



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

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***via email**

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