American Nuclear Society

Standards Committee Report of Activities

2024

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STANDARDS COMMITTEE

Report of Activities

2024

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INTRODUCTION

The Report of Activities of the American Nuclear Society (ANS) Standards Committee represents a record of the Committee's achievements for the calendar year 20243. The Report provides information on ANS standards projects.

Over 1000volunteer members participate in the development of ANS-sponsored nuclear standards and guidance documents, of which there are over 120 in various phases of maintenance and development. As of the end of 2024, there were 91 current standards approved by the American National Standards Institute as American National Standards (includes 3 American National Standards developed jointly with the American Society of Mechanical Engineers)

The ANS Standards Committee develops standards in accordance with the accredited organization method for developing evidence of consensus for their approval as American National Standards.

The work of the Standards Committee is managed by eight consensus committees:

ESCC: Environmental and Siting Consensus Committee

FWDCC: Fuel, Waste, and Decommissioning Consensus Committee

LLWRCC: Large Light Water Reactor Consensus Committee

NRNFCC: Nonreactor Nuclear Facilities Committee

NCSCC: Nuclear Criticality Safety Consensus Committee

RARCC: Research and Advanced Reactors Consensus Committee

SRACC: Safety and Radiological Analyses Consensus Committee

JCNRM: Joint Committee on Nuclear Risk Management

This report is presented in eight individual sections, each of which sets forth the details on those subcommittees and working groups active under its respective consensus committee.

ANS Standards Development Process

The mission of the American Nuclear Society (ANS) Standards Committee is to develop voluntary consensus standards to be certified by the American National Standards Institute (ANSI) as American National Standards. The ANSI has served as administrator and coordinator of the United States private sector voluntary standardization system for close to 100 years. Founded in 1918 by five engineering societies and three government agencies, the Institute remains a private, nonprofit membership organization supported by a diverse constituency of private and public sector organizations. Its prescribed process is set forth in the ANS Standards Committee Rules and Procedures, and it is also illustrated in the following flow chart presented as Figure 1.

The National Technology Transfer and Advancement Act of 1995 (NTTAA) requires all federal agencies and departments to use technical standards that are developed or adopted by voluntary consensus standards bodies, unless such use is impractical or inconsistent with law. To implement the Act, the Office of Management and Budget issued Circular A-119, which provides guidance to promote consistent application of the Act across federal agencies and departments. The NTTAA is available at https://www.gpo.gov/fdsys/granule/STATUTE-110/STATUTE-110-Pg775/content-detail.html. OMB Circular A-119 can be found at https://www.whitehouse.gov/wp-content/uploads/2020/07/revised_circular_a-119_as_of_1_22.pdf.

The process to produce an American National Standard requires time, patience, most of all dedication of many professionals. The birth of a standard begins with recognizing a need for a particular standard. Any individual or committee within the ANS Standards Committee may identify this need by completing a Project Initiation Notification System (PINS) form, which declares the purpose and need of the proposed standard. The document is reviewed, discussed, and most often approved by a select subcommittee (SubC) and a consensus committee (CC) that will oversee the standard. Last, the Standards Board (SB) will review the PINS form before it is submitted to ANSI.

Once the PINS form is approved and submitted to ANSI, a working group (WG) is assembled to commence the standards development process. Working group members comprise a small number of individuals recognized for their expertise in the subject. Although there is no requirement for a balance of representation on a WG, as required for the CC, WG membership should include those organizations having a significant interest in the project.

Subcommittees consist of members who have been appointed due to their expertise in one or more areas. They manage the development of several standards in closely related disciplines. Each SubC member is expected to lend his/her special expertise in the development of standards. Subsequent to drafting the standard, a formal ballot process within the SubC is not required but is often used as a preliminary review.

The SB has established eight consensus committees — Environmental and Siting Consensus Committee (ESCC); Fuel, Waste, and Decommissioning Consensus Committee (FWDCC); Nonreactor Nuclear Facilities Consensus Committee (NRNFCC); Nuclear Criticality Safety Consensus Committee (NCSCC); Large Light Water Reactors Consensus Committee (LLWRCC); Research and Advanced Reactors Consensus Committee (RARCC); Safety and Radiological Analyses Consensus Committee (SRACC); and Joint Committee on Nuclear Risk Management (JCNRM) a joint consensus committee with the American Society of Mechanical Engineers (ASME). Consensus committees comprise a diverse balance of interest. Each CC supervises the development of proposed standards within their assigned scopes, and they achieve consensus approval of these projects. A formal ballot must be employed to ascertain each member's position on the standards brought before the committee.

The WG chair must respond to all "approved with comments" and "negative" comments received from the formal ballot period; the SubC may assist in resolving comments. Members who ballot negative, must review the attempted resolution of his/her negative ballot vote. If the negative balloter finds the response unacceptable, then the balloter may maintain that decision by formally stating his/her reasons for doing so. Any outstanding negative positions must be circulated to all members of the CC for review. A member holding an affirmative position may change his/her vote if he/she wishes to support negative balloters.

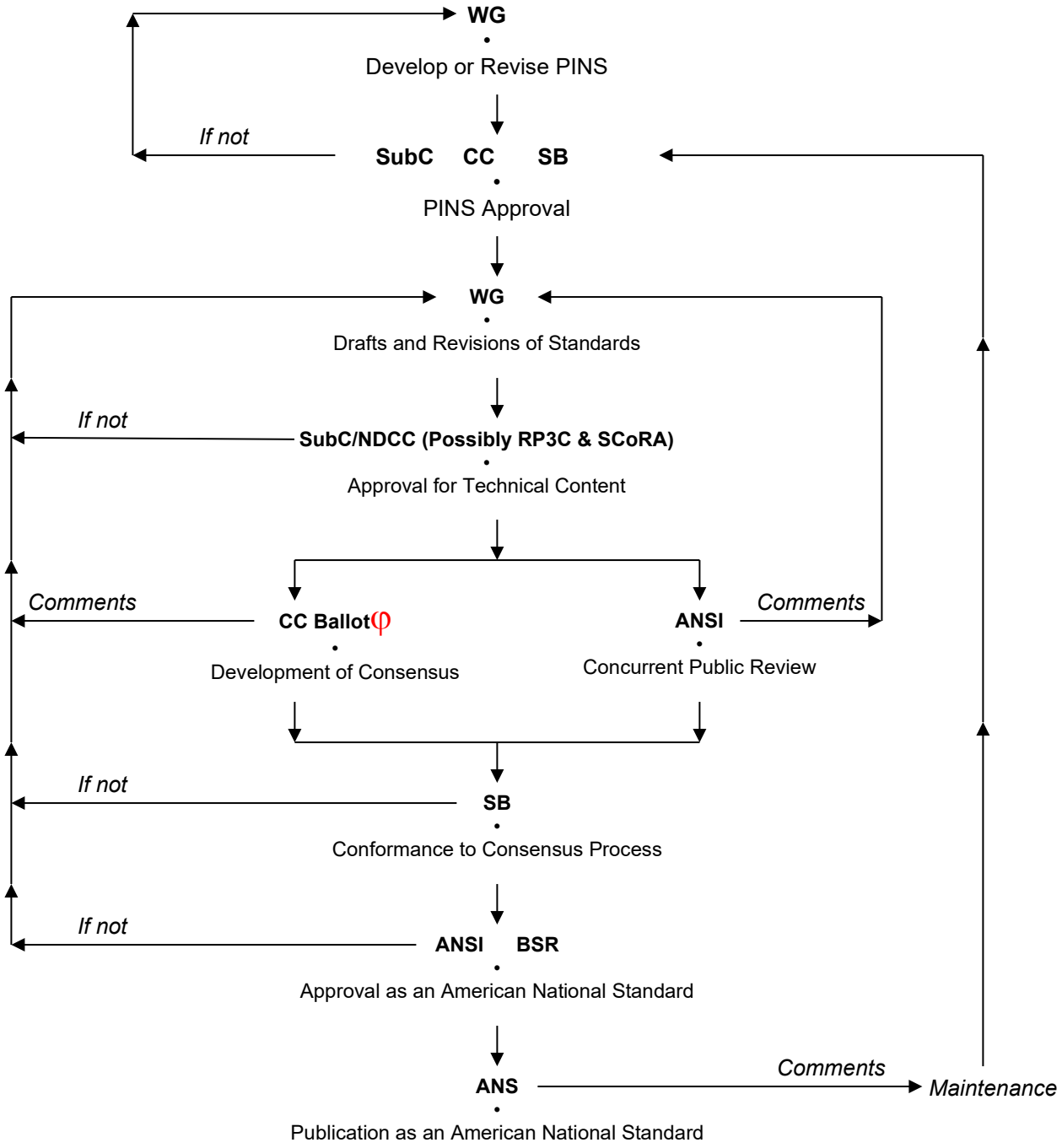
Simultaneous to the CC ballot, public review (PR) is conducted through the auspices of ANSI. ANSI announces a 45- or 60-day public review period for the proposed standard in its publication, *Standards Action*. As with CC comments, all comments from PR must be considered and resolved promptly.

Upon completion of the consensus process, a Letter Ballot is created for the SB to review and certify that all ANS procedures have been implemented to finalize the standard. The SB Letter Ballot summarizes the CC ballot tallies and other details during the ballot period.

The final step in the development of a proposed standard is to gain approval by the ANSI Board of Standards Review (BSR). Once certification by the SB has been granted, documentation is sent to the ANSI BSR with details of the ballot results to carefully scrutinize the case.

After ANSI notifies ANS of its approval, the proposed standard emerges as an American National Standard—a remarkable achievement and a credit to all the volunteers who made it possible.

Once approved, an American National Standard must be maintained to keep its certification. ANSI dictates that current standards be reviewed at least every five years to determine if the standard should be reaffirmed (reapproved), revised, or withdrawn. Standards that are found to be current and are not in need of any changes can be reaffirmed. A reaffirmation requires a consensus ballot, public review, and approval by ANSI. Absolutely no changes can be made to the formal portion of a standard through the reaffirmation process. If any changes are deemed necessary, a revision should be initiated. If the evaluation of technical content reveals that strict application of one or more criteria could result in equipment inoperability or a violation of a safety or technical specification, withdrawal shall be recommended.



ANS: American Nuclear Society	**RP3C:** Risk-informed, Performance-based Principles and Policy Committee
ANSI: American National Standards Institute	**SubC:** Subcommittee
BSR: Board of Standards Review	**SB:** Standards Board
CC: Consensus Committee	**SCoRA:** Subcommittee on Risk Application
NDCC: Non-developing consensus committee review	**WG:** Working Group

Figure 1 — Steps in the Development of a Standard

φ If a decision is made to issue a draft for trial use and application an additional CC ballot (w/o public review) as well as SB approval would be required. If approved by the CC & SB, the draft would be published and available for purchase. Once the trial-use period is completed, the working group would review the comments and determine the appropriate action. If seeking approval of the draft as an American National Standard, the draft would be revised to incorporate comments and continue to follow the process noted in the flow chart to gain ANSI certification.

STANDARDS BOARD ANNUAL REPORT

Chair, Andrew Sowder, Ph.D.

ANS Standards Board Issues Revised Strategic Plan for 2025–2030
The ANS Standards Board approved the ANS Standards Committee Strategic Plan for January 2025 through January 2030 at their meeting during the ANS Winter Conference on November 19, 2024. The revised Strategic Plan focuses on current themes, redirected industry activities such as the Electric Power Research Institute (EPRI)/Nuclear Energy Institute (NEI) North American Advanced Reactor Roadmap and initiatives of the Advanced Reactor Codes and Standards Collaborative, the need for integration and innovation in thought and activities among stakeholders, and other new initiatives. The revised Strategic Plan also streamlines goals and initiatives to reduce redundancy. The goals for the Standards Committee for 2025 through 2030 include the following:

Goal #1: Align ANS Standards Development Priorities with Industry Needs in the USA and Internationally
Goal #2: Develop and Maintain High-Quality Standards
Goal #3: Expand ANS Awareness and External Outreach
Goal #4: Ensure Sustainability of Working Groups, Subcommittees, and Consensus Committees

Larry L. Wetzel Selected as 2024 Standards Service Award Recipient
The Standards Board selected Larry L. Wetzel for the 2024 Standards Service Award. Wetzel was selected in recognition of over 20 years of participation and leadership in ANS nuclear criticality safety standards, service on the Nuclear Criticality Safety Consensus Committee, work stressing the importance of standards to young professionals, and efforts highlighting the importance of synergy among the ANS's nuclear criticality safety standards to maintain safe operation of nuclear facilities.

