-D2	Clarification	In DC applications, given that a site is not identified, a confirmatory site walkdown is not possible. In COL applications, the plant construction has not been completed and as such specific plant confirmatory walkdowns are not possible. Therefore, the applicant does not need to address this supporting requirement.
HLR-EXT-E	Documentation of the screening out of an external hazard shall be consistent with the applicable supporting requirements.	
EXT-E1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
EXT-E2	No Objection	
EXT-E3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following new supporting requirement is added: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.

Addressing Part 7, High Wind Events, Supporting Requirements

In addition to the general limitations, DC applications addressing 10 CFR 52.47(a)(27) and COL applications addressing 10 CFR 52.79(a)(46) might not have specific information that could impact the manner in which the applicant models high winds. Further, for these stages the supporting requirements requiring walkdowns and surveys to confirm the analyses are not feasible.

As noted in ASME/ANS-RA-Sa-2009, Section 7-2, “Technical Requirements for High Wind Events PRA At-Power,” the fact that the high wind events are not screened out in accordance with the screening criteria in Part 6 (as modified by the qualifications and clarifications provided previously on Part 6), the supporting requirements in this Part typically correspond to Capability Category II (i.e., Capability Category I would involve the simplified and/or conservative screening approaches identified in Part 6). As a result, many supporting requirements in this Part designate Capability Category I as “Not Defined.” However, consistent with the discussion in Part 9, Section 9-2, “Technical Requirements for Other External Hazards PRA At-Power,” it is acceptable to introduce conservatism in any given step as long as the impact on overall CDF and LRF is evaluated and the associated uncertainty addressed. Where simplifications and conservatism are used, the supporting requirement would be more appropriately considered Capability Category I. Therefore, the DC/COL applicants should develop high wind event PRAs, if necessary, considering the parallel generic supporting requirements of Part 9 for achieving Capability Category I.

Some supporting requirements refer back to the internal events PRA supporting requirements. As such, these supporting requirements should also consider the evaluation of the applicability and feasibility of the cited supporting requirements, including any pertinent comments or clarifications.

Table 7. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 7, High Winds Events at Power

Supporting Requirement	Position	Discussion
Wind Hazard Analysis		
HLR-WHA-A		The frequency of high winds at the site shall be based on site-specific probabilistic wind hazard analysis (existing or new) that reflects recent available regional and site-specific information. Uncertainties in the models and parameter values shall be properly accounted for and fully propagated in order to obtain a family of hazard curves from which a mean hazard curve can be derived.
WHA-A1	Qualification	For this supporting requirement, CC I is identified as “Not Defined.” However, the CC II/III consideration should be performed. DC applications will not have regional or site-specific information on which to base their analysis. Instead, DC applicants will likely establish site characteristics and site interface requirements to generically bound or represent the analysis. At the COL application stage site-specific information is available and can be used directly or in confirming the DC analysis. For those hazards evaluated, it is feasible to represent the hazards by a distribution consistent with the

Table 7. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 7, High Winds Events at Power

Supporting Requirement	Position	Discussion
		supporting requirement, though using generic or representative information.
WHA-A2	Qualification	For this supporting requirement, CC I is identified as “Not Defined.” However, the CC II/III consideration should be performed. DC applications will not have regional or site-specific information on which to base their analysis. Instead, DC applicants will likely establish site characteristics and site interface requirements to generically bound or represent the analysis. At the COL application stage site-specific information is available and can be used directly or in confirming the DC analysis. For those hazards evaluated, it is feasible to represent the hazards by a distribution consistent with the supporting requirement, though using generic or representative information.
WHA-A3	Qualification	For this supporting requirement, CC I is identified as “Not Defined.” However, the CC II/III consideration should be performed. DC applications will not have regional or site-specific information on which to base their analysis. Instead, DC applicants will likely establish site characteristics and site interface requirements to generically bound or represent the analysis. At the COL application stage site-specific information is available and can be used directly or in confirming the DC analysis.
WHA-A4	Qualification	For this supporting requirement, CC I is identified as “Not Defined.” However, the CC II/III consideration should be performed. Though the supporting requirement is feasible in that a missile hazards analysis should be performed, some information related to barriers might not be fully developed at the DC or COL application stages. That being the case, these features will likely be based on design guidelines and good engineering practices.
WHA-A5	Qualification	For this supporting requirement, CC I is identified as “Not Defined.” However, the CC II/III consideration should be performed. However, the objective of the supporting requirement is to identify the number, type, and location of missiles to support the missile analysis of WHA-A4. At the DC and COL stage, this analysis would be based on generic or bounding information, which is typically provided from the references for a site with construction activities nearby.
HLR-WHA-B	Documentation of the wind hazard analysis shall be consistent with the applicable supporting requirements.	
WHA-B1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
WHA-B2	No Objection	

