American Nuclear Society
Standards Committee

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January 31, 2024

Ms. Michele M. Sampson
NRC Standards Executive
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

SUBJECT: ANS-30.3 Working Group Response to NRC's Letter Dated June 27, 2023, Providing Preliminary Comments on the Request for Endorsement of ANSI/ANS-30.3-2022

Dear Ms. Sampson:

As the current American Nuclear Society (ANS) Standards Board chair, I am responding to your letter of June 27, 2023, which was in response to our letter dated August 9, 2022, requesting the U.S. Nuclear Regulatory Commission (NRC) consider endorsement of ANSI/ANS-30.3-2022, *Light Water Reactor Risk-Informed, Performance Based Design.* ANS appreciates the resources that the NRC has invested in forming a team to review and provide preliminary comments on ANSI/ANS-30.3-2022. We would very much like to continue the dialog and engage the industry in this important matter via an NRC public meeting.

Before addressing each of the eight comments, I would like to recognize the current members of the ANS-30.3 Working Group, who were instrumental in preparing this response.

Kent Welter (chair)—NuScale Power
James August—Core, Inc.
David Blanchard—Applied Reliability Engineering, Inc.
Robert Burg—Engineering Planning and Management, Inc.
Donald Dube—Individual
N. Prasad Kadambi—Kadambi Engineering Consultants
Gary Locklear—Kinectrics AES, Inc.
Paul Sicard—Entergy – River Bend Station
Douglas Van Bossuyt—Naval Postgraduate School
Sunil Weerakkody—U.S. Nuclear Regulatory Commission
Robert White—Nuclear Innovation Alliance
Cindy Williams—NuScale Power

Each of the NRC comments are provided below followed by our response.

<u>NRC Comment #1 (General)</u>: ANSI/ANS-30.3-2022 provides broad and high-level guidance to designers of advanced light water reactors. While this objective is consistent with the standard's intended purpose as design guidance, standards endorsed by the NRC in the past have included substantially more detail.

ANS Response #1: ANSI/ANS-30.3-2022 is a performance-based standard; therefore, it would not normally be expected to contain the level of technical detail typically found in prescriptive documents. With a global move toward modern performance-based design and licensing guidance, higher-level standards like ANSI/ANS-30.3-2022 provide flexibility to the reactor designer in establishing processes and procedures tailored to their own unique business needs and process while still maintaining strong tenets of nuclear safety. In addition, ANSI/ANS-30.3-2022 contains 150-plus “shall” statements across a wide range of design processes. It should be noted that the “shall” statements express a wide range of levels of detail. Each “shall” statement should be seen as being associated with a requirement that fulfills a purpose related to the particular section in which it occurs. For example, Section 4, “Safety requirements and functions,” expresses requirements at a much higher-level perspective than does Section 7, “Probabilistic risk assessment,” which gets into more detail. This is because the state of practice for probabilistic risk assessments (PRAs) and their application is much more developed. This approach allows users of ANSI/ANS-30.3-2022 more flexibility in making design decisions.

It should also be noted that ANSI/ANS-30.3-2022 offers users ways of taking advantage of recent evolutions in the NRC’s regulatory practice, which is more open to performance-based concepts and methods. Section 11, “Performance-based decision making,” may be seen as groundbreaking because it explicitly draws from the Commission’s modernization efforts documented in Staff Requirements Memorandum (SRM) for SECY-98-144, “White Paper on Risk-Informed, Performance-Based Regulation.” It is here that the Commission defined at a high level the specific attributes of performance-based requirements:

> A regulation can be either prescriptive or performance-based. A prescriptive requirement specifies particular features, actions, or programmatic elements to be included in the design or process, as the means for achieving a desired objective. A performance-based requirement relies upon measurable (or calculable) outcomes (i.e., performance results) to be met, but provides more flexibility to the licensee as to the means of meeting those outcomes. A performance-based regulatory approach is one that establishes performance and results as the primary basis for regulatory decision-making, and incorporates the following attributes: (1) measurable (or calculable) parameters (i.e., direct measurement of the physical parameter of interest or of related parameters that can be used to calculate the parameter of interest) exist to monitor system, including facility and licensee, performance; (2) objective criteria to assess performance are established based on risk insights, deterministic analyses, and/or performance history; *(3) licensees have flexibility to determine how to meet the established performance criteria in ways that will encourage and reward improved outcomes*; and (4) a framework exists in which the failure to meet a performance criterion, while undesirable, will not in and of itself constitute or result in an immediate safety concern. (emphasis added)

NRC Comment #2 (General): On several topics, the standard contains guidance that is noticeably different information from established NRC regulations, policy, guidance, and endorsed documents (e.g., guidance for Title 10 of the Code of Federal Regulations (10 CFR) 50.69, "Risk-informed categorization and treatment of structures, systems and components for nuclear power reactors," and 10 CFR 50.47 "Emergency plans").