U.S. Nuclear Regulatory Commission (NRC) Endorsement of ANSI/ANS-30.3-2022
The NRC held a public meeting on July 15, 2024, to discuss ANSI/ANS-30.3-2022, *Light Water Reactor Risk-Informed, Performance-Based Design*. The meeting was scheduled at ANS's request to discuss endorsement of ANSI/ANS-30.3-2022. ANSI/ANS-30.3-2022 is a transitional voluntary consensus standard that bridges the gap in design practices that have provided the solid basis for demonstrating the viability of light water reactors (LWRs) as a well-known technology. The NRC had many questions on the level of detail in the RIPB standard and the resources that would be needed by staff to perform the thorough review needed for the NRC to endorse the standard. No decision on endorsement was made at the meeting. The NRC will be digesting the feedback from this meeting and determining what the next steps are to move forward.

Defense Nuclear Facilities Safety Board (DNFSB) Request for ANS Representative at Public Hearing
The DNFSB invited a senior representative from ANS to participate in public hearings intended to benchmark aging management practices applicable to high-hazard work. Specifically, the DNFSB was interested in ANSI/ANS-3.14-2021, *Process for Infrastructure Aging Management and Life Extension of Nonreactor Nuclear Facilities*, to inform potential enhancements to U.S. Department of Energy's current regulatory approach. Todd Anselmi, ANS-3.14 Working Group Chair and Standard Board Vice Chair, represented ANS at the public hearing sessions held August 8 and 14, 2024. The DNFSB expressed their appreciation to ANS for Anselmi's excellent participation.

New Leadership for the ANS Risk-informed, Performance-based Principles and Policy Committee (RP3C)
Steven L. Krahn, Ph.D., and Brandon M. Chisholm, Ph.D., took over as chair and vice chair, respectively, of the RP3C effective of the close of the ANS Annual Conference on June 19, 2024. Krahn succeeds N. Prasad Kadambi, Ph.D., as the RP3C chair (2013–2024). Kadambi was recognized for his dedication to the incorporation of RIPB principles in ANS standards and for his founding role in and leadership of the RP3C since its formation in 2013. Chisholm succeeds Robert W. Youngblood III, Ph.D., as the RP3C vice chair (2021–2024). Both Krahn and Chisholm were elected for a three-year renewable term.

RP3C Community of Practice (CoP)
RP3C held nine CoP presentations in 2024 and has held 48 since the program was initiated in February 2020. All presentations have been recorded and are available on the RP3C CoP public webpage. The CoP presentations are

part of RP3C's training and knowledge-sharing activities of risk-informed, performance-based (RIPB) principles and practices within the nuclear industry. CoP presentations have been provided by representatives from NuScale Power, Duke Energy, Oklo, the Thorium Energy Alliance, the U.S. Nuclear Regulatory Commission, Idaho National Laboratory, X-energy, The Breakthrough Institute, TerraPower, the Electric Power Research Institute, the Nuclear Energy Institute, Vanderbilt University, GE Hitachi, North Carolina State University, and a host of independent industry experts. The following CoPs have between 2000 and 5000 views of the recording:

- "Experience Implementing the NEI 18-04 Process for the Xe-100 Advanced Reactor Design"—November 19, 2021, by Kyle Metzroth (X-energy)
- "Natrium™ SSC Classification Using the Licensing Modernization Project"—April 29, 2022, by Brian Johnson (TerraPower)
- "Safety Assessment and Strategy Using a Risk-Informed Approach for the BWRX-300"—September 29, 2023, by Dennis Henneke (GE Hitachi)
- "Development of a Risk-Informed and Performance-Based Safety Case for TerraPower's Molten Chloride Reactor Experiment (MCRE)"—January 26, 2024, by Brandon Chisholm (Southern Company)

CoP presenters are also offered the opportunity to include their presentations in the new Nuclear Science and Technology Open Research (NSTOR) online platform Currently, thirty-four presentations have been added to NSTOR's RP3C CoP Collection.

Update on the Advanced Reactor Codes & Standards Collaborative

The Advanced Reactor Codes and Standards Collaborative (ARCSC) was established in 2022 to ensure the development, alignment and timely availability of U.S., Canadian and international codes and standards needed to support large-scale advanced reactor deployment. Founding members along with ANS include the American Society of Mechanical Engineers (ASME), the CSA Group, the Electric Power Research Institute (EPRI), and the Nuclear Energy Institute (NEI). Currently, ANS holds a co-chair and secretary role as part of the ARCSC leadership team. The Collaborative aligns actions with the NEI/EPRI North American Advanced Reactor Roadmap (NAARR). Membership on the Collaborative includes representatives from standards development organizations, industry organizations, and federal agencies including AISC, ANS, ASME, ASCE, CSA Group, IEEE, IEC, ISA, DOE, EPRI, NEI, and NRC. The 3rd Annual ARCSC Workshop was held on December 4, 2024, at NEI's offices in Washington D.C. Presentations provided attendees

- the Collaborative's progress to date;
- results of ARCSC's gap assessment and validation surveys, including the standards development organizations;
- advanced reactor designers' standards priorities and resource needs;
- RIPB approaches to support development of industry RIPB guidelines/standards; and
- future ARCSC actions.

ANS Participation at September 2024 NRC Standards Forum

The annual NRC Standards Forum was held on September 25, 2024. ANS along with other standards development organizations were invited to present at the Forum. Standards Board Chair Andrew Sowder's presentation at the Forum highlighted Standards Board initiatives, ANS standards on advanced reactors, recently issued standards, and support of ARCSC.

ANS Winter Meeting Panel: "Everyone Has a Seat at the Table—Balancing Interests with Consensus Standard Development"

The panel session "Everyone Has a Seat at the Table—Balancing Interests with Consensus Standard Development" was held as part of the ANS Young Members Group's session on Wednesday, November 20, 2024, during the 2024 ANS Winter Conference and Expo. This panel provided an overview of ANS standards including what standards are, how they are developed and used, and why we need them. The panel featured examples of standards projects that are RIPB and applicable to advanced reactors. The purpose of the panel was to equip attendees with knowledge of the standards development process and to motivate them to become involved in the standards program. Sessions chairs included Leah Parks (U.S. Nuclear Regulatory Commission) and Matthew Wargon (TerraPower). In addition to Parks and Wargon, panelists include Douglas Bowen (Oak Ridge National Laboratory), Brandon Chisholm (Southern Company), Gale Hauck (Oak Ridge National Laboratory), and Steven Krahn (Vanderbilt University).

Presentations to the Professional Divisions Committee (PDC)

A presentation was made by Standards Board Chair Andrew Sowder to the PDC on April 16, 2024. Subsequently, Standards Board Vice Chair Todd Anselmi, followed up with the PDC at their November 17, 2024, meeting. The presentations provided PDC members with an overview of the standards development process; organizational structure; the hierarchy of Standards Committee rules, policies, and procedures; and current standards activities and initiatives. Cadence has been established for a bi-annual standards newsletter presented to the PDC at the annual and winter conferences to ensure PDC members are aware of current standards activities and opportunities for involvement.

Ad Hoc Committee Formed on Artificial Intelligence (AI) Standards for Nuclear Application

An ad hoc committee was formed under the Large Light Water Reactor Consensus Committee (LLWRCC) to explore the need for AI standards for nuclear applications. The entire Standards Committee was engaged to provide feedback on this initiative through a survey issued in February 2024. A kickoff meeting of the AI Standards Ad Hoc Committee was held on May 15, 2024, with a second meeting held June 12, 2024. Feedback from the February 2024 survey was overwhelmingly in support of ANS exploring AI standards for nuclear applications. A second survey was issued in July 2024 to propose specific standards that are felt to benefit the industry and fit within the expertise of the ANS. The ad hoc committee is developing a proposal that focuses on industry needs appropriate for ANS's undertaking. The intent is to first gain approval of the LLWRCC. If approved, the LLWRCC is expected to submit a recommendation to the Standards Board to consider forming a new consensus committee dedicated to AI.

Nuclear Space Application Standards

A new standard ANS-31.1, *Testing and Facilities for Space Nuclear Power and Propulsion Reactors*, has been proposed. This standard will be the first ANS standard for space reactors. The intent is for the standard to provide criteria for the testing of nuclear reactors to be utilized for in-space related applications such as the production of electrical power for use on space platforms, on the surface of the moon or other solar system bodies and for the propulsion of space platforms and vehicles. The criteria are to be used by the developers, analyzers, and evaluators of space reactors when considering the ground and in-space testing of space reactors and their associated equipment, as well as the facilities in which such testing is conducted. This standard is intended to be design, mission, sponsor, location, and facility agnostic. The proposal was reviewed by the ANS Research and Advanced Reactor Consensus Committee (RARCC). Comments from the RARCC's review are currently being addressed.

Volunteer Engagement Including Utilization of Young and Emerging Professionals

Membership of the ANS Standards Committee continues to grow. The collection of subject matter experts that participate in ANS standards has grown to just over 1000. The total number of volunteers includes 39 young professionals engaged as associate members. The Associate Member Program has placed 130 young professionals since 2015. The program has made a significant impact with 56 of these young professionals now in the full member role, several of which are taking on committee leadership positions. An additional 200 volunteers support our joint PRA committee with ASME.

ANS Standards in Full Compliance with American National Standards Institute (ANSI) with No Delinquent Standards

All ANS standards have either been revised or reaffirmed in the last five years and fully comply with the requirements of ANSI to perform periodic maintenance within five years. Standards that have not completed maintenance within five years are considered delinquent by ANSI. ANS had 91 current American National Standards at the end of 2024. This number includes 3 American National Standards developed jointly with the American Society of Mechanical Engineers.