Table 7. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 7, High Winds Events at Power

Supporting Requirement	Position	Discussion
WHA-B3	Qualification	<p>DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement:</p> <p>DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.</p>
High Wind Fragility Analysis		
HLR-WFR-A		<p>A wind fragility evaluation shall be performed to estimate plant-specific, realistic wind fragilities for those structures, or systems, or components, or a combination thereof whose failure contributes to core damage or large early release [large release], or both.</p>
WFR-A1	Qualification	<p>For this supporting requirement, CC I is identified as “Not Defined.” The CC II/III aspects should be performed, recognizing that plant walkdown aspects of this supporting requirement cannot be performed for either DC or COL applications. In addition, the DC applicant will likely use generic information based on design and guidance documents. At the COL application stage site-specific information is available and can be used directly or in confirming the DC analysis, though generic data will likely still be used for structure and component fragilities. The information collected should include the available and pertinent information for that application stage to reflect the system design and will be enhanced if additional system design information is available at the COL application stage.</p>
WFR-A2	No Objection	
HLR-WFR-B		<p>Documentation of the wind fragility analysis shall be consistent with the applicable supporting requirements.</p>
WFR-B1	Qualification	<p>DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement:</p> <p>DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.</p>
WFR-B2	No Objection	
WFR-B3	Qualification	<p>DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement:</p>

Table 7. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 7, High Winds Events at Power

Supporting Requirement	Position	Discussion
		DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
High Wind Plant Response Model		
HLR-WPR-A	The high wind PRA systems model shall include wind-caused initiating events and other failures that can lead to core damage or large early release [large release]. The model shall be adapted from the internal events, at-power PRA systems model to incorporate wind-analysis aspects that are different from the corresponding aspects in the at-power, internal events PRA systems model.	
WPR-A1	No Objection	
WPR-A2	No Objection	
WPR-A3	No Objection	
WPR-A4	No Objection	
WPR-A5	No Objection	
WPR-A6	Qualification	<p>In DC applications, given that a site is not identified, only bounding site parameters can be assessed or siting criteria presented to eliminate hazards. In COL applications, the site-specific conditions can be assessed to determine whether there are additional hazards to consider.</p> <p>The supporting requirement comes after already passing through the Screening of Part 6 (EXT-B1, B2, B3, and C1) using conservative estimates. Therefore, whatever additional screening is performed should be consistent with the previous screening approaches; also, applicants should verify that screened out hazards are not significant contributors. Therefore, this supporting requirement should be enhanced as follows:</p> <p>If any additional screening criteria are applied, ENSURE</p> <ul style="list-style-type: none"> (a) supporting requirement IE-C6 of Part 2, as applied to the external hazard, is met, OR (b) the external hazard affects only components in a single system, AND it can be shown that the product of the frequency of the external hazard and the probability of SSC failure given the hazard is two orders of magnitude lower than the product of the non-hazard (i.e., internal events) frequency for the corresponding initiating event in the PRA, and the random (non-external hazard) failure probability of the same SSCs that are assumed failed by the external hazard. <p>If the external hazard impacts multiple systems, DO NOT screen on this basis.</p>

Table 7. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 7, High Winds Events at Power