ANS Response #2**:** The standard represents established state-of-practice techniques (e.g., NuScale Design Certification and Standard Design Approval Application) and is expected to be fully compliant with existing NRC light water reactor (LWR) regulations. In addition, the standard provides guidance in some areas (e.g., risk-informed single failure criterion) whereby designers may take exceptions to specific regulations or guidance with appropriate justification on a case-by-case basis. Section 11, "Performance-based decision making," on regulatory conformance describes how a designer might develop such justification for departures or exceptions, which are allowed under the existing regulations. Additional specific comments are addressed via responses to NRC Comment #5 (10 CFR 50.69) and #7 (10 CFR 50.47).

NRC Comment #3 (Technical): Classification of events based on event sequence instead of initiating event frequency could incorrectly result in events being classified inconsistent with current regulatory requirements and staff guidance.

***ANS Response #3*:** It is not clear to what the phrase "classification of events" refers, since this term is not used in the standard.

Assuming the comment is referring to the "categorization" of initiating events by frequency and functional event type found in Section 5.1, "Initiating event selection,"

> —This section is consistent with chapter 15 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition" (formerly issued as NUREG-75/087).

Assuming the comment is referring to the identification of design basis events (DBEs) found in Section 5.2, "Identification of DBEs,"

> —Section 5.2.1, "DBE identification using a deterministic approach with incorporation of insights from the PRA," describes a deterministic approach consistent with the manner in which DBEs were identified for the current generation of plants and is entirely consistent with regulatory requirements, staff guidance (e.g., NUREG-0800 and NUREG-75/087), and industry standards (ANS-51.1-1983 [withdrawn], *Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants*, and ANS-52.1-1983 [withdrawn], *Nuclear Safety Criteria for the Design of Stationary Boiling Water Reactor Plants*). In addition, this section requires enhancement of the traditional approach to identifying DBEs by incorporating insights developed in the PRA, allowing for the consideration of design features and operating characteristics that may be unique to the plant design in the progression of event sequences.
>
> Section 5.2.2, "Identification of DBEs by adjusting the scope of the PRA," describes an alternative approach that uses the PRA as a primary source of DBE development, similar to NEI 18-04 (Rev. 1), *Risk-Informed Performance-Based Technology Guidance for Non-Light Water Reactors*, and industry standards for other advanced reactor designs (e.g., ANSI/ANS-53.1-2011 [R2021], *Nuclear Safety Design Process For Modular Helium-Cooled Reactor Plants*). In beginning with the event sequences of the PRA, this section also requires adjustments to be made to the PRA to incorporate assumptions that would be made in more traditional deterministic analyses to ensure the completeness of the selection of DBEs. NEI 18-04 and the process described in ANSI/ANS-53.1-2011 (R2021) are technology-neutral and applicable to LWRs.

The two ends of the spectrum for identifying DBEs are described above. In between these ends of the spectrum are blended approaches that are acceptable and include deterministic methods with only limited expansion of the design-specific PRA for unique initiators or selected transient and accident scenarios.

<u>NRC Comment #4 (Technical)</u>: How the risk-informed approach to single failure criteria meets the regulations in 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," and 10 CFR Part 50 Appendix A.

***<u>ANS Response #4</u>*:** 10 CFR 50.46 does not mention the single failure criteria; however, ANSI/ANS-30.3-2022 requires consideration of the potential for single failures in the design and analysis of the plant. For example:

> —ANSI/ANS-30.3-2022, Sections 5.2.1.1, "Consideration of single failures and coincident occurrences," (deterministic approach supplemented by PRA insights) and 5.2.2.2, "Review of the PRA for deterministic insights," (use of PRA as a primary source supplemented by deterministic considerations) both require consideration of potential single failures in the identification of DBEs.
>
> —ANSI/ANS-30.3-2022, Section 9.1, "Classification," references the use of ANSI/ANS-58.14-2011 (R2022), *Safety and Pressure Integrity Classification Criteria for Light Water Reactors*, which requires consideration of single failures during DBEs in classification of systems, structures, and components (SSCs).