Summary of Standards Actions for 2024 include:

- 7 standards were published (includes 2 joint standards with ASME)
- 15 current standards were reaffirmed
- 1 standard was formally initiated with the submittal of a Project Initiation Notification Systems form to ANSI

New Standards to Look for in the Future

- ANS-2.22, *Environmental Radiological Monitoring at Operating Nuclear Facilities*
- ANS-2.35, *Guidelines for Estimating Present & Projecting Future Socioeconomic Impacts from Construction, Operations, and Decommissioning of Nuclear Facilities*
- ANS-2.34, *Characterization and Probabilistic Analysis of Volcanic Hazards*
- ANS-2.36, *Accident Analysis for Aircraft Crash into Reactor and Nonreactor Nuclear Facilities*
- ANS-3.5.1, *Nuclear Power Plant Simulators for Use in Simulation Assisted Engineering and Non-Operator Training*
- ANS-3.13, *Nuclear Facility Reliability Assurance Program (RAP) Development*
- ANS-3.15, *Risk-Informing Critical Digital Assets (CDAs) for Nuclear Power Plant Systems*
- ANS-19.10, *Methods for Determining Neutron Fluence in BWR and PWR Pressure Vessel and Reactor Internals*
- ANS-30.2, *Categorization Classification of SSCs for New Nuclear Power Plants*
- ANS-53.1, *Nuclear Safety Criteria for the Design of High Temperature Gas-Cooled Reactor Plants*
- ANS-54.8, *Liquid Metal Fire Protection*
- ANS-55.6, *Liquid Radioactive Waste Processing System for Light Water Reactor Plants*
- ANS-56.2, *Containment Isolation Provisions for Fluid Systems After a LOCA*
- ANS-60.1, *Civilian Nuclear Export Controls*
- ASME/ANS RA-S-1.3-2024, *Standard for Radiological Accident Offsite Consequence Analysis (Level 3 PRA) to Support Nuclear Installation Applications*

ANS Standards Committee

Scope: *The American Nuclear Society Standards Committee is responsible for the development and maintenance of standards that address the design, analysis, and operation of components, systems, and facilities related to the application of nuclear science and technology. The scope of the Standards Committee includes the development and maintenance of standards on the following subjects and closely related activities:*

- *a. Definitions of terminology used in nuclear science and technology*
- *b. Siting requirements for nuclear facilities*
- *c. Nuclear facility design and operations, including safety criteria for facilities, operator selection, and training*
  - *i. Power production reactors*
  - *ii. Research reactors and critical facilities*
  - *iii. Nuclear fuel production, handling, and storage facilities*
- *d. Facilities for handling radioactive isotopes, including remote handling of radioactive materials*
- *e. Remediation and restoration of sites used for nuclear facilities*
- *f. Emergency preparedness*
- *g. Nuclear criticality safety*
- *h. Reactor physics and radiation shielding*
- *i. Computational analysis programs used in the nuclear field*
- *j. Probabilistic risk assessment, risk management, and risk criteria*
- *k. Fission product behavior*
- *l. Radioactive waste management*

The Standards Committee does not develop standards for the application of radiation for medical purposes.

The Standards Committee reviews standards being developed or issued by other organizations on related topics to help ensure consistency and completeness and to avoid duplication.

Standards developed by the Standards Committee are intended to be issued as American National Standards.

The Standards Committee consists of consensus committees, subcommittees, and working groups, all of which are under the administrative control and policy direction of the ANS Standards Board.

Standards Board Membership

Andrew G. Sowder, Chair, Electric Power Research Institute
Todd Anselmi, Vice Chair, ASME Liaison, Idaho National Laboratory
Robert Becse, Member at Large, Westinghouse Electric Company, LLC
Robert J. Budnitz, Member at Large, Consultant
Jennifer Call, Member at Large, Tennessee Valley Authority
Brandon Chisholm, Member at Large, Southern Company
Michelle French, Ex Officio Member (LLWRCC), Westinghouse Government Services
Gale Hauck, Ex Officio Member (RARCC), Oak Ridge National Laboratory
Dennis Henneke, Ex Officio Member (JCNRM), Individual
Mark Joseph, Ex Officio Member (NRNFCC), Navarro Research & Engineering, Inc.
Robert Kalantari, Engineering Planning and Management, Inc.
Jean-Francois Lucchini, Ex Officio Member (FWDCC), Los Alamos National Laboratory
Carl A. Mazzola, Ex Officio Member (ESCC), Los Alamos National Laboratory (TRIAD National Security)
Benjamin Parks, Member at Large, U.S. Nuclear Regulatory Commission
Frances Pimentel, Member at Large, Nuclear Energy Institute
Andrew O. Smetana, Ex Officio Member (SRACC), Individual
Kent Byron Welter, Member at Large, NuScale Power
Larry L. Wetzel, Ex Officio Member (NCSCC), Consultant

Amir Afzali, Observer, Individual
Scottman Ammons, INPO Liaison, Institute of Nuclear Power Operations
Kelsey Amundson, ANS Board of Directors Liaison, Los Alamos National Laboratory
Douglas Bowen, Observer, Oak Ridge National Laboratory
Jarvis Caffrey, HPS Liaison, NASA - MSFC
Donald R. Eggett, Observer, Eggett Consulting, Inc.
George F. Flanagan, Observer, Individual
Sudesh Gambhir, Observer, Individual
Calvin M. Hopper, Observer, Individual
N. Prasad Kadambi, ANSI Liaison, Kadambi Engineering Consultants
Steven Krahn, Observer (RP3C), Vanderbilt University
Mark A. Linn, Observer, Individual
Brian McDonald, ASCE Liaison, Exponent, Inc.
Leah Parks, Observer, U.S. Nuclear Regulatory Commission
Madhumita Sircar, ACI Liaison, Individual
Donald Spellman, NTAG/ISO/TC85/SC6 Liaison, Individual
Rebecca Steinman, IEEE/NPEC Liaison, Constellation Generation
Edward G. Wallace, Observer, GNBC Associates, Inc.
Andrew Whittaker, ASCE Liaison, University at Buffalo, SUNY

Ex Officio Member = *Consensus Committee Chair*

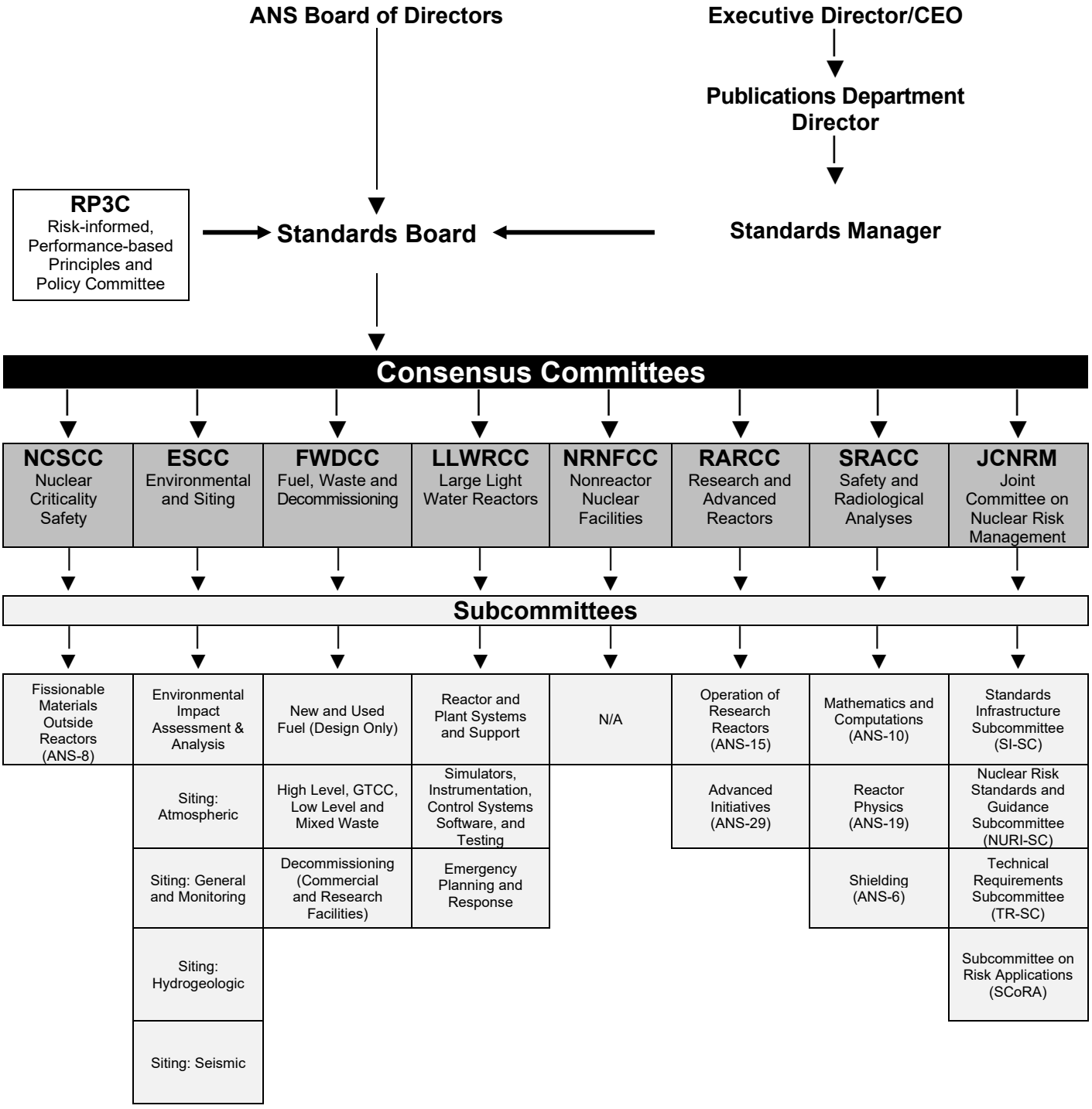


Figure 2 – ANS Standards Committee: Organizational Chart

SUBCOMMITTEE CHAIRS

Advanced Initiatives (ANS-29) (RARCC)	Jason Andrus
Decommissioning (Commercial and Research Facilities) (FWDCC)	Joshua Vajda
Emergency Planning and Response (LLWRCC)	Ronald Markovich
Environmental and Impact Assessment (ESCC)	Leah Parks
Fissionable Material Outside Reactors (ANS-8) (NCSCC)	Douglas Bowen
High Level, GTCC, Low Level, and Mixed Waste (FWDCC)	Robert Howard
Mathematics and Computations (ANS-10) (SRACC)	Paul Hulse
New and Used Fuel (Design Only) (FWDCC)	John Scaglione
Operation of Research Reactors (ANS-15) (RARCC)	Thomas Newton
Reactor and Plant Systems and Support (LLWRCC)	Robert Burg
Reactor Physics (ANS-19) (SRACC)	Dimitrios Cokinos
Shielding (ANS-6) (SRACC)	Charlotta Sanders
Simulators, Instrumentation, Control Systems, Software and Testing (LLWRCC)	OPEN
Siting: Atmospheric (ESCC)	David Bruggeman
Siting: General and Monitoring (ESCC)	Leah Parks
Siting: Hydrogeologic (ESCC)	OPEN
Siting: Seismic (ESCC)	Yong Li
Nuclear Risk Standards and Guidance Subcommittee (NURI-SC)	Reed LaBarge
Standards Infrastructure Subcommittee (SI-SC)	Sai Zhang
Subcommittee on Risk Applications (SCoRA)	Stuart Lewis
Technical Requirements Subcommittee (TR-SC)	Michelle Bensi

APPROVED AMERICAN NATIONAL STANDARDS

Developed by the ANS Standards Committee

(through December 2024)

ANS-1-2000; R2007; R2012; R2019; R2024	*Conduct of Critical Experiments* (reaffirmed 6/5/2024)—$55.00
ANS-2.2-2016; R2020	*Earthquake Instrumentation Criteria for Nuclear Power Plants* (reaffirmed 11/13/2020)—$192.00
ANS-2.3-2011; R2016; R2021	*Estimating Tornado, Hurricane, and Extreme Straight-Line Wind Characteristics at Nuclear Facility Sites* (reaffirmed 7/19/2021)—$96.00
ANS-2.6-2018; R2023	*Guidelines for Estimating Present & Forecasting Future Population Distributions Surrounding Nuclear Facility Sites* (reaffirmed 1/3/2023)—$183.00
ANS-2.8-2019; R2024	*Probabilistic Evaluation of External Flood Hazards for Nuclear Facilities* (approved 6/13/2024)—$258.00
ANS-2.10-2017; R2022	*Criteria for Retrieval, Processing, Handling, and Storage of Records from Nuclear Facility Seismic Instrumentation* (approved 4/1/2022)—$150.00
ANS-2.15-2013; R2017; R2021	*Criteria for Modeling and Calculating Atmospheric Dispersion of Routine Radiological Releases from Nuclear Facilities* (reaffirmed 11/11/2021)—$233.00
ANS-2.17-2010; R2016; R2021	*Evaluation of Subsurface Radionuclide Transport at Commercial Nuclear Power Plants* (reaffirmed 6/28/2021)—$189.00
ANS-2.21-2022	*Criteria for Assessing Atmospheric Effects on the Ultimate Heat Sink* (approved 1/27/2022)—$248.00
ANS-2.23-2016; R2020	*Nuclear Plant Response to an Earthquake* (reaffirmed 11/13/2020)—$224.00
ANS-2.26-2004; R2010; R2017; R2021	*Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design* (reaffirmed 12/10/2021)—$163.00
ANS-2.27-2020	*Criteria for Investigations of Nuclear Facility Sites for Seismic Hazard Assessments* (approved 4/16/2020)—$195.00
ANS-2.29-2020	*Probabilistic Seismic Hazard Analysis* (approved 4/16/2020)—$230.00
ANS-2.30-2015; R2020	*Criteria for Assessing Tectonic Surface Fault Rupture and Deformation at Nuclear Facilities* (reaffirmed 5/4/2020)—$311.00
ANS-3.1-2014; R2020	*Selection, Qualification and Training of Personnel for Nuclear Power Plants* (reaffirmed 2/4/2020)—$175.00
ANS-3.2-2012; R2017; R2022	*Managerial, Administrative, and Quality Assurance Controls for the Operational Phase of Nuclear Power Plants* (reaffirmed 5/26/2022)—$175.00
ANS-3.4-2013; R2018; R2023	*Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants* (reaffirmed 7/19/2023)—$189.00

