

# **ACTION PLAN**

## **REVIEW AND ENDORSEMENT OF ASME/ANS ADVANCED NON-LWR PRA STANDARD ASME/ANS RA-S-1.4**

**April 16, 2020**

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## 1.0 INTRODUCTION

### 1.1 Background

The U.S. Nuclear Regulatory Commission (NRC), by publishing its Final Policy Statement on the Use of Probabilistic Risk Assessment Methods in Nuclear Regulatory Activities (Ref. 1), reflected its belief that an overall policy on the use of probabilistic risk assessment (PRA) methods in nuclear regulatory activities should be established so that the many potential applications of PRA would be implemented in a consistent and predictable manner that would promote regulatory stability and efficiency. Furthermore, the Commission stated its belief that the use of PRA technology in NRC regulatory activities should be increased to the extent supported by the state-of-the-art in PRA methods and data and in a manner that complements the NRC's deterministic approach. In addition, the Commission published regulations pertaining to design certification (DC) applicants, combined license (COL) applicants, and COL holders as follows:

10 Code of Federal Regulations (CFR) 52.47(a)(27) states that a DC application must contain an FSAR that includes a description of the design-specific PRA and its results.

10 CFR 52.79(a)(46) states that a COL application must contain an FSAR that includes a description of the plant-specific PRA and its results.

10 CFR 52.137(a)(25) states that a standard design approval (SDA) application must contain an FSAR that includes a description of the design-specific PRA and its results.

10 CFR 52.157(a)(31) states that a manufacturing license (ML) application must contain an FSAR that includes a description of the design-specific PRA and its results.

10 CFR 50.71(h)(1) states that no later than the scheduled date for initial loading of fuel, each holder of a COL shall develop a Level 1 and a Level 2 PRA. The PRA must cover those initiating events and modes for which NRC-endorsed consensus standards on PRA exist one year prior to the scheduled date for initial loading of fuel.

10 CFR 50.71(h)(2) states that each COL holder must maintain and upgrade the PRA required by 10 CFR 50.71(h)(1). The upgraded PRA must cover initiating events and modes of operation contained in NRC-endorsed consensus standards on PRA in effect one year prior to each required upgrade. The PRA must be upgraded every four years until the permanent cessation of operations under 10 CFR 52.110(a).

10 CFR 50.71(h)(3) states that each COL holder must, no later than the date on which the licensee submits an application for a renewed license, upgrade the PRA required by 10 CFR 50.71(h)(1) to cover all modes and all initiating events.

Further, in Staff Requirements Memorandum (SRM)-SECY-15-002 (Ref.2), the Commission confirmed that "the Commissions' guidance given in the 'Policy Statement on Severe Reactor Accidents Regarding Future Designs and Existing Plants' and other Commission direction identified by staff apply to new 10 CFR Part 50 power reactor applications in a manner consistent with 10 CFR Part 52 design and license applications." The Commission also approved revision of the regulations in 10 CFR Part 50 (Ref. 3) for new power reactor applications to more closely align with requirements in 10 CFR Part 52 (Ref. 4),

incorporating the requirements identified by the staff in this paper which would include PRA requirements for new reactor applicants under 10 CFR Part 50 similar to those for 10 CFR Part 52 applicants.

Congress recently passed the Nuclear Energy Innovation and Modernization Act, which states under Title 1, Advanced Nuclear Reactor and User Fees, Section 103(b)(4)(B), the NRC should evaluate options for licensing commercial advanced nuclear reactors including

*(iii) collaboration with standards-setting organizations to identify specific technical areas for which new or updated standards are needed and providing assistance if appropriate to ensure the new or updated standards are developed and finalized in a timely fashion;*

*(iv) the incorporation of consensus-based codes and standards developed under clause (iii) into the regulatory framework—*

- (I) to provide predictability for the regulatory processes of the Commission; and*
- (II) to ensure timely completion of specific licensing actions*

Since the PRA Policy Statement and the PRA rule for new reactors were issued, a number of risk-informed activities have been undertaken and a number of documents have been written by both the staff and industry that provide guidance on the use of PRA information in the risk-informed reactor regulatory activities, and on PRA acceptability, such as:

- Consensus PRA standards have been under development by the American Society of Mechanical Engineers (ASME) and the American Nuclear Society (ANS). On April 5, 2002, ASME issued its initial PRA standard for a full-power, internal events (excluding internal fire but including internal floods) Level 1 PRA and a limited Level 2 (i.e., large early release frequency (LERF)) PRA for light-water reactors (LWRs), referred to here as the Level 1/LERF LWR PRA standard (Ref.5). Addenda and revisions to this PRA standard have subsequently been issued such that this PRA standard addresses all hazards. The next major revision of this PRA standard will be designated as ASME/ANS RA-S-1.1.
- The advanced non-light water reactor (non-LWR) PRA standard (ASME/ANS RA-S-1.4-2013 (Ref.6)) was issued in 2013 by ASME/ANS for trial use. The scope of this standard addresses Level 1 PRA through Level 3 PRA as well as all hazards and all operating modes. The requirements in this standard cover PRAs performed during design, pre-operational, and post-operational phases. This standard has been piloted and is scheduled to be finalized as an American National Standard Institute (ANSI) standard in 2021, as stated in the JCNRM letter to the NRC dated November 26, 2019 (Ref.7).
- Regulatory Guide (RG) 1.200 (Ref. 8), “An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities” was issued in March 2009 as Revision 2. Revision 3 of RG 1.200 is expected to be issued in 2020. RG 1.200 provides the staff position for an acceptable PRA for