Given such input, Section 6.6, "Risk-informed single-failure criterion consideration," allows for use of the PRA in a review of the plant design to identify the appropriate failures to consider in the safety analysis of the plant. This is consistent with staff positions documented in SECY-05-138, "Risk-Informed and Performance-Based Alternatives to the Single-Failure Criterion." As indicated in this section, inclusion or exclusion of single failures would be based on event sequences under consideration, the impact on the loss of functioning of components in question on system response to the event, and the cost of addressing postulated failures versus the magnitude of the risk being addressed.

In Section 11, *Performance-based decision-making*," a review for conformance with regulatory requirements is required to be performed. Any departure from regulation would require justification and possibly a request for exemption. The outcome of risk-informed, performance-based design (including treatment of single failures) is intended to encourage alternatives to regulatory requirements or guidance that would otherwise result in design decisions that could cause excessive or unnecessary design or operational complexity and cost with minimal to no safety benefit. This draws from the experience documented in the SRM for SECY-19-0036, "Application of the Single Failure Criterion to NuScale Power LLC's Inadvertent Actuation Block Valves," on the NuScale application.

<u>NRC Comment #5 (Technical—four subparts)</u>: Changes to the categorization process from established NRC regulations, policy, guidance, and endorsed documents for 10 CFR 50.69, including . . . .

<u>ANS Response #5</u>: The categorization and classification scheme chosen for ANSI/ANS-30.3-2022 was purposefully chosen to be consistent with the 10 CFR 50.69 "four box" approach to support efficient handoff from the designer to the constructor/operator/owner. In addition, NEI 00-04, "10 CFR 50.69 SSC Categorization Guideline," in some instances, is highly prescriptive and goes beyond what is needed or required for the design phase, since it was developed for existing operating reactors with different risk profiles than those expected for advanced passive LWRs. Specific responses to the four subparts are provided below.

<u>NRC Comment #5 (1)</u>: . . . allowing for classification of individual SSCs as opposed to entire systems . . .

***<u>ANS Response #5 (1)</u>*:** ANSI/ANS-30.3-2022, Section 9.1, "Classification," references ANSI/ANS-58.14-2011 (R2022) in performing classification of SSCs as safety related, non-safety related, or non-safety related with special treatment.

ANSI/ANS-58.14-2011 (R2022) not only requires classification of entire systems but SSCs at all levels of the plant design:

- Section 4.3, "Determination of safety-related functions."
- Section 4.4, "Determination of safety-related systems and structures."
- Section 4.5, "Determination of safety-related components and parts."

<u>NRC Comment #5 (2)</u>: . . . the omission of the risk sensitivity study to assess the potential cumulative impact of the categorization of the SSCs . . .

***<u>ANS Response #5 (2)</u>*:** Section 9.2, "Categorization," of ANSI/ANS-30.3-2022 requires the performance of risk-sensitivity studies. The risk-sensitivity study demonstrating the cumulative effect of the categorization of SSCs is described in the bullets under ANSI/ANS-30.3-2022, Section 9.2:

> Limited credit is taken for SSCs categorized as non–risk significant.
> An engineering rationale is required documenting the risk significance of SSCs.

<u>NRC Comment #5 (3)</u>: . . . the omission of constraints on changes from the preliminary classification by the independent panel of experts . . .

***<u>ANS Response #5 (3)</u>*:** Current industry guidance on the categorization of SSCs (NEI 00-04) does not address their classification but accepts that classification as it exists for each facility implementing 10 CFR 50.69. When using the PRA, specific measures of importance to be used and their thresholds are prescribed. The categorization of SSCs must be performed for systems as a whole, as opposed to individual components, so as to ensure all system functions are considered. The guidance relies significantly on the initial categorization of SSCs, and the independent decision-making panel reviewing the results may upgrade the categorization of an SSC but not reduce it. The reliance placed on the initial categorization allows for a relatively straightforward confirmatory risk sensitivity study to assess the cumulative impact of the categorization results in which the failure probability of all SSCs classified as low in risk significance is simply raised by a factor of 3 to 5 to demonstrate that their impact on risk is small.