ANS-3.5-2018; R2024	*Nuclear Power Plant Simulators for Use in Operator Training and Examination* (approved 9/11/2024)—$171.00
ANS-3.11-2024	*Determining Meteorological Information at Nuclear Facilities* (approved 10/21/2024)—$232.00
ANS-3.14-2021	*Process for Aging Management and Life Extension for Nonreactor Nuclear Facilities* (approved 8/5/2021)—$215.00
ANS-5.1-2014; R2019; R2023	*Decay Heat Power in Light Water Reactors* (reaffirmed 12/4/2023)—$229.00
ANS-5.4-2011; R2020	*Method for Calculating the Fractional Release of Volatile Fission Products from Oxide Fuel* (reaffirmed 4/9/2020)—$107.00
ANS-5.10-1998; R2006; R2013; R2019; R2024	*Airborne Release Fractions at Non-Reactor Nuclear Facilities* (reaffirmed 7/18/2024)—$180.00
ANS-6.1.1-2020	*Photon and Neutron Fluence-to-Dose Conversion Coefficients* (approved 9/10/2020)—$97.00
ANS-6.1.2-2013; R2018; R2023	*Group-Averaged Neutron and Gamma-Ray Cross Sections for Radiation Protection and Shielding Calculations for Nuclear Power Plants* (reaffirmed 6/16/2023)—$76.00
ANS-6.3.1-1987; R1998; R2007; R2015; R2020	*Program for Testing Radiation Shields in Light Water Reactors* (LWR) (reaffirmed7/28/2020)—$107.00
ANS-6.4-2006; R2016; R2021	*Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants* (reaffirmed 8/5/2021)—$284.00
ANS-6.4.2-2006; R2016; R2021	*Specification for Radiation Shielding Materials* (reaffirmed 12/2/2021)—$107.00
ANS-6.6.1-2015; R2020	*Calculation and Measurement of Direct and Scattered Gamma Radiation from LWR Nuclear Power Plants* (reaffirmed 4/23/2020)—$197.00
ANS-8.1-2014; R2018; R2023	*Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors* (reaffirmed 6/5/2023)—$131.00
ANS-8.3-2022	*Criticality Accident Alarm System* (approved 9/9/2022)—$139.00
ANS-8.6-1983; R1988; R1995; R2001; R2010; R2017; R2022	*Safety in Conducting Subcritical Neutron-Multiplication Measurements In Situ* (reaffirmed 9/8/2022)—$43.00
ANS-8.7-2022	*Nuclear Criticality Safety in the Storage of Fissile Materials* (approved 5/6/2022)—$134.00
ANS-8.10-2015; R2020	*Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement* (reaffirmed 3/26/2020)—$76.00
ANS-8.12-1987; R1993; R2002; R2011; R2016; R2021	*Nuclear Criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors* (reaffirmed 8/16/2021)—$131.00
ANS-8.14-2004; R2011; R2016; R2021	*Use of Soluble Neutron Absorbers in Nuclear Facilities Outside Reactors* (reaffirmed 8/5/2021)—$65.00

ANS-8.15-2014; R2019 R2024	Nuclear Criticality Control of Special Actinide Elements (reaffirmed 7/8/2024)—$150.00
ANS-8.17-2004; R2009; R2014; R2019; R2024	*Criticality Safety Criteria for the Handling, Storage, and Transportation of LWR Fuel Outside Reactors* (reaffirmed 9/12/2024)—$65.00
ANS-8.19-2014; R2019 R2024	*Administrative Practices for Nuclear Criticality Safety* (reaffirmed 6/13/2024)—$69.00
ANS-8.20-1991; R1999; R2005; R2015; R2020	*Nuclear Criticality Safety Training* (reaffirmed 5/8/2020)—$65.00
ANS-8.21-2023	*Use of Fixed Neutron Absorbers in Nuclear Facilities Outside Reactors* (approved 6/20/2023)—$102.00
ANS-8.22-1997; R2006; R2011; R2016; R2021	*Nuclear Criticality Safety Based on Limiting and Controlling Moderators* (reaffirmed 12/7/2021)—$77.00
ANS-8.23-2019; R2024	*Nuclear Criticality Accident Emergency Planning and Response* (approved 2/29/2024)—$181.00
ANS-8.24-2017; R2023	*Validation of Neutron Transport Methods for Nuclear Criticality Safety* Calculations (reaffirmed 1/3/2023)—$167.00
ANS-8.26-2024	*Nuclear Criticality Safety Engineer Training and Qualification Program* (approved 11/21/2024) $118.00
ANS-8.27-2015; R2020	*Burnup Credit for LWR Fuel* (reaffirmed 8/7/2020)—$127.00
ANS-8.28-2024	*Administrative Practices for the Use of Nondestructive Assay Measurements for Nuclear Criticality Safety* (approved 3/12/2024)
ANS-10.4-2008; R2016; R2021	*Verification and Validation of Non-Safety Related Scientific and Engineering Computer Programs for the Nuclear Industry* (reaffirmed 6/15/2021)—$177.00
ANS-10.5-2006; R2011; R2016; R2021	*Accommodating User Needs in Scientific and Engineering Computer Software Development* (reaffirmed 8/23/2021)—$78.00
ANS-10.7-2013; R2018; R2023	*Non-Real Time, High-Integrity Software for the Nuclear Industry—Developer Requirements* (reaffirmed 4/19/2023)—$150.00
ANS-10.8-2015; R2020	*Non-Real Time, High-Integrity Software for the Nuclear Industry—User Requirements* (reaffirmed 10/29/2020)—$165.00
ANS-14.1-2004; R2009; R2014; R2019; R2024	*Operation of Fast Pulse Reactors* (reaffirmed 8/19/2024)—$65.00
ANS-15.1-2007; R2007; R2013; R2018; R2023	*The Development of Technical Specifications for Research Reactors* (reaffirmed 4/27/2023)—$131.00
ANS-15.2-1999; R2009; R2016; R2021	*Quality Control for Plate-Type Uranium-Aluminum Fuel Elements* (reaffirmed 1/28/2021)—$87.00
ANS-15.4-2016; R2021	*Selection and Training of Personnel for Research Reactors* (approved 7/23/2021)—$127.00
ANS-15.8-1995; R2005; R2013; R2018; R2023	*Quality Assurance Program Requirements for Research Reactors* (reaffirmed 11/27/2023)—$87.00

ANS-15.11-2016; R2021	*Radiation Protection at Research Reactor Facilities* (approved 7/20/2021)—$204.00
ANS-15.16-2015; R2020; R2024	*Emergency Planning for Research Reactors* (reaffirmed 12/9/2024)—$97.00
ANS-15.21-2012; R2018; R2023	*Format and Content for Safety Analysis Reports for Research Reactors* (reaffirmed 1/19/2023)—$168.00
ANS-16.1-2019; R2024	*Measurement of the Leachability of Solidified Low-Level Radioactive Wastes Short-Term Test Procedure* (approved 1/4/2024)—$174.00
ANS-18.1-2020	*Radioactive Source Term for Normal Operation of Light Water Reactors* (approved 7/24/2020)—$139.00
ANS-19.1-2019; R2024	*Nuclear Data Sets for Reactor Design Calculations* (approved 1/5/2024)—$130.00
ANS-19.3-2022	*Steady-State Neutronics Methods for Power Reactor Analysis* (approved 10/6/2022)—$194.00
ANS-19.3.4-2022	*The Determination of Thermal Energy Deposition Rates in Nuclear Reactors* (approved 7/12/2022)—$145.00
ANS-19.4-2017; R2022	*A Guide for Acquisition and Documentation of Reference Power Reactor Physics Measurements for Nuclear Analysis Verification* (reaffirmed 8/24/2022)—$144.00
ANS-19.6.1-2019; R2024	*Reload Startup Physics Tests for Pressurized Water Reactors* (approved 7/17/2024)—$172.00
ANS-19.10-2009; R2016; R2021	*Methods for Determining Neutron Fluence in BWR and PWR Pressure Vessel and Reactor Internals* (reaffirmed 10/7/2021)—$73.00
ANS-19.11-2017; R2022	*Calculations and Measurement of the Moderator Temperature Coefficient of Reactivity for Pressurized Power Reactors* (reaffirmed 6/2/2022)—$159.00
ANS-19.13-2024	*Initial Fuel Loading and Startup Physics Tests for First-of-a-Kind Advanced Reactors* (approved 10/7/2024)
ANS-20.2-2023	*Nuclear Safety Design Criteria and Functional Performance Requirements for Liquid-Fuel Molten Salt Reactor Nuclear Power Plants* (approved 1/4/2024)
ANS-30.3-2022	*Light-Water Reactor Risk-Informed Performance-Based Design Criteria and Methods* (approved 7/21/2022)—$211.00
ANS-40.37-2009; R2016; R2021	*Mobile Low Level Radioactive Waste Processing Systems* (reaffirmed 2/22/2021)—$200.00
ANS-41.5-2012; R2018; R2023	*Verification and Validation of Radiological Data for Use in Waste Management and Environmental Remediation* (reaffirmed 9/7/2023)—$220.00
ANS-51.10-2020	*Auxiliary Feedwater System for Pressurized Water Reactors* (approved 10/23/2020)—$183.00
ANS-53.1-2011; R2016; R2021	*Nuclear Safety Design Process for Modular-Helium Cooled Reactor Plants* (reaffirmed 10/7/2021)—$318.00

ANS-54.1-2020	*Nuclear Safety Criteria and Design Process for Liquid-Metal-Cooled Nuclear Power Plants* (approved 3/23/2020)—$199.00
ANS-55.1-2021	*Solid Radioactive Waste Processing Systems for Light Water Cooled Reactor Plants* (approved 12/2/2021)—$215.00
ANS-56.8-2020	*Containment System Leakage Testing Requirements* (approved 12/11/2020)—$192.00
ANS-57.1-1992; R1998; R2005; R2015; R2019; R2024	*Design Requirements for Light Water Reactor Fuel Handling System* (reaffirmed 9/16/2024)—$96.00
ANS-57.3-2018; R2023	*Design Requirements for New Fuel Storage Facilities at Light Water Reactor Plants* (reaffirmed 1/3/2023)—$107.00
ANS-57.8-2020	*Fuel Assembly Identification* (approved 8/28/2020)—$172.00
ANS-57.10-1996; R2006; R2016; R2021	*Design Criteria for Consolidation of LWR Spent Fuel* (reaffirmed 1/28/2021)—$185.00
ANS-58.8-2019; R2024	*Time Response Criteria for Manual Actions at Nuclear Power Plants* (approved 10/4/2024)—$118.00
ANS-58.9-2002; R2009; R2015; R2020	*Single Failure Criteria for Light Water Reactor Safety-Related Fluid Systems* (reaffirmed 7/23/2020)—$65.00
ANS-58.14-2011; R2017 R2022	*Safety and Pressure Integrity Classification Criteria for Light Water Reactors* (reaffirmed 2/4/2022)—$265.00
ANS-58.16-2014; R2020	*Safety Categorization and Design Criteria for Nonreactor Nuclear Facilities* (reaffirmed 4/9/2020)—$210.00
ANS-59.51-1997; R2007; R2015; R2020	*Fuel Oil Systems for Safety-Related Emergency Diesel Generators* (reaffirmed 7/27/2020)—$107.00
ANS-59.52-1998; R2007; R2015; R2020	*Lubricating Oil Systems for Safety-Related Emergency Diesel Generators* (reaffirmed 7/24/2020)—$96.00