LWRs and the staff endorsement of the PRA standard for LWRs. This RG is expected to provide the level of confidence of the PRA such that the PRA is demonstrated to be sufficient to support the identified applications. Consequently, an in-depth technical review by NRC staff would not be needed to ensure acceptability of the PRA to support the applications. This RG allows staff members to focus their review on key assumptions and areas identified by peer reviewers as being of concern and relevant to the application. Consequently, RG 1.200 provides for a more focused and consistent review process.

In implementing RG 1.200, a licensee can use a consensus standard (endorsed by the staff) to demonstrate that the PRA under consideration conforms to the staff position, and an independent peer review to demonstrate that the PRA is in conformance with the PRA standard.

- For advanced non-LWRs, as part of the Licensing Modernization Project (LMP), the Nuclear Energy Institute (NEI) has published a draft document titled “Risk-Informed Performance-Based Guidance for Non-Light Water Reactor Licensing Basis” (NEI 18-04) (Ref.9). This document presents a technology-inclusive, risk-informed, and performance-based (TI-RIPB) process for selection of Licensing Basis Events (LBEs); safety classification of structures, systems, and components (SSCs) and associated risk-informed special treatments; and determination of defense-in depth adequacy for advanced non-LWRs. When using the LMP methodology, it is expected the non-LWR PRA Standard will be used to demonstrate the technical acceptability.

As a result of the publication of NEI 18-04, the staff published Draft Guide (DG) 1353 (Ref.10), to endorse NEI-18-04, with clarifications. This draft guide describes the NRC’s proposed guidance on using a technology-inclusive, risk-informed and performance-based methodology to inform the content of applications for licenses, certifications, and approvals for advanced non-LWRs.

The staff also issued SECY-19-0117, "Technology-Inclusive, Risk-Informed, and Performance-Based Methodology to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-Light-Water Reactors," a notation vote paper that recommends the Commission find that use of the proposed technology-inclusive, risk-informed, and performance-based methodology is a reasonable approach for establishing key parts of the licensing basis for non-LWRs.

## **1.2 Objectives**

The objectives of this document are to describe the tasks that are needed to review and endorse the latest version of the advanced non-LWR ASME/ANS PRA standard, ASME/ANS RA-S-1.4 (Ref.4), referred to hereafter as the advanced non-LWR PRA standard, and the industry peer review guidance. The plan describes the approach and activities, on the part of both NRC and industry, that are needed to achieve the program

objectives. Moreover, a proposed schedule is included. This action plan is a living document; it will be updated periodically to show progress of the tasks.

### **1.3 Scope and Limitations**

This plan addresses development of the staff's position on acceptability of the PRA needed to support current activities related to advanced non-LWRs. These activities include applications for a standard DC, COL, standard design approval (SDA), manufacturing license (ML), construction permit (CP), or operational license (OL), some of which may be submitted in accordance with the LMP, along with pre-operational and post-operational regulatory activities.

The staff review of the advanced non-LWR PRA standard considers a base PRA, risk-informed applications, and use of PRA during the licensing stage. In this context, licensing applications (e.g. submitted under 10 CFR Part 52) are different from risk-informed applications.

### **2.0 APPROACH**

This section identifies the activities to develop, review and endorse the ASME/ANS advanced non-LWR PRA standard. The staff activities involve five major tasks:

- Task 1: Supporting development of the advanced non-LWR PRA standard
- Task 2: Preparation for review of the advanced non-LWR PRA standard for endorsement
- Task 3: Staff review and endorsement of the advanced non-LWR PRA standard
- Task 4: Development of schedule for staff review and endorsement
- Task 5: Development of communication plan

The details of each task are described below. In performing some of these tasks, the work may be performed using a version of the advanced non-LWR PRA standard that has not yet been approved by ANSI. When this occurs, the version being used will be noted and documented.

#### **2.1 Task 1: Supporting Development of the Advanced non-LWR PRA Standard**

The objective of this task is to participate on the JCNRM for the purpose of developing a consensus PRA standard for advanced non-LWRs. <sup>1</sup> A draft version of the advanced non-LWR PRA standard was issued for trial use and has been piloted. Lessons learned from the pilots have been addressed. As part of the process of going from a trial use standard to a final ANSI standard, JCNRM major milestones include the following:

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<sup>1</sup> The NRC will support the JCNRM's effort to maintain the advanced non-LWR PRA standard via participation in the JCNRM by maintaining awareness of lessons learned and contemplated by the JCNRM. If any of this updated information impacts the staff position (endorsement), the staff may issue a letter or revise the RG.