As a new LWR is in the process of being designed, no existing classification of SSCs exists, and ANSI/ANS-30.3-2022 addresses the performance of both classification and categorization. In that regard, more flexibility is given to the designer with respect to identifying SSCs that are safety related and/or risk significant than in current industry guidance for categorization under 10 CFR 50.69.

With the inclusion of the process for classification of SSCs in addition to categorization, the designer will have the capability to adjust classification of SSCs to optimize their effectiveness in managing risk, raising or lowering categorization and classification results as needed, adjusting the design as well as special treatment. It is also expected that these changes would be governed by a designer's design control process with input and review from the design reliability assurance program expert panel. Given this flexibility, less emphasis is placed on the initial risk significance determination, and greater emphasis is placed on the confirming sensitivity study in ANSI/ANS-30.3-2022 than is the case for current industry categorization guidance. The ANSI/ANS-30.3-2022 categorization process is directed at ensuring consideration not only of individual system functions but all functions across the integrated plant design. Further, ANSI/ANS-30.3-2022 requires additional documentation beyond that required in industry guidance for the current generation of plants justifying the final categorization and classification of SSCs, including those that may have changed in categorization or classification as a part of the independent panel's review. This documentation not only includes additional sensitivity studies demonstrating that safety goals still are met but also requires development of engineering justification of the final categorization or classification in terms of plant design features and operating characteristics.

NRC Comment #5 (4): . . . allowing the use of absolute thresholds instead of relative importance.

ANS Response #5 (4)**:** ANSI/ANS-30.3-2022 allows for the use of both absolute and relative importance in the determination of risk significance. However, absolute measures of importance, combined with the confirmatory sensitivity study of Section 9.2, "Categorization," are encouraged to address a number of known issues with relative importance of which the independent expert panel must be aware and consider in the determination of risk significance. For example:

- Combinatorial effects—reduction in importance due to redundancies.
- Shadowing—reduction in relative importance due to other dominant contributors to risk.
- Truncation—reduction in importance due to truncation of basic events during accident sequence quantification.
- Overestimation of importance—increase in relative importance for SSCs having limited effectiveness in performing their functions.
- Insensitivity to global improvements in safety—SSCs addressing a wide spectrum of accident sequences can result in little or no change in relative importance of other SSCs.

The last of these issues is of particular importance to advanced reactors that incorporate new design features capable of addressing a wide variety of accident sequence conditions potentially resulting in a significant reduction in risk as compared to the current generation of plants. Relative measures of importance may not reflect the effects of these new design features, whereas absolute importance would directly demonstrate the reduction in risk.

<u>NRC Comment #6 (Technical)</u>: The use of a risk metric as a cut-off value for the determination of design basis events without consideration of uncertainty, key assumptions, or cliff edge effects.

***<u>ANS Response #6</u>*:** It is not clear to which section this comment refers unless it is reference to the 10^{-7}/year threshold referenced in Section 5.2, "Identification of DBEs." Our interpretation of this comment is that the staff wants to understand the basis for the cut-off value. This threshold for defining DBEs is consistent with the suggested threshold for the current generation of plants found in NUREG-75/087 and WASH-1270, *Technical Report on Anticipated Transients Without Scram for Water-Cooled Power Reactors*, which is the NRC's suggested cut-off for individual contributions exceeding 10 CFR 100, "Reactor Site Criteria," limits. Therefore, the 10^{-7}/year threshold is consistent with existing NRC guidance. Note that it is significantly less than the threshold between DBEs and beyond design basis events (BDBEs) proposed by NEI 18-04 (10^{-4}/year).

<u>NRC Comment #7 (Technical)</u>: The discussion on emergency planning zone sizing does not reference NUREG-0396, "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants," the technical basis for 10 CFR 50.47, "Emergency plans," and the proposed emergency preparedness rule for small modular reactors and other new technologies. The scope of accidents does not state that a spectrum of accidents should be considered as stated in NUREG-0396.

***<u>ANS Response #7</u>*:** Section 8.2, "EPZ sizing," includes a reference to 10 CFR 50.47. While NUREG-0396 provides the technical basis for 10 CFR 50.47, its addition (or omission) has no impact on the guidance on EPZ (emergency planning zone) sizing in Section 8.2. This is also the case for recent rulemaking on emergency preparedness for small modular reactors and other technologies. Also, because Section 8.2.1.2, "Scope of accidents," describes the scope of accidents as those from the PRA—including DBEs, BDBEs, and design basis accident sequences—this captures the intent of "a spectrum of accidents." The standard provides a modern performance-based approach to risk-informed EPZ sizing that goes beyond the guidance in NUREG-0396.