Approved ASME/ANS Joint American National Standard

ASME/ANS RA-S-1.1-2024	*Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications* (approved 3/15/2024)—$610.00
ASME/ANS RA-S-1.2-2024	*Severe Accident Progression and Radiological Release (Level 2) PRA Standard for Nuclear Power Plant Applications for Light Water Reactors (LWRs)* (approved 6/17/2024)—$270.00
ASME/ANS RA-S-1.4-2021	*Probabilistic Risk Assessment Standard for Advanced Non-Light Water Reactor Nuclear Power Plants* (approved 1/28/2021)—$590.00

Approved ASME/ANS Joint Trial-Use Standards (not approved by ANSI)

ANS/ASME-58.22-2014	*Requirements for Low Power and Shutdown Probabilistic Risk Assessment* (approved for trial use by the JCNRM; not approved by ANSI)—$440.00
ASME/ANS RA-S-1.3-2017	*Standard for Radiological Accident Offsite Consequence Analysis (Level 3 PRA) to Support Nuclear Installation Applications* (approved for trial use by the JCNRM; not approved by ANSI)—$220.00

Environmental and Siting Consensus Committee (ESCC)

Carl A. Mazzola, Chair
Los Alamos National Laboratory (TRIAD National Security)

Scope: *The ESCC is responsible for the preparation and maintenance of voluntary consensus standards as well as standards-related guidance documents, guidance standards, and technical reports supporting all aspects of nuclear power plant and non-reactor nuclear facility siting, environmental assessment, environmental management, environmental monitoring, and the categorization and evaluation of natural phenomena hazards at these public and private sector nuclear facilities.*

Many of the ESCC standards presently support the siting and environmental needs of the civilian nuclear industry and the Department of Energy (DOE) in meeting 10 CFR 50, 10 CFR 51 and 10 CFR 52 licensing requirements and assisting with compliance to 40 CFR enabling regulations associated with the Clean Air Act, Clean Water Act, Safe Drinking Water Act, Resource Conservation and Recovery Act, Comprehensive Environmental Response Compensation and Liability Act, Toxic Substances Control Act, and National Environmental Policy Act. The ANS Standards Committee Procedures Manual for Consensus Committees shall be used to guide the activities of this consensus committee. The ESCC supervises the work of the following subcommittees. They are as follows:

- *Environmental and Impact Assessment*
- *Siting: Atmospheric*
- *Siting: General and Monitoring*
- *Siting: Hydrogeologic*
- *Siting: Seismic*

ESCC Membership:

Carl A. Mazzola, Chair, Los Alamos National Laboratory (TRIAD National Security)
Leah Parks, Vice Chair, U.S. Nuclear Regulatory Commission
Amir Bahadori, Kansas State University
J. Matthew Barnett, Pacific Northwest National Laboratory
Thomas Bellinger, Consolidated Nuclear Security, LLC
David Bruggeman, Los Alamos National Laboratory (TRIAD National Security)
Jennifer Call, Tennessee Valley Authority
Andrew Dewhurst, RSL Safety Corporation
William Ebert, Argonne National Laboratory
Patrick Frias, U.S. Department of Energy
Marsha Kinley, Duke Energy Corporation
Yong Li, Defense Nuclear Facility Safety Board
Daniel Menchaca, Texas A&M University
Timothy Moore, Individual
Kit Ng, Bechtel Power Corporation
James O'Brien, U.S. Department of Energy
Kevin Quinlan, U.S. Nuclear Regulatory Commission
Emma Redfoot, Oklo, Inc.
Michael Salmon (Liaison), International Atomic Energy Agency
Jean Savy, Individual
Ali Simpkins, Oak Ridge Associated Universities
Cibi Sundaram, Uppsala University
Evan Swiker, United Engineers and Constructors
Thomas Weaver, U.S. Nuclear Regulatory Commission

Report of the ESCC:

The ESCC held virtual meetings on March 28, July 16, and November 6, 2024. Patrick Frias, Timothy Moore, Timothy Moore, Kevin Quinlan, and Emma Redfoot were confirmed as members of the ESCC.

Approved in 2024:

ANSI/ANS-2.8-2019 (R2024), *Probabilistic Evaluation of External Flood Hazards for Nuclear Facilities* (reaffirmation of ANSI/ANS-2.8-2019)

ANSI/ANS-3.11-2024, *Determining Meteorological Information at Nuclear Facilities* (revision of ANSI/ANS-3.11-2015; 2020)

ANSI/ANS-16.1-2019 (R2024), *Measurement of the Leachability of Solidified Low-Level Radioactive Wastes by a Short-Term Test Procedure* (reaffirmation of ANSI/ANS-16.1-2019)

Active standards/projects (Approved PINS):

ANS-2.3, *Estimating Tornado, Hurricane, and Extreme Straight-Line Wind Characteristics at Nuclear Facility Sites* (revision of ANSI/ANS-2.3-2011; R2021)

ANS-2.15, *Criteria for Modeling Atmospheric Dispersion of Radiological Releases from Nuclear Facilities* (revision of ANSI/ANS-2.15-2013; R2021)

ANS-2.18, *Evaluating Radionuclide Transport in Surface Water for Nuclear Facilities* (proposed new standard)

ANS-2.22, *Environmental Radiological Monitoring at Nuclear Facilities* (proposed new guidance document)

ANS-2.26, *Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design* (revision of ANSI/ANS-2.26-2004; R2021)

ANS-2.32, *Guidance on the Selection and Evaluation of Remediation Methods for Subsurface Contamination* (proposed new standard)

ANS-2.34, *Characterization and Probabilistic Analysis of Volcanic Hazards* (proposed new standard)

ANS-2.35, *Guidelines for Estimating Present & Projecting Future Socioeconomic Impacts from Construction, Operations, and Decommissioning of Nuclear Facilities* (proposed new standard)

Environmental and Impact Assessment and Analysis Subcommittee

Membership:
Leah Parks, Chair, U.S. Nuclear Regulatory Commission
David Anderson, Pacific Northwest National Laboratory

The Environmental and Impact Assessment and Analysis Subcommittee manages the following project:

ANS-2.35, *Guidelines for Estimating Present & Projecting Future Socioeconomic Impacts from the Construction, Operations, and Decommissioning of Nuclear Sites* (proposed new standard)

Scope: *This standard provides civilian and government professionals with acceptable methodologies for determining and reporting potential socioeconomic impacts from constructing, operating, and decommissioning nuclear facilities including, but not limited to, LWRs, SMRs, advanced reactors, and nuclear fuel cycle facilities.*

Membership:
David Anderson, Chair, Pacific Northwest National Laboratory; Megan Harkema, Vanderbilt University' Bandana Kar, U.S. Department of Energy; Leah Parks, U.S. Nuclear Regulatory Commission; Jerry Riggs, Enercon; Amy

Rose, Oak Ridge National Laboratory; Rachel Turney, Enercon Services, Inc.; Kevin Weinisch, KLD Engineering, P.C.; Daniel Yurman, Individual

Status: PINS submitted to ANSI on 5/20/2019. The working group met approximately quarterly in 2022. In September 2022, the first draft text of the standard was developed and circulated among the working group for review and comment. At the October 2022 meeting, additional writing and review assignments were made with report outs in January 2023. The working group made incremental progress on the draft. A writing meeting was held at the June 2023 Annual Meeting. Members questioned whether the standard is appropriate for RIPB methods. The draft is close to be completed and expected to start the ballot process in early 2025.

Siting: Atmospheric Subcommittee

Membership:
David Bruggeman, Chair, Los Alamos National Laboratory
Kevin Quinlan, Vice Chair, U.S. Nuclear Regulatory Commission
Thomas Bellinger, Consolidated Nuclear Security, LLC
John Ciolek, Los Alamos National Laboratory
Sarah Davis, Oak Ridge National Laboratory
Marsha Kinley, Duke Energy Corporation
Carl Mazzola, Los Alamos National Laboratory

The Siting: Atmospheric Subcommittee oversees the following projects:

ANSI/ANS-2.3-2011 (R2021), *Estimating Tornado, Hurricane, and Extreme Straight Line Wind Characteristics at Nuclear Facility Sites* (proposed new standard, historical revision of ANSI/ANS-2.3-1983)

Scope: *This standard defines site phenomena caused by (1) extreme straight winds, (2) hurricanes, and (3) tornados in various geographic regions of the U.S. These phenomena are used for the design of nuclear facilities.*

Membership:
David Bruggeman, Chair, Los Alamos National Laboratory; Adeola Adediran, Bechtel Corporation; Jeffrey Baum, ABSG Consulting Inc.; Ashley Bruggeman, Triad National Security, LLC; Mark Carroll, ChemStaff; Michelle Evans, Simpson Gumpertz & Heger Inc.; Antonio Godoy, Individual; Brent Gutierrez, U.S. Department of Energy; Charles Hunter, Individual; Shannon Jasim-Hanif, U.S. Department of Energy; Mark Levitan, National Institute of Standards & Technology; Alex Markivich, Westinghouse Electric Company, LLC; Carl Mazzola, Los Alamos National Laboratory; Gerald Meyers, Individual; Larry Twisdale, Applied Research Associates, Inc.; Steven Weinbeck, Savannah River National Laboratory; Elena Yegorova, U.S. Nuclear Regulatory Commission

Status:
This standard was reaffirmed 7/19/2021. A PINS was submitted to ANSI on 10/25/22. Steven Weinbeck stepped down as working group chair. The working group has been awaiting new and emerging tornado research conducted by the National Institute of Standards and Technology and ASCE before undertaking a major revision.

ANSI/ANS-2.15-2013 (R2021), *Criteria for Modeling and Calculating Atmospheric Dispersion of Routine Radiological Releases from Nuclear Facilities* (new standard)

Scope: *This Standard establishes parameter selection criteria (meteorological and other data collected at nuclear facilities) for modeling the atmospheric effects on radioactive and toxic chemical releases, inclusive of dilution, diffusion, transport, plume rise, plume meander, aerodynamic effects of buildings, dry deposition, wet deposition (e.g., precipitation scavenging), and resuspension.*

Membership:
John Ciolek, Co-Chair, Los Alamos National Laboratory; Sarah Davis, Co-Chair, Argonne National Laboratory; Mark Abrams, ABS Consulting, Inc.; David Brown, National Institute of Standards & Technology; Mark Carroll, ChemStaff; Joseph Chang, Rand Corporation; Toree Cook, Tennessee Valley Authority; Cliff Glantz, Pacific Northwest National Laboratory; Chuck Hunter, Individual; Marsha Kinley, Duke Energy Corporation; Dimitrios Kontogeorgakos, Argonne

National Laboratory; Michael Mazaika, U.S. Nuclear Regulatory Commission; Carl Mazzola, Los Alamos National Laboratory; Mark Pfieffer, Argonne National Laboratory; Doyle Pittman, Individual; Jeremy Rishel, Pacific Northwest National Laboratory; Brian Shay, Argonne National Laboratory; Ali Simpkins, Oak Ridge Associated Universities

Status: This standard was reaffirmed on 11/11/2021. A PINS for the next revision was submitted to ANSI on 10/25/2022. The ESCC and the Standards Board approved a ballot to terminate work on ANS-2.16 and ANS-3.8.10. Relevant material will be included in the next revision of ANS-2.15. The project implementation plan was completed in September 2024.