1. Final review to resolve outstanding technical issues in the advanced non-LWR PRA standard. An NRC working group representative will provide support to this effort. COMPLETE
2. Readiness review to ensure that the advanced non-LWR PRA standard is ready for ballot (e.g., standard is in compliance with JCNRM rules). A participating NRC staff member will support this effort. COMPLETE
3. Balloting of the advanced non-LWR PRA standard by JCNRM and then by both the ASME and ANS Standard boards. Any negative comments received during any of the ballots will also need to be addressed before going to ANSI for final approval. This effort will be led by JCNRM with the NRC review team and NRC representatives to the JCNRM providing comments on the JCNRM ballot.
4. Issuance of the advanced non-LWR PRA standard for ANSI public review and comment. These public comments will also need to be addressed. This effort will be led by JCNRM.
5. Technical editing of the advanced non-LWR PRA standard will be performed to ensure clear and accurate communication of the standard. This effort will be led by JCNRM.
6. Final review to ensure the technical editing did not negatively impact the requirements in the advanced non-LWR PRA standard. This effort will be led by JCNRM.

During the JCNRM ballot period, the NRC staff will develop technical comments that will be submitted by the NRC in the form of a table similar to Table 2-1 below. The product of this effort includes documentation of NRC comments that will be provided to JCNRM on the advanced non-LWR PRA standard and how the comments are to be resolved.

**Table 2-1 NRC Comments Provided to the JCNRM on the Advanced Non-LWR PRA Standard**

Index Number	Description of NRC Comment	Resolution of NRC Comment

In the second column, a detailed description of the issue (or concern) raised by the NRC is provided. In the third column, the JCNRM will provide a description on how the issue has been addressed, whether JCNRM agrees with the comment (and the proposed resolution) or, if JCNRM disagrees with the comment, it will include the basis for the disagreement.



## **2.2 Task 2: Preparation for Review of the Advanced non-LWR PRA Standard for Endorsement**

Work needs to be accomplished before the staff can initiate the review of the advanced non-LWR PRA standard. In order for staff to review and endorse the advanced non-LWR PRA standard in an efficient and effective manner, the NRC must have a sound understanding of how the advanced non-LWR PRA standard was developed and how this standard is to be used. This work includes the following subtasks:

- Subtask 2-1: Determine the scope of regulatory activities for the advanced non-LWR PRA standard
- Subtask 2-2: Identify the needed technical expertise to review the advanced non-LWR PRA standard for endorsement. COMPLETE
- Subtask 2-3: Create guidance for staff review of the advanced non-LWR PRA standard for endorsement
- Subtask 2-4: Compare the advanced non-LWR PRA standard to the LWR PRA standards and Regulatory Guide 1.200
- Subtask-2-5: Develop the staff position for an acceptable advanced non-LWR PRA
- Subtask 2-6: Identify and resolve technical and policy issues

The objective of each sub-task and how it will be accomplished are described below. These tasks can be performed in parallel with Task 1.

### 2.2.1 Task 2-1: Determine the scope of regulatory activities for the advanced non-LWR PRA standard

The objective of this task is to identify the different applications and associated regulatory activities that will be supported by the advanced non-LWR PRA standard. The various applications should address each phase of the facility (i.e., licensing, construction, and operation). As part of this identification, the needed capability of the PRA for each application (and its associated activities) is identified, and therefore, the needed capability and scope from the advanced non-LWR PRA standard. An understanding of the different applications (and their associated activities) and their needed capability will determine the level of review and endorsement needed for the advanced non-LWR PRA standard.

The capability of the application, and therefore the PRA, is determined by three attributes:

1. Scope and level of detail – The degree to which the scope and level of detail of the plant design, operation, maintenance, and physical phenomena relevant to the plant design are modeled.
2. Plant specificity – The degree to which plant-specific or design-specific information is incorporated such that the as-built and as-operated plant, or as-designed plant, is addressed.
3. Realism – The degree to which realism is incorporated such that the expected response of the plant is addressed.

The degree to which each of the above attributes are addressed determines the capability category (CC). In general, CC I for each attribute is less rigorous (see Table 1.4-2 in the advanced non-LWR PRA standard) than CC II; that is, for CC II, the scope and level of detail is generally more expanded, more plant specific information is required, and the level of realism is higher.

This effort will involve identifying and describing each type of application for the various facility stages (e.g., licensing, construction, and operation) along with their associated activities. For each application identified, the capability category will also be identified, that is, whether, in general, the supporting requirements (SRs) need to be CC I or CC II. This identification is performed for a full-scope PRA (i.e., all stages of sequences from initiator to consequence, all operating modes, and all hazards). The results of this task will be documented in the guidance developed in Task 2-3.

Although the advanced non-LWR PRA standard has not yet been finalized at this point, the staff can still perform this step. Moreover, this effort is not dependent on other tasks, and therefore can start immediately.

### 2.2.2 Task 2-2: Identify the needed technical expertise to review the advanced non-LWR PRA standard for endorsement

The objective of this task is to identify the needed technical expertise to review the advanced non-LWR PRA standard. The advanced non-LWR PRA standard covers multiple technical disciplines. It is necessary to both understand the needed technical expertise and where that expertise should be applied for the review of the advanced non-LWR PRA standard. This task will assist in determining whether adequate expertise is available to perform the review and endorsement within the staff.