Supporting Requirement	Position	Discussion
		<p>ENSURE that the mean cumulative contribution to CDF of the high wind events that have been screened out is less than 5% of the total mean CDF for high wind events.</p> <p>ENSURE that the mean cumulative contribution to LRF of the high wind events that have been screened out is less than 5% of the total mean LRF for high wind events.</p>
WPR-A7	No Objection	
WPR-A8	No Objection	
WPR-A9	No Objection	
WPR-A10	No Objection	
WPR-A11	Qualification	For this supporting requirement, CC I is identified as “Not Defined.” However, the CC II/III consideration to examine the system recoveries modeled in the internal events PRA and to adjust them based on the hazard impacts can and should be performed. At the DC and COL stage such consideration would be based on design and operational guidance.
HLR-WPR-B		The analysis to quantify core damage and large early release [large release] frequencies shall appropriately integrate the wind hazard, the wind fragilities, and the plant response aspects.
WPR-B1	Qualification	For this supporting requirement, CC I is identified as “Not Defined.” However, the CC II/III consideration is feasible consistent with the qualifications associated with the hazards identified for supporting requirements WHA-A1 through A5.
WPR-B2	Qualification	For this supporting requirement, CC I is identified as “Not Defined.” However, the CC II/III consideration is feasible consistent with the qualifications associated with the hazards identified for supporting requirements WHA-A1 through A5.
HLR-WPR-C		Documentation of the high wind plant response model development and quantification shall be consistent with the applicable supporting requirements.
WPR-C1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
WPR-C2	No Objection	
WPR-C3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement:

Table 7. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009, Part 7, High Winds Events at Power

Supporting Requirement	Position	Discussion
		DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.

Addressing Part 8, External Flood Events, Supporting Requirements

In addition to the general limitations, DC applications addressing 10 CFR 52.47(a)(27) and COL applications addressing 10 CFR 52.79(a)(46) might not have specific information that could impact the manner in which the applicant models external flood events. Further, for these stages the supporting requirements requiring walkdowns and surveys to confirm the analyses are not feasible.

As noted in ASME/ANS-RA-Sa-2009, Section 8-2, “Technical Requirements for External Flood Events PRA,” the fact that the external flooding events are not screened out in accordance with the screening criteria in Part 6 (as modified by the qualifications and clarifications provided previously on Part 6), the supporting requirements in this Part typically correspond to Capability Category II (i.e., Capability Category I would involve the simplified and/or conservative screening approaches identified in Part 6). As a result, many supporting requirements in this Part designate Capability Category I as “Not Defined.” However, consistent with the discussion in Part 9, Section 9-2, for other external hazards, it is acceptable to introduce conservatisms in any given step as long as the impact on overall CDF and LRF is evaluated and the associated uncertainty is addressed. Where simplifications and conservatisms are used, the supporting requirement would be more appropriately considered Capability Category I. Therefore, DC/COL applicants should develop external flood event PRAs, if necessary, considering the parallel generic supporting requirements of Part 9 for achieving Capability Category I.

Some supporting requirements refer back to the internal events PRA supporting requirements. As such, these supporting requirements should also consider the evaluation of the applicability and feasibility of the cited supporting requirements, including any pertinent comments or clarifications.

Table 8. Addressing Capability Category I Supporting Requirements from Part 8, “Requirements for External Flood Events At-Power PRA,” of ASME/ANS RA-Sa-2009