ANSI/ANS-2.21-2022, *Criteria for Assessing Atmospheric Effects on the Ultimate Heat Sink* (revision of ANSI/ANS-2.21-2012; R2016)

Scope: *This standard establishes criteria for the use of meteorological and hydrological data by nuclear facilities to evaluate the atmospheric effects from meteorological parameters on ultimate heat sinks. These input parameters may include dry-bulb temperature; wet-bulb temperature; dewpoint, cloud-cover, relative humidity, precipitation, wind speed, incoming short-wave solar radiation, incoming long-wave radiation, surface water temperature, and atmospheric pressure.*

Membership:
Marsha Kinley, Chair, Duke Energy Corporation; Chuck Bowman, Chuck Bowman Associates, Inc.; Edward Buchak, Environmental Resources Management; Jennifer Call, Tennessee Valley Authority.; Mark Carroll, Chemstaff; Richard Codell, Individual; Andrew Dewhurst, RSL Safety Corporation, Inc.; Chang Li, U.S. Nuclear Regulatory Commission; Michael Mazaika, U.S. Nuclear Regulatory Commission; Carl Mazzola, Los Alamos National Laboratory; Rajiv Prasad, Pacific Northwest National Laboratory; Kevin Quinlan, U.S. Nuclear Regulatory Commission

Status: The revision was approved by ANSI on 1/27/2022. The working group did not meet in 2024. Maintenance will be needed by 2027.

ANSI/ANS-3.11-2024, *Determining Meteorological Information at Nuclear Facilities* (revision of ANSI/ANS-3.11-2015; R2020)

Scope: *The standard includes the identification of which meteorological parameters should be measured, parameter accuracies, meteorological tower siting considerations, data monitoring methodologies, data reduction techniques and quality assurance requirements.*

Membership:
David Bruggeman, Chair, Los Alamos National Laboratory; Mark Abrams, ABS Consulting; Kevin Birdwell, Oak Ridge National Laboratory; Patrick Brennan, Meteorological Evaluation Services; Jennifer Call, Tennessee Valley Authority; Mark Carroll, ChemStaff; John Ciolek, Los Alamos National Laboratory; Thomas Coulter, Coulter Air Quality Services; Paul Fransioli, Kleinfelder; Cliff Glantz, Pacific Northwest National Laboratory; Frank Hickey, Susquehanna Nuclear, LLC; James Holian, Holian Environmental, LLC; Charles Hunter, Individual; Rachael Ishaya, BRYZA Wind Laboratory; Marsha Kinley, Duke Energy Corporation; Stanton Lanham, Duke Energy; Stanley Levinson, Individual; Stanley Marsh, Southern California Edison; Michael Mazaika, U.S. Nuclear Regulatory Commission; Carl Mazzola, Los Alamos National Laboratory; Edward McCarthy, E.F. McCarthy & Associates; Doyle Pittman, Individual; Kevin Quinlan, U.S. Nuclear Regulatory Commission; Walter Schalk, U.S. Department of Energy; Sanjoy Sircar, Defense Nuclear Facilities Safety Board; Adam Smith, Tennessee Valley Authority; Ping Wan, Individual; Ken Wastrack, Tennessee Valley Authority; Steve Weinbeck, Savannah River National Laboratory

Status: ANSI approved the revision of this standard on 11/29/2024. The standard was published in November 2024.

Siting: General and Monitoring Subcommittee

Membership:
Leah Parks, Chair, U.S. Nuclear Regulatory Commission

Timothy Moore, Vice Chair, Individual
Teresa Eddy, Savannah River Nuclear Solutions
Andrew Garrabrants, Vanderbilt University
David Kosson, Vanderbilt University
Brooke Stagich, Savannah River National Laboratory

The Siting: General and Monitoring Subcommittee manages the following projects and current standards:

ANSI/ANS-2.6-2018 (R2023), *Guidelines for Estimating Present and Projecting Future Population Distributions Surrounding Nuclear Facility Sites* (new standard)

Scope: *This standard provides civilian and government professionals with generally accepted demographic methodologies for the estimation and projection of human population distributions and densities near nuclear facility sites in order to facilitate the regulatory authority's review of site suitability relative to population considerations.*

Membership:
OPEN, Chair; Leah Parks, Vice Chair, U.S. Nuclear Regulatory Commission; David Anderson, Pacific Northwest National Laboratory; Linda Andrews, Framatome, Inc.; Nate Bixler, Sandia National Laboratories; Olufemi Omtaomu, Oak Ridge National Laboratory; Mary Richmond, Bechtel Corporation; Amy Rose, Oak Ridge National Laboratory; Robert Sachs, Individual; Bo Saulsbury, Pacific Northwest National Laboratory; Harold Stiles, Enercom Services Inc.; Seshagiri Tammara, U.S. Nuclear Regulatory Commission; Rachel Turney, Enercon Services, Inc.; Kevin Weinisch, KLD Engineering, P.C.

Status: The standard was reaffirmed on 1/3/2023. The working group chair role remains open.

ANS-GD-2.22, *Environmental Radiological Monitoring at Nuclear Facilities* (proposed new guidance document)

Scope: *This guidance document establishes criteria for use in developing and implementing an integrated radiological environmental monitoring program focusing on ambient air, surface water, terrestrial, and biota.*

Membership:
Teresa Eddy, Co-Chair, Savannah River Nuclear Solutions; Brooke Stagich, Co-Chair, Savannah River National Laboratory; Janet Aremu-Cole, Duke Energy Corporation; Amir Bahadori, Kansas State University; James Bland, Chesapeake Nuclear Services, Inc.; Zachary Harvey, Lawrence Berkeley National Laboratory; Jerry Hiatt, Individual; Frank Hickey, Susquehanna Nuclear, LLC; Gary Huff, Gilbert Consulting Services Inc.; Xiaodong Jiang, Defense Nuclear Facilities Safety Board; James Key, Key Solutions, Inc.; Karen Kim-Stevens, Electric Power Research Institute; Michael McDonald, RSI EnTech, LLC; Erik Merchant, American Electric Power; Brittany Owensby, Savannah River Nuclear Solutions; Tanya Oxenberg, TPO Technical Services, LLC; Ralph Perona, Neptune and Company Inc.; Michael Stewart, U.S. Department of Energy; Wendy Thompson, Hanford Mission Integration Solutions; Nebiyu Tiruneh, U.S. Nuclear Regulatory Commission; Jared Wicker, Savannah River Nuclear Solutions; Kevin Witt, U.S. Department of Energy

Status: The PINS was submitted to ANSI on 4/24/2018. Theresa Eddy and Brooke Stagich are co-chairing the working group. The working group has completed an annotated outline and a majority of the draft document to be submitted for review. The group met at the 2023 ANS Annual Meeting and completed some technical discussions on the content including differences in applications and methodologies. T The working group decided the product of this project should be a guidance document instead of a standard and took steps to address NRC feedback to make it a higher-level guidance document.

ANSI/ANS-16.1-2019 (R2024), *Measurement of the Leachability of Solidified Low-Level Radioactive Wastes by a Short-Term Test Procedure* (revision of ANSI/ANS-16.1-2003; R2017)

Scope: *This standard provides a procedure to measure and index the release rates of non-volatile radionuclides from low–level radioactive waste forms in demineralized water over a test period. It can be applied to any material from which test specimens can be prepared by casting or cutting into a shape for which the surface area and volume can be determined. The results of this procedure do not represent waste form degradation in any specific environmental situation or represent waste form*

performance. The test method presented in this standard is an adaptation of the method published in the 1986 version of this standard but constrains test parameter values and data analyses to support direct comparisons of test responses of different waste form materials.

Membership:
David Kosson, Co-chair, Vanderbilt University; Andrew Garrabrants, Co-chair, Vanderbilt University; Leah Parks, Vice Chair, U.S. Nuclear Regulatory Commission; Kevin Brown, Vanderbilt University; William Ebert, Argonne National Laboratory; Albert Kruger, U.S. Department of Energy

Status: This standard was reaffirmed by ANSI on January 4, 2024.

ANSI/ANS-41.5-2012 (R2023), *Verification and Validation of Radiological Data for Use in Waste Management and Environmental Remediation* (new standard)

Scope: *This standard establishes criteria and processes for determining the validity of radioanalytical data for waste management and environmental remediation. These applications include site characterization, waste acceptance, waste certification, waste treatment design, process control, risk communication, litigation, and other applications as deemed necessary.*

Membership:
OPEN

Status: This standard was reaffirmed by ANSI on 9/7/2023. No activity in 2024.

Siting: Hydrogeologic Subcommittee

Membership:
OPEN, Chair
Todd Rasmussen, University of Georgia
Lisa Schleicher, U.S. Geological Survey
Raymond Schnieder, Westinghouse Electric Company, LLC
Nebiyu Tiruneh, U.S. Nuclear Regulatory Commission

The Siting: Hydrogeologic Subcommittee manages the following projects and current standards:

ANSI/ANS-2.8-2019 (R2024), *Probabilistic Evaluation of External Flood Hazards for Nuclear Facilities* (new standard, historical revision of ANSI/ANS-2.8-1992)

Scope: *This standard addresses necessary external flood conditions, technical parameters, and applicable methodologies required to evaluate/determine external flooding hazards for nuclear facilities.*

Membership:
Raymond Schnieder, Chair, Westinghouse Electric Company, LLC, Victoria Anderson, Nuclear Energy Institute; James August, Individual; Meredith Carr, U.S. Nuclear Regulatory Commission; Lawrence Cieslik, HDR Company; Jemie Dababneh, U.S. Army Core of Engineers; David Finnicum, Consultant; Quazi Hossain, Individual; LLC; Kevin Hyde, Individual; Sharon Jasim-Hanif, Department of Energy; Joseph Kanney, Individual; Gregory Lowe, Consultant; Carl Mazzola, Los Alamos National Laboratory; Marty McCann, Jack Benjamin & Associates, Inc.; Gerald Meyers, Individual; Kit Ng, Bechtel Power Corporation; Robert Rishel, Duke Energy Corporation; Jery Stedinger, Cornell University

Status: The standard was reaffirmed by ANSI on 6/13/2024.

ANS-2.9, *Evaluation of Ground Water Supply for Nuclear Facilities* (proposed new standard, historical revision of ANSI/ANS-2.9-1980; R1989)

Scope: *This standard presents guidelines for the determination of the availability of ground water supplies for nuclear power plant operations with respect to both safety and non-safety related aspects.*

Membership:
OPEN, Chair; Janet Aremu-Cole, Institute of Nuclear Power Operations; Lifeng Guo, U.S. Nuclear Regulatory Commission; Thomas J. Nicholson, U.S. Nuclear Regulatory Commission; Todd Rasmussen, University of Georgia

Status: The project has not been active due to the lack of a working group chair.

ANS-2.13, *Evaluation of Surface-Water Supplies for Nuclear Power Sites* (proposed new standard, historical revision of ANSI/ANS-2.13-1979; R1988)

Scope: *From historical standard: This standard presents criteria for determining: The availability of a surface water supply for plant operation with respect to both safety and nonsafety-related aspects. Water supply related effects of low flows and low levels on plant operation with respect to both safety and nonsafety-related systems.*

Membership:
OPEN, Chair; Edward Bruce, Duke Energy Corporation; Fehmida Mesania, NuScale Power, LLC; Nebiyu Tiruneh, U.S. Nuclear Regulatory Commission

Status: Revision of historical standard being considered. A chair is needed to initiate the revision.