This effort involves reviewing each scope item (i.e., each stage of sequences from initiator to consequence, each operating mode, and each hazard) and its technical elements to identify the needed technical expertise. Some technical elements are the same regardless of the risk level, hazard, or operating mode. If the technical expertise needs to be modified for a technical element because of the risk, hazard, or operating mode, this should be identified.

Although the advanced non-LWR PRA standard has not yet been finalized, it is sufficient to perform this task. Understanding where different technical expertise is needed will help identify the staff (and contractors) needed for the review and when their support is needed.

### 2.2.3 Task 2-3: Create guidance for staff review of Advanced non-LWR PRA standard

The objective of this task is to develop the guidance for reviewing the advanced non-LWR PRA standard for endorsement. Reviewing the standard will be performed by multiple individuals; it is important that the reviews are performed such that the level of review is consistent.

This effort involves developing the guidelines and criteria that will be used by the individual reviewers. This guidance states that the technical requirements need to meet the staff

position and that the advanced non-LWR PRA standard also adheres to standards language and other appropriate standard rules. This effort serves as guidance for other tasks. As needed, training will be provided to reviewers on the different types of non-LWR applications.

The product of this effort is a revision to the report describing the guidance and criteria to be used by the staff and its contractors in reviewing the advanced non-LWR PRA standard. The previous version of this report was issued in August 2019 (Ref.11).

#### 2.2.4 Task 2-4: Compare the advanced non-LWR PRA standard to the LWR PRA standards and RG 1.200

The objective of this task is to understand the differences and similarities between the advanced non-LWR and the LWR PRA standards and the staff endorsement in RG 1.200. The ASME/ANS Level 1/LERF LWR PRA (ASME/ANS RA-Sa-2009) (Ref. 5) standard has been extensively used for over a decade and the requirements are well understood; however, comparable experience is not available for advanced non-LWRs. Moreover, the advanced non-LWR PRA standard was developed based on requirements in the LWR PRA standards (i.e., the ASME/ANS Level 1/LERF, Level 2, Level 3, and low-power and shutdown (LPSD) PRA standards), and some of these LWR PRA standards have not been endorsed by the NRC. Further, trial-use versions of some of the LWR PRA standards were used to develop the advanced non-LWR PRA standard as they were the only versions of those LWR PRA standards available at the time. A comparison to the established PRA standards is a critical step in establishing the credibility of the advanced non-LWR PRA standard.

This effort involves two steps. The first step is to determine the scope and structure of the advanced non-LWR PRA standard. This effort involves identifying/defining all stages of sequences from initiator to consequence, all operating modes, and all hazards, for the various plant stages (i.e., design, preconstruction, pre-operation, and operation) that are addressed by the standard, and how the PRA model is built to cover the defined scope.

The second step is to compare the scope and structure of the advanced non-LWR PRA standard to that of the LWR PRA standards to identify differences and similarities. This comparison also includes a preliminary assessment of whether a given similarity or difference is appropriate; however, the acceptability of those similarities and differences will be assessed in Task 3-2. The structure of the LWR PRA standard starts with defining the risk levels, then for each risk level, the plant operating mode is defined, and for each operating mode, the different hazards that can challenge the facility are identified. Next, the technical elements (TEs) needed in the PRA for that risk level and the defined operating mode for each hazard are defined. The high-level requirements (HLRs) that are needed to accomplish the technical element for a PRA for the specified risk level and the defined operating mode for each hazard are then defined. Finally, the supporting requirements (SRs) needed to accomplish each HLR are defined for each TE for each hazard given the specified operating mode and risk level.

Understanding the context of an SR is important, particularly since the advanced non-LWR PRA standard is expected to adopt SRs from the LWR PRA standards. Therefore, when an

SR from an LWR PRA standard is adopted in the advanced non-LWR PRA standard, it must be determined that the context is appropriate.

The JCNRM advanced non-LWR working group has performed a comparison against the LWR PRA standards, including the Level/LERF February 2019 draft; and the trial use versions of the Level 2, Level 3 and LPSD PRA standards. In Task 2-3, the staff will use the results of this comparison to aid in their understanding of the differences between the advanced non-LWR PRA standard and the LWR PRA standards. This effort involves comparing the requirements in the advanced non-LWR PRA standard to related requirements in the LWR PRA standards. This comparison will identify:

- where the requirements are similar and consider whether this similarity is appropriate
- where the requirements are different and consider whether the difference is appropriate
- where there are requirements in the advanced non-LWR PRA standard that are not in the LWR PRA standard and consider whether this gap is appropriate
- where there are requirements in the LWR PRA standards that are not in the advanced non-LWR PRA standard and consider whether this gap is appropriate.

This comparison is to be done for the entire scope of the advanced non-LWR PRA standard. The results of this comparison will help the staff in Task 3 when reviewing the advanced non-LWR PRA standard for endorsement.

Although many of the PRA standards have not yet been finalized, they are sufficient to begin this task. Moreover, this effort is not dependent on other tasks, and therefore can start immediately.