<u>NRC Comment #8 (Technical)</u>: The standard does not address Commission expectations for advanced LWR design that have been issued through SECY papers (such as the "Regulatory Treatment of Non-Safety Systems [RTNSS]") and Commission policy statements (such as the "2008 Advanced Reactor Policy Statement"). Section 8 of ANSI/ANS-30.3-2022, "Severe Accident Considerations," references SECY-01-0009, "Modified Reactor Safety Goal Policy Statement." However, the SRM for SECY 01-0009 states, "The Commission has disapproved issuance of the revised Reactor Safety Goal Policy Statement at this time."

***<u>ANS Response #8</u>*:** The last bullet in Section 3.2, "DID principles," was intended to address the use of RTNSS at a high level:

- Use reliability-enhancing concepts in the design of non-safety systems so as to reduce risk to the extent practicable.

Additional guidance is provided in Section 4.4, "Performance-based safety objectives," on establishing performance-based safety objectives.

The reference in the standard states:

> As discussed in the NRC severe accident policy statement (SECY-01-0009), new designs should achieve a higher standard of severe accident performance compared to prior designs.

Although the SECY-01-0009 is referenced in the standard, it is not required to be followed and was referenced to highlight the NRC's goal of improving the safety of prior designs. Reference to this paper points the user to a position held by the staff at a certain point in time and enriches the knowledge base offering insight into the process at the NRC to arrive at Commission decisions.

In closing, I would like to thank you and the NRC staff for reviewing and providing comments on ANSI/ANS-30.3-2022. We look forward to receiving additional comments. Please do not hesitate to reach out to me with any questions.

Very truly yours,

Andrew Sowder, Ph.D.
ANS Standards Board Chair

Attachments:
1) NRC letter dated June 27, 2023
2) ANS letter dated August 9, 2022

Cc: India Banks, U.S. Nuclear Regulatory Commission
Stephen Cumblidge, U.S. Nuclear Regulatory Commission
Michelle Hayes, U.S. Nuclear Regulatory Commission
Ian Jung, U.S. Nuclear Regulatory Commission
Meraj Rahimi, U.S. Nuclear Regulatory Commission
Mehdi Reisi-Fard, U.S. Nuclear Regulatory Commission
Robert Roche-Rivera, U.S. Nuclear Regulatory Commission
Marty Stutzke, U.S. Nuclear Regulatory Commission
Christopher Van Wert, U.S. Nuclear Regulatory Commission
Sunil Weerakkody, U.S. Nuclear Regulatory Commission
Todd Anselmi, ANS Standards Board Vice Chair
ANS Standards Board members
Michelle French, Large Light Water Reactor Consensus Committee chair
Large Light Water Reactor Consensus Committee members
Kent Welter, ANS-30.3 Working Group chair
ANS-30.3 Working Group members
Kenneth Petersen, ANS President
Lisa Marshall, ANS Vice President
Harsh Desai, ANS Treasurer
Steven Arndt, ANS Immediate Past President
Craig Piercy, ANS Executive Director/CEO
John Fabian, Director, ANS Publications
Pat Schroeder, ANS Standards Manager

ATTACHMENT 1

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 27, 2023

Donald R. Eggett, Chair
American Nuclear Society Standards Board
555 North Kensington Avenue
La Grange Park, Illinois 60526-5592

SUBJECT: RESPONSE TO AMERICAN NUCLEAR SOCIETY LETTER OF REQUEST FOR NRC ENDORSEMENT OF ANSI/ANS-30.3-2022, “LIGHT WATER REACTOR RISK-INFORMED, PERFORMANCE-BASED DESIGN”

Dear Mr. Eggett:

The purpose of this letter is to respond to the American Nuclear Society (ANS) letter dated August 9, 2022 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML23111A238) requesting that the U.S. Nuclear Regulatory Commission (NRC) take action to review and endorse American National Standards Institute (ANSI)-approved standard ANSI/ANS-30.3-2022, “Light Water Reactor Risk-Informed, Performance-Based Design.”