ANSI/ANS-2.17-2010 (R2021), *Evaluation of Subsurface Radionuclide Transport at Commercial Nuclear Power Plants* (new standard, historical revision of ANSI/ANS-2.17-1980; R1989)

Scope: *This standard establishes the requirements for evaluating the occurrence and movement of radionuclides in the subsurface resulting from abnormal radionuclide releases at commercial nuclear power plants. This standard applies to abnormal radionuclide releases that affect groundwater, water supplies derived from groundwater, and surface waters affected by subsurface transport, including exposure pathways across the groundwater–surface-water transition zone.*

Membership:
Todd Rasmussen, Chair, University of Georgia; James Bollinger, Savannah River National Laboratory; Philip Meyer, Pacific Northwest National Laboratory; Thomas Nicholson, U.S. Nuclear Regulatory Commission

Status: This standard was reaffirmed by ANSI on 6/28/2021. No activity in 2024.

ANS-2.18, *Evaluating Radionuclide Transport in Surface Water for Nuclear Facilities* (proposed new standard)

Scope: *This new standard aims at establishing the requirements and providing a framework and recommended methodologies for the evaluation of the surface water transport and dilution of radionuclides in liquid effluent releases from nuclear power sites and nuclear facilities to demonstrate regulatory compliance of the dose limits. The approach can also be used to evaluate transport and migration of radionuclides from other reactor facilities that do not need to meet 10CFR20 dose limits.*

Membership: Nebiyu Tiruneh, Chair, U.S. Nuclear Regulatory Commission; Teresa Eddy, Savannah River Nuclear Solutions; David Fukuyama, Sandia National Laboratory; Joseph Kanney, U.S. Nuclear Regulatory Commission; Kit Ng, Bechtel Corporation; Kevin O'Kula, Individual; Brooke Stagich, Savannah River National Laboratory

Status: A PINS was submitted to ANSI on 3/9/2022. The working group has prepared a schedule for publication of the draft standard, drafted the table of contents of the standard, assigned section drafting responsibilities to working group members on voluntary basis, and conducted monthly virtual status update meetings. Drafting of

sections is progressing as planned and the monthly status virtual meetings will continue. Documents and meeting minutes are shared in the working group shared workspace. In 2024 the working group was able to finalize the proposed outline for the standard, complete section assignment to members, proceed with the drafting work, and conduct monthly status meetings.

ANS-2.19, *Guidelines for Establishing Site-Related Parameters for Site Selection and Design of ISFSIs* (proposed new standard, historical revision of ANSI/ANS-2.19-1981; R1990)

Scope: *From historical standard: This standard presents guidelines for establishing site-related parameters for site selection and design of an independent spent fuel storage installation (ISFSI). This installation provides storage of spent light water reactor (LWR) fuel that has aged a minimum of one year after discharge from the reactor core in a water basin type structure. Such an installation may be independent of both a nuclear power station and a reprocessing facility, or located adjacent to these facilities in order to share selected support systems. Aspects considered include flooding, geology, seismology, ground water, foundation engineering, earthwork engineering, and extreme wind conditions. These guidelines identify the basic site-related parameters to be considered in site evaluation, and in the design, construction, and operation of the ISFSI.*

Membership:
OPEN

Status: Revision of this historical standard is being considered.

ANS-2.32, *Guidance on the Selection and Evaluation of Remediation Methods for Subsurface* (proposed new standard)

Scope: *This standard describes actions and documentation that facilitate remedy decisions for radionuclide contamination in the subsurface at nuclear power plants. The content includes operational, infrastructure, and contaminant considerations with respect to how they impact the strategy for subsurface remediation. This standard builds from the existing ANS 2.17 standard (evaluating subsurface contamination) by providing a description of the elements of subsurface remediation, from determining the need for remediation, to selection, to implementation, and through closure.*

Membership:
Matthew Darois, Chair, Radiation Safety and Control Services Inc.; Kate Amrheim, U.S. Department of Energy; Kim Anthony, Energy Solutions; Janet Aremu-Cole, Institute of Nuclear Power Operations; Joseph Carlson, U.S. Department of Energy; Randall Fedors, U.S. Nuclear Regulatory Commission; Jerry Hiatt, Individual; Chris Johnson, Pacific Northwest National Laboratory; Karen Kim-Stevens, Electric Power Research Institute; Hilary Lane, Nuclear Energy Institute; Jack McCarthy, Holtec International; Thomas Nicholson, U.S. Nuclear Regulatory Commission; Michael Smith, Nuclear Energy Institute; Nebiyu Tiruneh, U.S. Nuclear Regulatory Commission; Haruko Wainwright, Massachusetts Institute of Technology; Stuart Walker, U.S. Environmental Protection Agency

Status: The PINS was submitted to ANSI on 1/25/2021. Progress has been slower than anticipated due to extremely busy schedules and workloads attributed to the commercial D&D projects currently being executed across the industry. Most committee members have provided content to each assigned standard section. The sections and content require considerable editing and formatting. I estimate that 75-80% of the initial draft is completed. The chair needs additional administrative support to edit and format the content. A PIP is in development.

Siting: Seismic Subcommittee

Membership:
Yong Li, Chair, Defense Nuclear Facility Safety Board
Thomas Weaver, Vice Chair, U.S. Nuclear Regulatory Commission
Douglas Clark, Consolidated Nuclear Security, LLC
Emily Gibson, National Nuclear Security Administration
Vladimir Graizer, U.S. Nuclear Regulatory Commission
Hanh Phan, U.S. Nuclear Regulatory Commission

Jenise-Marie Thompson, U.S. Nuclear Regulatory Commission
Ivan Wong, Lettis Consultants International

The Siting: Seismic Subcommittee manages the following projects and current standards:

ANSI/ANS-2.2-2016 (R2020), *Earthquake Instrumentation Criteria for Nuclear Power Plants* (new standard, historic revision of ANSI/ANS-2.2-2002)

Scope: *This standard specifies the required earthquake instrumentation for the site and structures of light water cooled, land based nuclear power plants. It may be used for guidance at other types of nuclear facilities. This standard does not address the following: (a) Instrumentation to automatically shut down a nuclear power plant at a predetermined ground acceleration. (b) Procedures for evaluating records obtained from seismic instrumentation and instructions for the treatment of data. These procedures and instructions are specified in American National Standard, Criteria for the Handling and Initial Evaluation of Records from Nuclear Power Plant Seismic Instrumentation, ANSI/ANS-2.10-2003.*

Membership:
Vladimir Graizer, Chair, U.S. Nuclear Regulatory Commission; John Ake, U.S. Nuclear Regulatory Commission; Roger Kenneally, Individual; Richard Lee, Los Alamos National Laboratory; Robert Nigbor, University of California-Los Angeles; Farhang Ostadan, Bechtel Corporation

Status: The standard was reaffirmed by ANSI on 11/16/2020. Updates will be needed to address SMRs and advanced reactors. No activity in 2024.Maintenance will be due in 2025.

ANSI/ANS-2.10-2017 (R2022), *Criteria for the Retrieval, Processing, Handling and Storage of Records from Nuclear Power Plant Seismic Instrumentation* (new standard, historical revision of ANSI/ANS-2.10-2003)

Scope: *This standard provides criteria for retrieval, processing, handling, and storage of data obtained from seismic instrumentation specified in ANSI/ANS 2.2-2016. The criteria will address both digital and analog seismic instrumentation. The standard focuses on strong ground motion data and is intended for use at nuclear power plants, and non-power nuclear facilities that utilize strong ground motion instrumentation.*

Membership:
OPEN, Chair; Tarek Elkhoraibi, Bechtel National Inc.; Vladimir Graizer, U.S. Nuclear Regulatory Commission; Alidad Hashemi, Bechtel National Inc.; Robert Kassawara, Individual; Roger Kenneally, Individual; Robert Nigbor, University of California-Los Angeles; Lisa Schleicher, U.S. Geological Survey

Status: A reaffirmation of the standard was approved on 4/1/2022. No activity in 2024.

ANSI/ANS-2.23-2016 (R2020), *Nuclear Plant Response to an Earthquake* (revision of ANSI/ANS-2.23-2002; R2009)

Scope: *This standard specifies actions that the owner of a nuclear power plant should take in the event of an earthquake. The requirements of this standard supplement those given in American National Standard Criteria for the Handling and Initial Evaluation of Records from Nuclear Power Plant Seismic Instrumentation, ANSI/ANS-2.10-2003. The application of these standards provides a complete evaluation of the need for post-earthquake plant shutdown in a timely manner. This standard also provides guidelines that will enable the owner to develop plant-specific procedures for determining the condition of components, systems, and structures needed for shutdown and criteria for restart when a nuclear power plant is required to shut down following an earthquake. This standard does not cover those operator actions performed in connection with the operation and control of the nuclear power plant following an earthquake. These actions are specified in plant operating procedures, emergency operating procedures, and alarm response procedures.*

Membership:
OPEN, Chair; Greg Hardy, Simpson, Gumpertz and Heger, Inc.; Robert Kassawara, Individual; Robert Kenneally, Individual; Carl Mazzola, Los Alamos National Laboratory; Frederick Sock, U.S. Nuclear Regulatory Commission

Status: The standard was reaffirmed on 11/16/2020. The working group chair role remains empty. No activity in 2024. Maintenance will be due in 2025.

ANSI/ANS-2.26-2004 (R2021), *Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design* (new standard)

Scope: *This standard provides: (a) criteria for selecting the seismic design category for nuclear facility structures, systems, and components (SSCs) to achieve earthquake safety and (b) criteria and guidelines for selecting Limit States for these SSCs to govern their seismic design. The Limit States are selected to ensure the desired safety performance in an earthquake.*

Membership:
Douglas Clark, Co-Chair, Consolidated Nuclear Security, LLC; Hahn Phan, Co-Chair, U.S. Nuclear Regulatory Commission; Amir Afzali, Individual; David Andersen, Defense Nuclear Facilities Safety Board; Todd Anselmi, Idaho National Laborator ; Chris Chaves, U.S. Department of Energy; Nilesh Chokshi, Individual; LLC; Biswajit Dasgupta, Southwest Research Institute; Bradley Dolphyn, Simpson Gumpertz & Heger Inc.; Siavash Dorvash, Simpson Gumpertz & Heger Inc.; Jonathen Facemire, Nuclear Energy Institute; Patrick Frias, U.S. Department of Energy; Emily Gibson, National Nuclear Security Administration; Nicholas Hansing, U.S. Nuclear Regulatory Commission; Greg Hardy, Simpson Gumpertz & Heger Inc.; Rahsean Jackson, Defense Nuclear Facilities Safety Board; Brian McDonald, Exponent, Inc.; Heather Morgan, International Atomic Energy Agency; Sunwoo Park, U.S. Nuclear Regulatory Commission; Emma Redfoot, Oklo, Inc.; Farshid Shahrokhi, Framatome Inc.; Gus Shryack, TerraPower; Victor Smith, Los Alamos National Laboratory; Shilp Vasavada, U.S. Nuclear Regulatory Commission; Andrew Whittaker, University at Buffalo

Status: The standard was reaffirmed on 12/10/2021. A PINS was submitted to ANSI 10/1/2019. A revision of this standard is underway. The working group has restarted bi-weekly meetings.