#### 2.2.5 Task 2-5: Develop staff position for an acceptable advanced non-LWR PRA and peer review guidance

The objective of this task is to develop the staff position for an acceptable advanced non-LWR PRA. The staff position provides the technical basis for reviewing and endorsing the advanced non-LWR PRA standard. A staff position is developed for a full-scope PRA addressing all stages of sequences from initiator to consequence, all operating modes, and all hazards for the different types of applications and their associated activities.

This effort involves defining, for the scope identified in Task 2-1, the objectives for each technical element (identified in Task 2-4). The technical attributes and characteristics needed to accomplish the objectives of the technical elements are then developed. In developing the staff position, the various applications (and their associated activities) need to be considered; that is, the staff position for an acceptable PRA may vary depending on the application and its associated activities.

The advanced non-LWR PRA standard provides requirements into *what* constitutes an acceptable base PRA. It does not provide requirements into *how* to perform such a PRA. To determine that the intents of the various requirements are correctly performed, a peer review of the PRA is required. Consequently, this effort also involves determining the staff position on an acceptable peer review process.

The staff position should cover:

- An acceptable peer review process, including peer review of newly developed methods
- Resolution of facts and observations (F&O)
- Peer Review team qualifications
- Peer Review documentation

The staff position should be informed by the staff position in RG 1.200 and modified as needed. This modification may involve revising, adding, or deleting attributes/characteristics.

The NRC staff position on advanced non-LWR PRA acceptability describes the fundamental characteristics and attributes necessary to achieve an acceptable PRA and is applicable regardless of whether a national consensus PRA standard is available. As such, the staff position on advanced non-LWR PRA acceptability can be developed irrespective of the availability of the advanced non-LWR PRA standard.

The product of this effort includes a table (see Table 2-2 below) that identifies the necessary technical attributes and characteristics for an acceptable PRA for an advanced non-LWR for the specified scope. The table differentiates the staff position for the different types of applications and activities. Another table (see Table 2-3 below) is developed to include the necessary attributes and characteristics for an acceptable peer review.

**Table 2-2 Staff Position of an Acceptable Advanced Non-LWR PRA**

Hazard	Technical Element	Technical Attributes and Characteristics Considering the Different Applications/Activities

In the first column, for the specific scope, the hazard under consideration is identified. In the second column, for the specified hazard the technical element is provided with a short description (e.g., objective). In the third column, for the specified hazard and for each technical element, the necessary attributes and characteristics are identified. This identification also takes into consideration if the attributes and characteristics differ because of the application and activity.

**Table 2-3 Staff Position of an Acceptable Peer Review**

Items	Attributes and Characteristics
Peer Review Process	
Resolution of facts and observations	
Team Qualifications	
Documentation	

**2.2.6 Task 2-6 Identify and resolve technical and policy issues**

The objective of this task is to identify technical and policy issues that may need to be resolved in order to develop a PRA for an advanced non-LWR and determine how these issues are addressed in the advanced non-LWR PRA standard. It is important to understand these issues since they could have a significant impact on the ability to develop a PRA model for an advanced non-LWR and establish confidence in the results produced by the PRA model.

This effort involves reviewing each technical element associated with all stages of sequences from initiator to consequence, all modes of operation, and all hazards, for the different types of applications, and identifying possible technical or policy issues and their significance. This identification generally occurs while developing the attributes and characteristics. This identification can be an iterative process in that additional issues may be identified when reviewing the advanced non-LWR PRA standard for endorsement; consequently, this task is not complete until the review of the advanced non-LWR PRA standard is complete. Possible technical issues may include risk significance and screening criteria. Moreover, an understanding of the issues can impact the review of the various requirements in Task 3-2.

Once the issues have been identified, a path for resolution must be determined. There may already be ongoing research that addresses the issue. This work should be reviewed and determined if it is applicable for the advanced non-LWR PRA standard. For an open issue, research that is needed and the significance of the issue are documented.

Although the advanced non-LWR PRA standard has not been finalized yet, it is sufficient to initiate this task. Moreover, this effort is dependent on Tasks 2-1, 2-4 and 2-5 and thus needs to be taken into consideration.

The product of this effort includes a table (see Table 2-4 below) identifying each technical or policy issue. A description of the issue is included along with the significance of the issue. The significance describes its risk significance and what requirements in the advanced non-LWR PRA standard would be impacted. The description identifies what needs to be addressed to resolve the issue. Any ongoing research on the issue is identified and described.

**Table 2-4 List of Issues Associated with Advanced Non-LWR PRA**

Issue	Description of Issue	Significance of Issue	Potential Resolution of Issue

**2.3 Task 3: Staff Review and Endorsement of the Advanced Non-LWR PRA Standard**

The objective of this task is to review, develop, and document the staff position on the ANSI advanced non-LWR PRA standard. This work includes the following subtasks:

- Subtask 3-1: Develop preliminary draft regulatory guide (DG)
- Subtask 3-2: Review advanced non-LWR PRA standard for endorsement
- Subtask 3-3: Finalize RG

2.3.1 Task 3-1 Develop preliminary draft regulatory guide

The objective of this task is to develop a preliminary draft regulatory guide. This DG, when finalized, will provide the vehicle for staff endorsement. There is a formal template available to develop RGs. However, it is assumed that this new RG will be similar in structure to RG 1.200. In developing the staff guidance (as part of the RG), the results from Task 2 are used. This work can begin prior to when the advanced non-LWR PRA standard is finalized and issued as an ANSI standard.