Supporting Requirement	Position	Discussion
External Flooding Hazard Analysis		
HLR-XFHA-A		The frequency of external flooding at the site shall be based on site-specific probabilistic hazard analysis (existing or new) that reflects recent available regional and site-specific information. The external-flooding hazard analysis shall use up-to-date databases. Uncertainties in the models and parameter values shall be properly accounted for and fully propagated to obtain a family of hazard curves from which a mean hazard curve can be derived.
XFHA-A1	Qualification	For this supporting requirement, CC I is identified as “Not Defined.” However, the CC II/III consideration should be performed. DC applications will not have regional or site-specific information on which to base their analysis. Instead, DC applicants are expected to establish site characteristics and site-interface requirements to generically bound or represent the analysis. At the COL application stage, site-specific information is available and can be used directly or in confirming the DC analysis.
XFHA-A2	Qualification	For this supporting requirement, CC I is identified as “Not Defined.” However, the CC II/III consideration should be performed. DC applications will not have regional or site-specific information on which to base their analysis. Instead, DC applicants are expected to establish site characteristics and site-interface requirements to generically bound or represent the analysis. At the COL application stage, site-specific information is available and can be used directly or in confirming the DC analysis.
XFHA-A3	Qualification	For this supporting requirement, CC I is identified as “Not Defined.” However, the CC II/III consideration should be performed. DC applications will not have regional or site-specific information on which to base their analysis. Instead, DC applicants are expected to establish site characteristics and site-interface requirements to generically bound or represent the analysis. At the COL application stage, site-specific information is available and can be used directly or in confirming the DC analysis.
XFHA-A4	Qualification	For this supporting requirement, CC I is identified as “Not Defined.” However, the CC II/III consideration should be performed. DC applications will not have regional or site-specific information on which to base their analysis. Instead, DC applicants are expected to establish site characteristics and site-interface requirements to generically bound or represent the analysis. At the COL application stage, site-specific information is available and can be used directly or in confirming the DC analysis.
XFHA-A5	Qualification	For this supporting requirement, CC I is identified as “Not Defined.” However, the CC II/III consideration should be performed. DC applications will not have regional or site-specific information on which to base their analysis. Instead, DC applicants are expected to establish site characteristics and site-interface requirements to generically bound or represent the analysis. At the COL application

Table 8. Addressing Capability Category I Supporting Requirements from Part 8, “Requirements for External Flood Events At-Power PRA,” of ASME/ANS RA-Sa-2009

Supporting Requirement	Position	Discussion
		stage, site-specific information is available and can be used directly or in confirming the DC analysis.
XFHA-A6	Qualification	For this supporting requirement, CC I is identified as “Not Defined.” However, the CC II/III consideration should be performed. DC applications will not have regional or site-specific information on which to base their analysis. Instead, DC applicants are expected to establish site characteristics and site-interface requirements to generically bound or represent the analysis. At the COL application stage, site-specific information is available and can be used directly or in confirming the DC analysis.
XFHA-B		Documentation of the external flood hazard analysis shall be consistent with the applicable supporting requirements.
XFHA-B1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and their bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
XFHA-B2	No Objection	
XFHA-B3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
External Flood Fragility Analysis		
XFFR-A		An external flood fragility evaluation shall be performed to estimate plant-specific, realistic susceptibilities, fragilities for those structures, or systems, or components, or a combination thereof, whose failure contributes to core damage or large early release [large release], or both.
XFFR-A1	Qualification	For this supporting requirement, CC I is identified as “Not Defined.” Certain aspects of the CC II/III consideration can be and should be performed. DC applications will likely use generic information based on design and guidance documents and associated generic data for the fragilities. At the COL application stage, site-specific information is available and can be used directly or in confirming the DC analysis, while generic data would still be used for many structures. However, plant walkdowns cannot be performed for either DC or COL applications. The information collected should include the available and pertinent information for that application stage to reflect the

Table 8. Addressing Capability Category I Supporting Requirements from Part 8, “Requirements for External Flood Events At-Power PRA,” of ASME/ANS RA-Sa-2009