The NRC performed a preliminary review of ANSI/ANS-30.3-2022 (the Standard) and plans to perform a detailed review at the appropriate time. The review will determine whether the Standard should be endorsed (with exceptions, as necessary) and identify gaps that need to be addressed prior to endorsement. If the NRC’s review determines that the Standard should be endorsed, the NRC will determine how to endorse it.

The general approach, and some of its elements included in the Standard, have not been widely applied to light-water reactor license applications beyond the use for specific elements for some newer designs showing compliance with, or proposing exemptions from, existing regulations and conformance with, or proposing alternatives from, existing guidance. This limited experience combined with evolving experience gained from modernizing the licensing approach for non-light-water reactors can inform the staff’s consideration of the concepts in ANSI/ANS-30.3-2022.

The NRC staff recognizes that ANSI/ANS-30.3-2022, which is intended for use in designing and licensing new commercial light-water reactors, applies and extends certain concepts or elements of the risk-informed and performance-based methodology, such as using event sequences versus initiating events for licensing basis event selection and replacing the single failure criteria with reliability criteria. These concepts have been endorsed in Regulatory Guide 1.233, Revision 0, “Guidance for Technology-Inclusive, Risk-Informed, and Performance-Based Approach to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-Light-Water Reactors” (ML20091L698), which endorses Nuclear Energy Institute (NEI) 18-04, Revision 1, “Risk-Informed Performance-Based Technology Inclusive Guidance for Non-Light Water Reactor Licensing Basis Development” (ML22060A190). These concepts, or elements, are being incorporated into additional guidance documents for non-light-water reactors such as those from the agency-led Advanced Reactor Content of Application (ARCAP) and industry-led Technology Inclusive Content of Application Project

(TICAP) initiatives. They are also being incorporated into pre-licensing documents (e.g., topical reports, white papers) submitted to the NRC, or under development, by some developers of non-light-water reactors.

For this light-water reactor standard, the NRC staff has the following non-exhaustive list of general observations from a preliminary review of ANSI/ANS-30.3-2022:

- ANSI/ANS 30.3-2022 provides broad and high-level guidance to designers of advanced light water reactors. While this objective is consistent with the Standard's intended purpose as design guidance, standards endorsed by the NRC in the past have included substantially more detail.

- On several topics, the Standard contains guidance that is noticeably different information from established NRC regulations, policy, guidance, and endorsed documents (e.g., guidance for Title 10 of the *Code of Federal Regulations* (10 CFR) 50.69, "Risk-informed categorization and treatment of structures, systems and components for nuclear power reactors," and 10 CFR 50.47 "Emergency Plans").

Preliminary Technical Observations:

A preliminary review of ANSI/ANS-30.3-2022 by the NRC staff has identified several technical issues which need detailed review, additional information, and interactions with ANS. A non-exhaustive list of such issues is:

- Classification of events based on event sequence instead of initiating event frequency could incorrectly result in events being classified inconsistent with current regulatory requirements and staff guidance.

- How the risk-informed approach to single failure criteria meets the regulations in 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," and 10 CFR Part 50 Appendix A.

- Changes to the categorization process from established NRC regulations, policy, guidance, and endorsed documents for 10 CFR 50.69, including (1) allowing for classification of individual structures, systems, and components (SSCs) as opposed to entire systems, (2) the omission of the risk sensitivity study to assess the potential cumulative impact of the categorization of the SSCs, (3) the omission of constraints on changes from the preliminary classification by the independent panel of experts, and (4) allowing the use of absolute thresholds instead of relative importance. The changes identified above, among others, call into question the potential impact of SSC categorization and alternative treatment on SSC reliability and plant risk.

- The use of a risk metric as a cut-off value for the determination of design basis events without consideration of uncertainty, key assumptions, or cliff edge effects.

- The discussion on emergency planning zone sizing does not reference NUREG-0396, "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants," the technical basis for 10 CFR 50.47, "Emergency plans," and the proposed emergency preparedness rule for small modular reactors and other new technologies. The scope of accidents does not state that a spectrum of accidents should be considered as stated in NUREG-0396.

- The Standard does not address Commission expectations for advanced light-water reactor design that have been issued through SECY papers (such as the Regulatory Treatment of Non-Safety Systems (RTNSS)) and Commission policy statements (such as the 2008 Advanced Reactor Policy Statement). Section 8 of ANS 30.3, "Severe Accident Considerations," references SECY-01-0009, "Modified Reactor Safety Goal Policy Statement." However, the SRM for SECY 01-0009, states, "The Commission has disapproved issuance of the revised Reactor Safety Goal Policy Statement at this time."