This effort involves developing the preliminary DG using the RG template and the results from Task 2. This preliminary DG will provide the staff position in four areas:

- (1) A technically acceptable PRA – this section uses the results from Task 2-5
- (2) Use of consensus PRA standards and related industry PRA programs – this section uses the results from Task 2-5
- (3) Demonstrating the technical acceptability of the PRA to support a regulatory application – this section uses the results from Task 2-1
- (4) Documentation needed to support a regulatory submittal.

The scope of each of the above areas is addressed in the RG. This part of the DG is providing the staff guidance (position) but not the actual endorsement of the advanced non-LWR PRA standard or related industry guidance (peer review).



The product of this effort includes a preliminary draft guide that provides the staff position; it does not include any staff endorsement.

### 2.3.2 Task 3-2 Review Advanced Non-LWR PRA standard for Endorsement

The objective of this task is to develop the staff endorsement of the advanced non-LWR PRA standard, which is part of the staff position on PRA acceptability for advanced non-LWR PRAs. The activities associated with this task involve a review against the characteristics and attributes for an acceptable PRA (developed in Task 2-4) for each requirement. This review is also performed using the review guidance developed in Task 2-3.

The staff's position on each requirement is to be categorized as "no objection," "no objection with clarification," or "no objection subject to the following qualification," and defined as follows:

- No objection - The staff has no objection to the requirement.
- No objection with clarification - The staff has no objection to the requirement. However, certain requirements, as written, are either unclear or ambiguous, and therefore the staff has provided its understanding of these requirements.
- No objection subject to the following qualification - The staff has a technical concern with the requirement and has provided a qualification to resolve the concern.

The staff review considers the acceptability of the advanced non-LWR PRA standard with respect to the different applications and anticipated activities (as described in Tasks 2-1, 2-4, and 2-5).

As the staff reviews and endorses the advanced non-LWR PRA standard against the staff position developed in Task 2-4, additional technical issues needing resolution may arise or the staff may identify a need to revise or provide further clarification of the developed staff position. These issues need to be identified and documented (as per Task 2-6).

This endorsement will be documented in the RG described in Task 3-1 above and will follow the normal process for development of a RG. In the interim, if NRC acceptance of the advanced non-LWR PRA standard is needed before the final RG can be issued, the NRC may elect to issue an interim letter of acceptance.

Although the advanced non-LWR PRA standard has not yet been finalized, it is sufficient to initiate this task. However, this effort cannot be completed until the advanced non-LWR PRA standard is published.

The product of this effort involves using the following table (Table 3-1) as a template.



**Table 3-1 Staff Position on Advanced Non-LWR PRA Standard**

Standard Requirement	Issue	Objection	Comments

In the first column, each requirement is referenced. If there is an issue with the requirement, the issue is described in the second column. In the third column, the issue is characterized as either a clarification or a qualification. In the fourth column, the proposed language that is needed to address the objection is provided; that is, how the requirement needs to be stated such that there is no objection (i.e., no clarification or no qualification).

**2.3.3 Task 3-3 Finalize RG**

The objective of this task is to finalize and issue the RG which provides the staff position on acceptability of PRAs for advanced non-LWRs, including endorsement of the advanced non-LWR PRA standard. There is a specific process for issuing a RG. This process involves different levels of concurrence among the offices, NRC legal review, and briefing the ACRS. This effort includes the following steps:

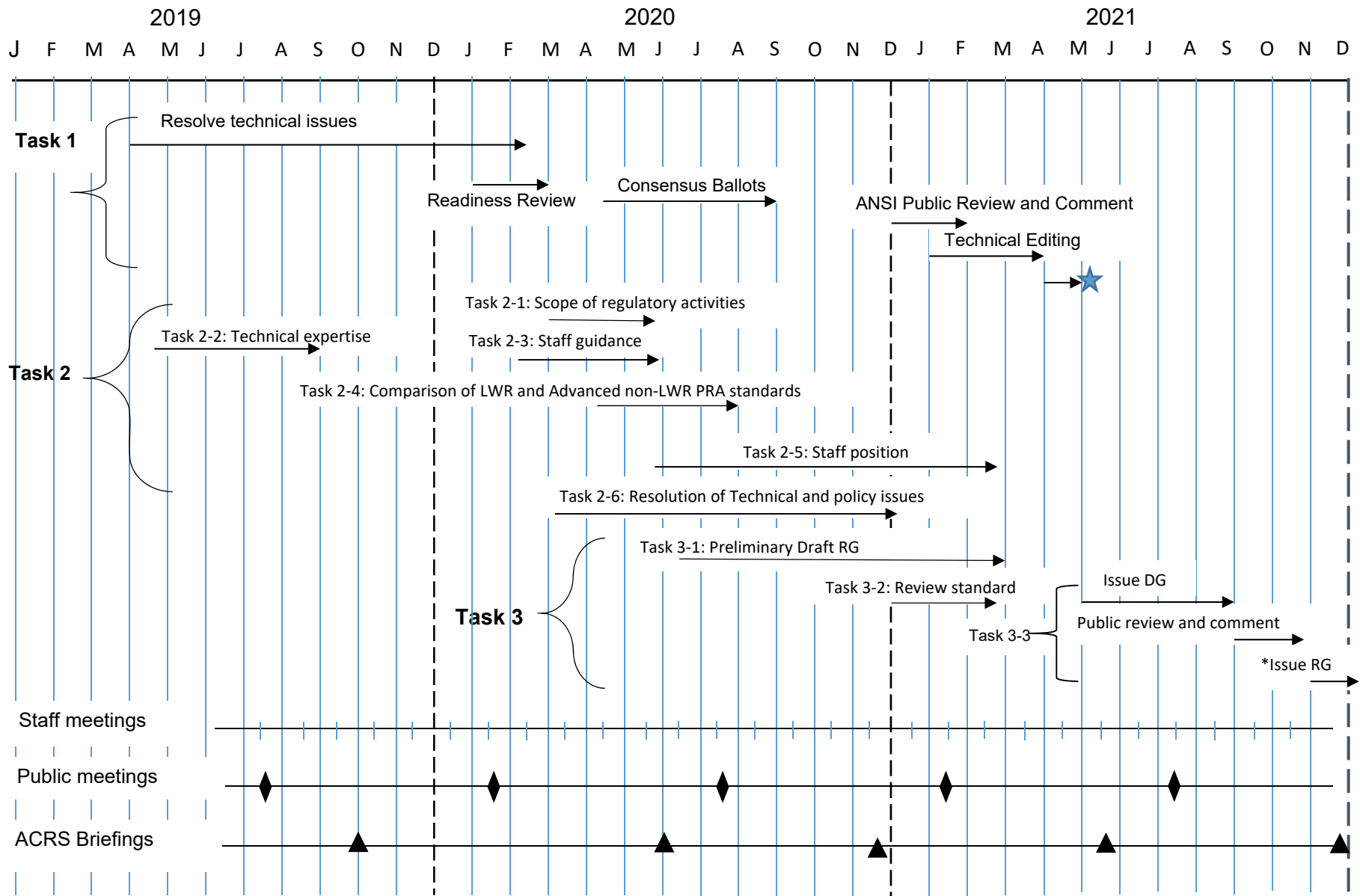
- Issue the draft guide for public review and comment using the outputs from Tasks 3-1 and 3-2
- Evaluate public comments and revise the DG where appropriate
- Issue final RG for use.

This effort is completely dependent on Tasks 3-1 and 3-2, and therefore cannot start until those tasks are completed.

The products of this effort include a DG ready for review and comment, documentation of public comments and staff resolution, and the final RG for publication.

**2.4 Task 4: Development of Schedule for Staff Review and Endorsement**

The objective of this task is to develop a schedule for Tasks 1 through 3. This schedule will be conditional on the completion of the necessary PRA standards. A timeline of the various tasks and related efforts that impact the schedule are shown in Figure 4-1. Key milestones associated with the various tasks and their anticipated completion dates are shown in Table 4-1.



\* RG to be issued Fall 2022

**Table 4-1 Schedule for Completion of Review and Endorsement of Advanced Non-LWR PRA Standard**

<b>TASK/MILESTONE</b>	<b>Responsible Org*</b>	<b>Completion Date**</b>
<b>Task 1: Development of Advanced non-LWR PRA Standard</b>		
• 1-1: Technical issues	JCNRM	March 2020***
• 1-2: Readiness review		March 2020***
• 1-3: Consensus ballots		September 2020
• 1-4: Technical editing (post ballot)		December 2020
• 1-4: ANSI Public review and comment		March 2021
• 1-4: Technical editing (for ANSI publication)		April 2021
• 1-6: ANSI publication		May 2021
<b>Task 2: Preparation for Review of the Advanced non-LWR PRA Standard and Industry Peer Review Guidance</b>		
• 2-1: Determine scope of regulatory activities	NRR/DANU and RES/DRA	June 2020
• 2-2: Identify the needed technical expertise to review the Advanced non-LWR PRA standard	RES/DRA and NRR/DANU	September 2019***
• 2-3: Development of staff guidance		June 2020
• 2-4: Comparison of the Advanced non-LWR PRA		August 2020
• 2-5: Develop staff position for an acceptable Advanced non-LWR PRA and peer review guidance		March 2021
• 2-6: Identification and resolution of technical and policy issues		December 2020
<b>Task 3: Staff Review and Endorsement of the Advanced non-LWR PRA Standard and Industry Peer review guidance</b>		
• 3-1: Develop draft regulatory guide (task dependent on task 1.3)	RES/DRA and NRR/DANU	March 2021
• 3-2: Review Advanced non-LWR PRA standard		March 2021
• 3-3: Finalize RG — Publish DG — Public review and comment — Publish RG		September 2021 November 2021 November 2022
<b>Task 4: Develop schedule for staff review and endorsement</b>	RES/DRA and NRR/DANU	January 2020 ***

\*In this column, when two offices are noted, the first noted Office has the lead for that task or subtask.