Supporting Requirement	Position	Discussion
		system design and will be enhanced if additional system design information is available at the COL application stage.
XFFR-A2	No Objection	
XFFR-B		Documentation of the external flood fragility analysis shall be consistent with the applicable supporting requirements.
XFFR-B1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and their bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
XFFR-B2	No Objection	
XFFR-B3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
External Flood Plant Response Model		
XFPR-A		The external flooding-PRA systems model shall include flood-caused initiating events and other failures that can lead to core damage or large early release [large release]. The model shall be adapted from the internal events, at-power PRA systems model to incorporate flood-analysis aspects that are different from the corresponding aspects in the at-power, internal events PRA systems model.
XFPR-A1	No Objection	
XFPR-A2	No Objection	
XFPR-A3	No Objection	
XFPR-A4	No Objection	
XFPR-A5	No Objection	
XFPR-A6	Qualification	In DC applications, given that a site is not identified, only bounding site parameters can be assessed or siting criteria presented to eliminate hazards. In COL applications, the site-specific conditions can be assessed to determine whether there are additional hazards to consider. The supporting requirement comes after already passing through the screening of Part 6 (EXT-B1, B2, B3, and C1) using conservative estimates. Therefore, whatever additional screening is performed should be consistent with the previous screening approaches; also, applicants should verify that screened out hazards are not significant

Table 8. Addressing Capability Category I Supporting Requirements from Part 8, “Requirements for External Flood Events At-Power PRA,” of ASME/ANS RA-Sa-2009

Supporting Requirement	Position	Discussion
		<p>contributors. Therefore, this supporting requirement should be enhanced as follows:</p> <p>If any additional screening criteria are applied, ENSURE that</p> <ul style="list-style-type: none"> (a) supporting requirement IE-C6 of Part 2, as applied to the external hazard, is met, OR (b) the external hazard affects only components in a single system, AND the product of the frequency of the external hazard and the probability of SSC failure (given the hazard) is at least two orders of magnitude lower than the product of the non-hazard (i.e., internal events) frequency for the corresponding initiating event in the PRA and the random (non-external hazard) failure probability of the same SSCs that are assumed failed by the external hazard. <p>If the external hazard impacts multiple systems, DO NOT screen on this basis.</p> <p>ENSURE that the mean cumulative contribution to CDF of the external-flood events that have been screened out is less than 5% of the total mean CDF for external-flood events.</p> <p>ENSURE that the mean cumulative contribution to LRF of the external-flood events that have been screened out is less than 5% of the total mean LRF for external-flood events.</p>
XFPR-A7	No Objection	
XFPR-A8	No Objection	
XFPR-A9	No Objection	
XFPR-A10	No Objection	
XFPR-A11	Qualification	<p>For this supporting requirement, CC I is identified as “Not Defined.” However, the CC II/III consideration (to examine the system recoveries modeled in the internal-events PRA and to adjust them based on the hazard impacts) can and should be performed. At the DC and COL stages, such consideration would be based on design and operational guidance.</p>
HLR-XFPR-B		<p>The analysis to quantify core damage and large early release [large release] frequencies shall appropriately integrate the external flood hazard, the external flood fragilities, and the systems-analysis aspects.</p>
XFPR-B1	Qualification	<p>For this supporting requirement, CC I is identified as “Not Defined.” However, the CC II/III consideration should be performed.</p>
XFPR-B2	Qualification	<p>For this supporting requirement, CC I is identified as “Not Defined.” However, the CC II/III consideration should be performed.</p>

Table 8. Addressing Capability Category I Supporting Requirements from Part 8, “Requirements for External Flood Events At-Power PRA,” of ASME/ANS RA-Sa-2009

Supporting Requirement	Position	Discussion
HLR-XFPR-C		Documentation of the external flood plant response model development and quantification shall be consistent with the applicable supporting requirements.
XFPR-C1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and their bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
XFPR-C2	No Objection	
XFPR-C3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.

Addressing Part 9, Other External Events, Supporting Requirements

In accordance with ASME/ANS-RA-Sa-2009, Section 9-1.3, the analysis of other external hazards relates to those external hazards beyond seismic (Part 5) that are not screened out (Part 6, subject to the qualifications and clarifications provided above on Part 6). Further, as noted in ASME/ANS-RA-Sa-2009, Section 9-2, the fact that the specific external hazard is not screened out in accordance with the screening criteria in Part 6 (as modified by the qualifications and clarifications provided previously on Part 6), the supporting requirements in this Part typically correspond to Capability Category II (i.e., Capability Category I would involve the simplified and/or conservative screening approaches identified in Part 6), though this section also indicates that it is acceptable to introduce conservatisms in any given step as long as the impact on overall CDF and LRF is evaluated and the associated uncertainty is addressed. Where simplifications and conservatisms are used, the supporting requirement would be more appropriately considered Capability Category I. High winds and external flooding are specifically addressed in Parts 7 and 8, respectively.