As necessary and appropriate, the NRC staff will engage with the relevant ANS groups and possibly conduct public meetings on the topics listed above. The NRC staff will provide any insights gained through the course of the review to the cognizant ANS groups.

Sincerely,

/RA/

Michele M. Sampson, NRC Standards Executive
Office of Nuclear Regulatory Research

cc: Michelle French, Chair
Large Light Water Reactor Consensus Committee
American Nuclear Society

Patricia Schroeder, Standards Manager
American Nuclear Society

ATTACHMENT 2

American Nuclear Society
Standards Committee

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August 9, 2022

Ms. Louise Lund
U.S. Nuclear Regulatory Commission
Standards Executive
Mail Stop T-10A12
Washington, DC 20555-0001

Subject: Letter of notification of ANSI approved standard for NRC review and endorsement

Dear Ms. Lund:

The American Nuclear Society (ANS), a standards development organization under the auspices of the American National Standards Institute (ANSI), is pleased to provide you with an electronic copy of ANSI/ANS-30.3-2022 that has been approved by ANSI. We request that this standard be reviewed by the NRC staff and endorsed for use in regulatory applications. Once this standard is found to merit application in the regulatory framework, we will update our records. We are available to discuss and resolve any questions the staff may have during the review.

Recently approved standard:

> **ANSI/ANS-30.3-2022, *Light Water Reactor Risk-Informed, Performance-Based Design*** (new standard) received ANSI approval on July 21, 2022. This standard provides requirements for the incorporation of risk-informed, performance-based principles and methods into the nuclear safety design of new commercial light water reactors. The process described in this standard establishes a minimum set of requirements for the designer to appropriately combine deterministic, probabilistic, and performance-based methods during design and continuing into operations.
>
> NRC representative on working group: None
> NRC representative on consensus committee when approved: David Desaulniers

The ANS Standards Board seeks regulatory endorsement of this standard as an important contribution to advancing the mandates in the Nuclear Energy Innovation and Modernization Act (NEIMA) of 2019. The ANS has contributed significantly to the modernization of nuclear safety standards. The following are examples of ANS standards that employ concepts and methods associated with risk-informed and performance-based (RIPB) methods, which are characteristic of modernization:

- ANSI/ANS-2.26-2004 (R2021), “Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design”
- ANSI/ANS-53.1-2011 (R2021), “Nuclear Safety Design Process for Modular-Helium Cooled Reactor Plants”
- ANSI/ANS-54.1-2020, “Nuclear Safety Criteria and Design Process for Liquid-Metal-Cooled Nuclear Power Plants”
- ANSI/ANS-2.8-2019, “Probabilistic Evaluation of External Flood Hazards for Nuclear Facilities”
ANSI/ANS-58.8-2019, “Time Response Criteria for Manual Actions at Nuclear Power Plants”

These ANS standards have contributed to modernization of nuclear safety in a wide variety of areas such as seismic design, gas-cooled reactor design, sodium-cooled reactor design, external flooding hazards, and human actions during operations. These standards do not employ RIPB methods in the same way or to the same extent. However, each of them directs the modernization effort toward meeting the Commission's stated goals and objectives articulated in SRM-SECY-98-144, "White Paper on Risk-Informed and Performance-Based Regulation." As such, they support NEIMA and NRC's efforts to achieve the Act's mandates.

Of note, ANSI/ANS-30.3-2022 advances and promotes RIPB concepts and methods to a greater extent than the other mentioned standards. Regulatory endorsement of this standard would enable NRC to report to Congress significant progress in implementing the advanced reactor regulatory activities plan. It also supports the staff's ongoing rulemaking on 10 CFR Part 53 because it answers many of the "how to" questions that arise in the high-level objectives of the preliminary rule. Hence, we recommend that the vehicles for the endorsement to be considered include RG 1.206, "Applications for Nuclear Power Plants," and RG 1.233, "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."

A copy of ANSI/ANS-30.3-2022 is provided to facilitate your internal review. If you have any questions, feel free to contact me or Pat Schroeder, ANS Standards Manager, by telephone at 630-579-8269 or by e-mail at pschroeder@ans.org.

Sincerely,

D. R. Eggett

Donald R. Eggett, Chair
ANS Standards Board

(Attachment 1 e-standard)

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