\*\*The completion dates for Task 3 is dependent on JCNRM meeting the completion dates for Task 1.

\*\*\* These tasks have been completed, these represent the actual dates of completion.

## 2.5 Task 5: Development of Communication Plan

The objective of this task is to identify how the work will be communicated internally and externally. This communication will include (1) explaining the staff activities to stakeholders, and (2) describing the staff's approach. The plan will provide a structure for communicating the messages to stakeholders.

The various stakeholders include:

- Internal stakeholders – including technical staff, management, OGC, and ACRS
- External stakeholders – including the public, ASME/ANS JCNRM, NEI, and potential applicants.

### 2.5.1 Communication with internal stakeholders

The Project Team (consisting of the lead reviewers in NRR and RES, the senior level advisor, and the project manager) will periodically interact with Division management in RES and NRR at key milestones to provide the status of the project. The interactions will address:

- The progress of the work
- The schedule and resources
- Key issues needing resolution.

The staff will brief senior management at the direction of Division management.

The Project Team will hold monthly project meetings with the review team. The objective of these meetings is to communicate the status and progress of the overall project and discuss issues needing resolution. The purpose of the meetings is to ensure consistency and traceability of the work.

The staff will consult with OGC to ensure there is no legal objection. OGC advice may be sought to confirm that there is no legal issue when issuing the DG and final RG.

The staff will brief the ACRS as part of the normal process of developing a RG. These meetings/briefings will occur during the draft guide development and before issuance of the final RG. The ACRS may request briefings at other times.

### 2.5.2 Communication with external stakeholders

Staff participate in the ASME/ANS JCNRM, which is responsible for developing the advanced non-LWR PRA standard. The staff participation includes representation on the JCNRM and on its associated Subcommittee on Development and Maintenance<sup>2</sup> and the advanced non-LWR writing group. In this manner, the staff is able to communicate its staff position from the outset of the development of the advanced non-LWR PRA standard. The

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<sup>2</sup> While the advanced non-LWR PRA standard is being developed (prior to publication as an ANSI standard, it is under the Subcommittee on Development. Once the advanced non-LWR PRA standard is published it comes under the Subcommittee on Maintenance.

staff also provides formal comments as part of the ASME/ANS balloting process. Although the advanced non-LWR PRA standard is developed as part of a consensus process, the staff may still need to take exception to fulfill its statutory mission.

As the staff reviews the advanced non-LWR PRA standard for endorsement, the staff will hold public meetings to share its views and to solicit input. The following public meetings are proposed:

- During Task 2, to share staff's initial views on development of the staff position and technical issues
- During Task 3-2, to share staff's review of the advanced non-LWR PRA standard
- During Task 3-3, to discuss the DG, once the DG has been issued for public comment
- During Task 3-3, to address public comments received on the DG.

In addition, as part of the regular advanced non-LWR stakeholder meetings, status reports may be given on implementation of this plan.

When the staff has a draft endorsement (as documented in a DG), this DG will be formally issued for public review and comment.

The final published RG will also serve as a communication tool to the public on the staff position of the advanced non-LWR PRA standard.

### 3.0 REFERENCES

1. USNRC, "Use of Probabilistic Risk Assessment Methods in Nuclear Activities: Final Policy Statement," *Federal Register*, Vol. 60, p. 42622 (60 FR 42622), August 16, 1995.
2. SECY-15-002, "Proposed updates of Licensing Policies, Rules and Guidance for Future New Reactor Applications", U.S. Nuclear Regulatory Commission, Washington, DC, January 8, 2015.
3. 10 CFR Part 50, "Domestic licensing of production and utilization facilities".
4. 10 CFR Part 52, "Licenses, certifications, and approvals for nuclear power plants".
5. ASME/ANS RA-Sa-2009, "Standard for Level 1/ Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications," Addendum A to RA-S-2008, ASME, New York, NY, American Nuclear Society, La Grange Park, Illinois, February 2009.
6. ASME/ANS RA-S-1.4-2013, "Probabilistic Risk Assessment Standard for Advanced Non-LWR Nuclear Power Plants," ASME, New York, NY, American Nuclear Society, La Grange Park, Illinois, 2013.

7. Joint Committee on Nuclear Risk Management (JCNRM) “Letter to the NRC Communicating Plan for Advanced Non-LWR Standard Development”, November 2020 (ML20031D602).
8. Regulatory Guide 1.200, “An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities,” U.S. Nuclear Regulatory Commission, Washington, DC.
9. Nuclear Energy Institute (NEI) 18-04, “Risk-Informed Performance-Based Guidance for Non-Light Water Reactor Licensing Basis”, September 2018. (ADAMS Accession No. ML18271A172)
10. Draft Regulatory Guide 1353, “Guidance for a Technology-Inclusive, Risk-Informed, and Performance-Based Methodology to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-Light Water Reactors”, April 2019.
11. USNRC, “Guidelines for Review and Endorsement of the ASME/ANS PRA Standard for Advanced Non-LWR Nuclear Power Plants and Industry Peer Review Guidance”, August 2019 (ADAMS Accession No ML19235A285).