In addressing 10 CFR 52.47(a)(27), DC applications will not have regional or site-specific information on which to base their analysis of the “other” external hazards. In this case, DC applicants will likely establish site characteristics and site interface requirements, typically described in Chapter 2 of the DC as part of the site selection criterion, to bound the results for these other external hazards. In those cases where the supporting requirements require the

use of regional and/or site-specific information for the DC application, the use of the site characteristics and site interface requirements would be considered as achieving the supporting requirement at Capability Category I consistent with the “extent necessary for the analysis.” This lack of regional and site-specific information will also impact the ability of the DC applicant to perform and confirm (e.g., by walkdowns) the fragility analyses that require the use of site-specific information for structures and equipment and the DC application will likely rely on generic information and general design documents in developing the fragility analyses. The system response model will also not be fully developed as the operational aspects and design details might not be fully established at the DC application stage. As a result, the system response model will build-off the internal events system response models, which will be based on guidance documents instead of plant-specific procedures and operating experience.

In addressing 10 CFR 52.79(a)(46), the COL application will have regional and site-specific information on which to base their analysis of the other external hazards. COL applicants will either confirm and maintain the DC bounding analysis for their specific site or develop a site-specific analysis for these other external hazards. If the COL applicant decides to use the DC bounding analysis and confirms it bounds the site parameters, then the supporting requirements that require the use of regional and/or site-specific information are met at the same level as the DC application. Many aspects of the fragility analysis might also still not be fully developed and cannot be confirmed (e.g., by walkdowns) at the time of the COL application. As a result, the COL application may continue to rely on generic information and general design documents in the fragility analysis. The system response model will also not be fully complete because the operational aspects and details might not be fully established at the COL application stage. As a result, the system response model will build-off the internal events system response models, which will be based on guidance documents instead of plant-specific procedures. The COL application should reflect the latest design and guidance, which may involve an update to the system response model to reflect changes since the DC application.

Some supporting requirements refer back to the internal events PRA supporting requirements. As such, these supporting requirements should also consider the evaluation of the applicability and feasibility of the cited supporting requirement, including any pertinent comments or clarifications.

Table 9. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009 Part 9 Other External Events at Power

Supporting Requirement	Position	Discussion
External Hazard Analysis		
HLR-XHA-A		The analysis of the hazard (the frequency of occurrence of different intensities of the external hazard) shall be based on a site-specific probabilistic evaluation reflecting recent available data and site-specific information. The analysis can be based on either historical data or a phenomenological model, or a mixture of the two.
XHA-A1	Clarification	DC applications will not have regional or site-specific information on which to base their analysis. Instead, DC applicants will likely establish site characteristics and site interface requirements to generically bound or represent the analysis. This meets the “to the

Table 9. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009 Part 9 Other External Events at Power

Supporting Requirement	Position	Discussion
		extent necessary for the analysis” aspect of the supporting requirement. At the COL application stage site-specific information is available and can be used directly or in confirming the DC analysis.
XHA-A2	Clarification	For those hazards evaluated, it is feasible to represent the specific hazard by a distribution that is consistent with the supporting requirement (although it uses generic or representative information). At the COL application stage site-specific information is available and can be used directly or in confirming the DC analysis.
XHA-A3	No Objection	
XHA-A4	No Objection	
HLR-XHA-B	Documentation of the external hazard analysis shall be consistent with the applicable supporting requirements.	
XHA-B1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
XHA-B2	No Objection	
XHA-B3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
External Hazard Fragility Analysis		
HLR-XFR-A	The fragility of a structure, or system, or component, or a combination thereof (SSC) shall be evaluated using plant-specific, SSC-specific information and an accepted engineering method for evaluating the postulated failure.	
XFR-A1	Clarification	The information collected should include the available and pertinent information for that application stage to reflect the system design. DC applications will likely use generic information based on design and guidance documents. This meets the “to the extent necessary for the purpose of the analysis” aspect of the supporting requirement. At the COL application stage site-specific information is available and can be used to enhance the fragility analysis, if additional system design information is available, which can be used directly or in confirming the DC analysis.
XFR-A2	Qualification	The information collected should include the available and pertinent information for that application stage to reflect the system design. DC applications will likely use generic information based on design and

Table 9. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009 Part 9 Other External Events at Power

Supporting Requirement	Position	Discussion
		guidance documents or similar plant data, if available. This meets the “to the extent necessary for the analysis” aspect of the supporting requirement and should be performed. At the COL application stage site-specific information is available and can be used to enhance the fragility analysis, if additional system design information is available, which can be used directly or in confirming the DC analysis. However, it is recognized that plant walkdowns cannot be performed for either DC or COL applications and, therefore, this aspect of the supporting requirement does not need to be performed.
XFR-A3	No Objection	
XFR-A4	No Objection	
HLR-XFR-B	Documentation of the external hazard fragility analysis shall be consistent with the applicable supporting requirements.	
XFR-B1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
XFR-B2	No Objection	
XFR-B3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.
External Hazard Plant Response Model		
HLR-XPR-A	The external hazard PRA plant model shall include external hazard-caused initiating events and other failures that can lead to core damage or large early release [large release]. The model shall be adapted from the internal events, at-power PRA systems model to incorporate external hazard-analysis aspects that are different from the corresponding aspects in the at-power, internal events PRA systems model.	
XPR-A1	No Objection	
XPR-A2	No Objection	
XPR-A3	No Objection	
XPR-A4	No Objection	
XPR-A5	No Objection	
XPR-A6	Qualification	In DC applications, given that a site is not identified, only bounding site parameters can be assessed or siting criteria presented to eliminate hazards. In COL applications, the site-specific conditions

Table 9. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009 Part 9 Other External Events at Power

Supporting Requirement	Position	Discussion
		<p>can be assessed directly in confirming the DC screening or in determining whether there are additional hazards to consider.</p> <p>The supporting requirement comes after already passing through the Screening of Part 6 (EXT-B1, B2, B3, and C1) using conservative estimates. Therefore, whatever additional screening is performed should be consistent with the previous screening approaches. In addition, applicants should verify that screened out hazards are not significant contributors. Therefore, this supporting requirement should be enhanced as follows:</p> <p>If any additional screening criteria are applied, ENSURE that</p> <ul style="list-style-type: none"> (a) supporting requirement IE-C6 of Part 2, as applied to the external hazard, is met, OR (b) the external hazard affects only components in a single system, AND it can be shown that the product of the frequency of the external hazard and the probability of SSC failure given the hazard is two orders of magnitude lower than the product of the non-hazard (i.e., internal events) frequency for the corresponding initiating event in the PRA, and the random (non-external hazard) failure probability of the same SSCs that are assumed failed by the external hazard. <p>If the external hazard impacts multiple systems, DO NOT screen on this basis.</p> <p>ENSURE that the mean cumulative contribution to CDF of the specific external hazard events that have been screened out is less than 5% of the total mean CDF for that external hazard.</p> <p>ENSURE that the mean cumulative contribution to LRF of the specific external hazard events that have been screened out is less than 5% of the total mean LRF for that external hazard.</p>
XPR-A7	No Objection	
XPR-A8	No Objection	
XPR-A9	No Objection	
XPR-A10	No Objection	
XPR-A11	Qualification	<p>For this supporting requirement, CC I is identified as “Not Defined.” However, the CC II/III consideration to examine the system recoveries modeled in the internal events PRA and to adjust them based on the hazard impacts can and should be performed. At the DC and COL stage such consideration would be based on design and operational guidance.</p>

Table 9. Addressing Capability Category I Supporting Requirements from ASME/ANS RA-Sa-2009 Part 9 Other External Events at Power

Supporting Requirement	Position	Discussion
HLR-XPR-B		The analysis to quantify core damage and large early release [large release] frequencies shall appropriately integrate the external hazard, the fragilities, and the plant response aspects.
XPR-B1	No Objection	
XPR-B2	No Objection	
XPR-B3	No Objection	
HLR-XPR-C		Documentation of the external hazard plant response analysis and quantification shall be consistent with the applicable supporting requirements.
XPR-C1	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their impact on applications. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the limitations, and bases, resulting from the status of the design, site, operational, and maintenance information or data that would impact applications.
XPR-C2	No Objection	
XPR-C3	Qualification	DC and COL applicants may make additional assumptions regarding the site, design, and operational practices, which need to be documented, including their consideration as a source of uncertainty. Therefore, the following requirement is added to this supporting requirement: DOCUMENT the additional sources of uncertainty and related assumptions resulting from the status of the design, site, operational, and maintenance information or data.

Final Resolution

The NRC staff will subsequently incorporate the contents of this guidance into the next revision of RG 1.200, RG 1.206, and SRP Section 19.0, as appropriate.

Applicability

This guidance is applicable all DC applications under 10 CFR 52.47(a)(27) and all COL applications under 10 CFR 52.79(a)(46). This guidance shall be implemented on the day

following its issuance. It shall remain in effect until it has been superseded, withdrawn, or incorporated in a revision RG 1.200, RG 1.206, and SRP Section 19.0, as appropriate.

References

1. American Society of Mechanical Engineers/American Nuclear Society (ASME/ANS) RA-Sa-2009, "Addenda to ASME/ANS RA-S-2008 Standard for Level 1/ Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications," ANS, La Grange Park, Illinois, February 2009.
2. U.S. *Code of Federal Regulations*, "Licenses, Certifications, and Approvals for Nuclear Power Plants," Part 52, Chapter 1, Title 10, "Energy."
3. U.S. *Code of Federal Regulations*, "Contents of Applications; Technical Information," §50.34, Chapter 1, Title 10, "Energy."
4. U.S. *Code of Federal Regulations*, "Maintenance of Records, Making of Reports." §50.71, Chapter 1, Title 10, "Energy."
5. U.S. *Code of Federal Regulations*, "Contents of Applications; Technical Information in Final Safety Analysis Report." §50.34(b), Chapter 1, Title 10, "Energy."
6. U.S. Nuclear Regulatory Commission, "PRA Information to Support Design Certification and Combined License Applications," Interim Staff Guidance DC/COL-ISG-003, May 2008
7. U.S. Nuclear Regulatory Commission, "Implementation of a Probabilistic Risk Assessment-Based Seismic Margin Analysis for New Reactors," Interim Staff Guidance DC/COL-ISG-020, March 2010.
8. U.S. Nuclear Regulatory Commission, "Review of New Reactor Digital Instrumentation and Control Probabilistic Risk Assessments," Interim Staff Guidance DI&C/COL-ISG-003, August 2008.
9. U.S. Nuclear Regulatory Commission, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," NUREG-0800, March 2007.
10. U.S. Nuclear Regulatory Commission, "An Approach For Determining the Technical Adequacy of Probabilistic Risk Assessment Results For Risk-Informed Activities," Regulatory Guide 1.200, Revision 2, March 2009.
11. U.S. Nuclear Regulatory Commission, "Combined License Applications for Nuclear Power Plants," U.S. Nuclear Regulatory Commission, Regulatory Guide 1.206, June 2007.
12. U.S. Nuclear Regulatory Commission, "Regulatory Guide 1.200 Implementation," Regulatory Issue Summary 2007-06, March 22, 2007.

“PAPERWORK REDUCTION ACT STATEMENT

This Interim Staff Guidance (ISG) does not contain new or amended information collection requirements subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). Existing information collection requirements were approved by the Office of Management and Budget (OMB), approval number 3150-0151.

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