ANSI/ANS-2.27-2020, *Criteria for Investigations of Nuclear Facility Sites for Seismic Hazard Assessments* (revision of ANSI/ANS-2.27-2008; R2016)

Scope: *This standard provides criteria and guidelines for conducting geological, seismological, geophysical, and geotechnical investigations needed to provide information to support the following: (1) seismic source characterization input to a probabilistic seismic hazard analysis (PSHA); (2) evaluation of tectonic permanent ground deformation (PGD) hazard using probabilistic fault displacement hazard analysis (PFDHA) for surface-faulting sources and probabilistic tectonic deformation hazard analysis (PTDHA) for blind fault sources; (3) site response analysis input to PSHAs; (4) nontectonic, earthquake-induced ground failure hazard; (5) foundation stability.*

Membership:
Stephen Thompson, Chair, Lettis Consultants International; OPEN, Vice Chair; Jon Ake, U.S. Nuclear Regulatory Commission; M. Logan Cline, Rizzo International, Inc.; Carl Costantino, Carl J. Costantino & Associates; C.B. Crouse, AECOM N&E Technical Services, LLC; Emily Gibson, National Nuclear Security Administration; Richard Lee, Los Alamos National Laboratory; Yong Li, Defense Nuclear Facilities Safety Board; Clifford Munson, U.S. Nuclear Regulatory Commission; Robert Nigbor, University of California–Los Angeles; Susan Olig, Olig Seismic Geology, Inc.; Ellen Rathje, University of Texas–Austin; ;Adrian Rodriguez-Marek, Virginia Tech; Lisa Schleicher, U.S. Geological Survey; Kenneth Stokoe, University of Texas–Austin; Stephen Thompson, Lettis Consultants International, Inc.

Status: The revised standard was approved by ANSI on 4/16/2020. Stephen Thompson took over for Kathryn Hanson as the new working group chair. No activity in 2024. Maintenance will be due in 2025.

ANSI/ANS-2.29-2020, *Probabilistic Seismic Hazard Analysis* (revision of ANSI/ANS-2.29-2008; R2016)

Scope: *This standard provides criteria and guidance for performing a Probabilistic Seismic Hazard Analysis (PSHA) that is used in the design and construction of nuclear facilities, i.e., facilities that store, process, test, or fabricate radioactive materials in such form and quantity that a nuclear risk to the workers, to the off-site public, or to the environment may exist. These include, but are not limited to, nuclear fuel manufacturing facilities; nuclear material waste processing, storage, fabrication, and reprocessing facilities; uranium enrichment facilities; tritium production and handling facilities; radioactive materials laboratories; and nuclear reactors.*

Membership:
Emily Gibson, Chair, National Nuclear Security Administration; Lisa Schleicher, Vice Chair, U.S. Geological Survey; Jon Ake, U.S. Nuclear Regulatory Commission; Nilesh Chokshi, Individual; Kevin Coppersmith, Coppersmith Consulting Inc.; Carl Costantino, Individual; C.B. Crouse, AECOM Technical Services, Inc.; Russell Green, Virginia Tech; Nicholas Gregor, Individual; Thomas Houston, Individual; Annie Kammerer, Individual; Jeffrey Kimball, Rizzo International, Inc.; Yong Li, Defense Nuclear Facilities Safety Board; James Marrone, Bechtel Corporation; Stephen McDuffie, U.S. Department of Energy; Clifford Munson, U.S. Nuclear Regulatory Commission; Suzette Payne, Idaho National Laboratory; Jean Savy, Individual; John Stamatakos, Southwest Research Institute; Gabriel Toro, Individual; Ivan Wong, Lettis Consultants International; Robert Youngs, Wood Environmental & Infrastructure Solutions

Status: A revision of this standard was approved by ANSI on 4/16/2020. No activity in 2024. The working group expects to recommend reaffirming the standard in 2025. An update of ANS-2.29 will be considered after the revision to ANS-2.26 has been completed.

ANSI/ANS-2.30-2015 (R2020), *Criteria for Assessing the Tectonic Surface Fault Rupture and Deformation at Nuclear Facilities* (new standard)

Scope: *This standard provides criteria and guidelines for investigations to assess potential for surface and near-surface faulting and associated near-fault deformation at nuclear facilities, referencing considerable new experience. The standard is an up-to-date compilation of techniques to evaluate fault offset potential and a valuable resource for planning and conducting site characterization studies for future nuclear facilities. It supplements a group of standards (i.e., ANS-2.26, -2.27, -2.29, ASCE 43-05) whose focus is on vibratory ground motion rather than fault offset hazard.*

Membership:
Ivan Wong, Chair, Lettis Consultants International; Rui Chen, California Geological Survey; Timothy Dawson, California Geological Survey; Keith Kelson, U.S. Army Corps of Engineers; Jeffrey Kimball, Rizzo Associates; Joseph Litehiser, Individual; Susan Olig, Olig Seismic Geology Inc.; David Schwartz, U.S. Geological Survey; Stephen Thompson, Lettis Consultants International, Inc.; Donald Wells, Furgo USA

Status: A reaffirmation was approved on 5/4/2020. No activity in 2024. The plan is to begin an update of the standard in 2025.

ANS-2.34, *Characterization and Probabilistic Analysis of Volcanic Hazards* (proposed new standard)

Scope: *This standard provides criteria and guidance for performing a probabilistic volcanic hazard analysis (PVHA) for the design and construction of nuclear facilities. Criteria provided in this standard address several aspects of conducting PVHAs, including 1) selection of the methodology and level of investigative and analytical rigor appropriate for an analysis, including a deterministic screening; 2) characterization of the hazards posed by existing volcanic vents and potential newly emerging volcanic vents; and 3) characterization of the unique hazards posed by several volcanic phenomena including ashfall, lava flows, lahars, and asphyxiating gases.*

Membership:
Jenise-Marie Thompson, Chair, U.S. Nuclear Regulatory Commission; K. Michael Cline, Rizzo International, Inc.; Charles Connor, University of South Florida; Kevin Coppersmith, Coppersmith Consulting Inc.; Emily Gibson, National Nuclear Security Administration; William Hackett; Individual; Brittain Hill, Individual; Stephen McDuffie, U.S. Department of Energy; Suzette Payne, Idaho National Laboratory; Thomas Sisson, U.S. Geological Survey; John Stamatakos, Southwest Research Institute; Arash Zandieh, Lettis Consultants International, Inc.

Status: The PINS was submitted to ANSI on 9/28/2017. The project plan to develop the standard, and an initial outline, were finalized in May 2019. In 2020, several sections of the draft standard were completed and reviewed by the team. In March 2022, the working group chair provided the group an updated version of the document that incorporated working group comments. A further update including a section on quality assurance was provided in December 2022.

This majority of this standard had been drafted when the working group took a year-long hiatus to await the completion of two volcanic hazard analysis projects in the Western U.S.; a probabilistic volcanic hazards

assessment (VHA) for the Idaho National Laboratory (INL) site that was conducted as a SSHAC (Senior Seismic Hazard Analysis Committee) level 3 project, and a non-SSHAC study of volcanic hazards in southwestern Wyoming. Several working group members were involved in one or both of these projects. Significant new knowledge and techniques for conducting VHAs have been developed as a result of these two studies. The working group is now focused on revising the draft standard to incorporate the newly developed knowledge and techniques into the draft.

Environmental and Siting Consensus Committee (ESCC) Organizational Chart

Chair: Carl A. Mazzola — **Vice Chair: Leah Parks**

Siting: Atmospheric	*Siting: Hydrogeologic*	*Siting: Seismic*	*Siting: General and Monitoring*	Environmental Impact Assessment & Analysis
David Bruggeman (Chair)	**OPEN (Chair)**	**Yong Li (Vice Chair)**	**Leah Parks (Chair)**	**Leah Parks (Chair)**
OPEN (Vice Chair)	**OPEN (Vice Chair)**	**Thomas Weaver (Vice Chair)**	**OPEN (Vice Chair)**	**OPEN (Vice Chair)**
Ⓟ = PINS submitted to ANSI				
2.3-2011 (R2021) @ (A1) Estimating Tornado, Hurricane, and Extreme Straight Line Wind Characteristics at Nuclear Facility Sites RF 7/19/2021 (WGC: OPEN)	2.8-2019 (R2024) (2A) Probabilistic Evaluation of External Flood Hazards for Nuclear Facilities RF: 6/13/2024 (WGC: R. Schneider)	2.26-2004 (R2021) Ⓟ (A1) Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design RF 12/10/2021 (WGC: D. Clark & H. Phan)	2.6-2018 (R2023) (A2) Guidelines for Estimating Present & Projecting Future Population Distributions Surrounding Nuclear Facility Sites RF 1/3/2023 (WGC: OPEN)	2.35 (NEW) Ⓟ (B1) Estimating the Socioeconomic Impacts of Construction, Operation, and Decommissioning at a Nuclear Facility (WGC: D. Anderson)
2.15-2013 (R2021) @ (A1) Criteria for Modeling and Calculating Atmospheric Dispersion of Routine Radiological Releases from Nuclear Facilities RF 11/11/2021 (WGC: J. Ciolek & S. Davis)	2.17-2010 (R2021) (2A) Evaluation of Subsurface Radionuclide Transport at Commercial Nuclear Power Plants RF 6/28/2021 (WGC: T. Rasmussen)	2.2-2016 (R2020) (A2) Earthquake Instrumentation Criteria for Nuclear Power Plants RF 11/16/2020 (WGC: V. Graizer)	16.1-2019 (R2024) (A2) Measurement of the Leachability of Solidified Low-Level Radioactive Wastes by a Short-Term Test Procedure RF 1/4/2024 (WGCs: D. Kosson & A. Garrabrants)	
2.21-2022 (A2) Criteria for Assessing Atmospheric Effects on the Ultimate Heat Sink App'd 2/4/2022 (WGC: M. Kinley)	2.18 (NEW) @ (B1) Evaluating Radionuclide Transport in Surface Water for Nuclear Facilities (WGC: N. Tiruneh)	2.10-2017 (R2022) (A2) Criteria for Retrieval, Processing, Handling, and Storage of Records from Nuclear Facility Seismic Instrumentation RF 4/1/2022 (WGC: OPEN)	41.5-2012 (R2023) (A2) V&V of Radiological Data for Use in Waste Management and Environment RF 9/7/2023 (WGC: L. Parks)	
3.11-2024 (A2) Determining Meteorological Information at Nuclear Facilities App'd 10/21/2024 (WGC: D. Bruggeman)	2.32 (NEW) @ (B1) Guidance on the Selection and Evaluation of Remediation Methods for Subsurface Contamination (WGC: M. Darois)	2.23-2016 (R2020) (A2) Nuclear Power Plant Response to an Earthquake RF 11/16/2020 (WGC: OPEN)	GD-2.22 (NEW) Ⓟ (B1) Environmental Radiological Monitoring at Operating Nuclear Facilities (WGC: T. Eddy & B. Stagich)	
	2.9 (W2000) Ⓟ (C2) Evaluation of Ground Water Supply for Nuclear Facilities (WGC: OPEN)	2.27-2020 (A2) Criteria for Investigations of Nuclear Facility Sites for Seismic Hazard Assessments App'd 4/16/2020 (WGC: S. Thompson)		
	2.13 (W1998) (C2) Evaluation of Surface-Water Supplies for Nuclear Power Sites (project being considered) (WGC: OPEN)	2.29-2020 (A2) Probabilistic Seismic Hazard Analysis App'd 4/16/2020 (WGC: E. Gibson)		
	2.19 (W2001) (C2) Guidelines for Establishing Site-Related Parameters for Site Selection and Design of ISFSIs (Water Pool Type) (project being considered) (WGC: OPEN)	2.30-2015 (R2020) (A2) Criteria for Assessing Tectonic Surface Fault Rupture and Deformation at Nuclear Facilities RF 5/4/2020 (WGC: I. Wong)		
		2.34 (NEW) Ⓟ (B1) Characterization and Probabilistic Analysis of Volcanic Hazards (WGC: J. Thompson)		
(A1) Current Being Worked On Standards				
(A2) Current Not Being Worked On Standards				
(B1) Proposed Being Worked On Standards				
(B2) Proposed Not Being Worked On Standards				
(C1) Withdrawn Being Worked On Standards				
(C2) Withdrawn Not Being Worked On Standards				

Table 1 – ESCC Organizational Chart

Fuel, Waste, and Decommissioning Consensus Committee (FWDCC)

Jean Francois Lucchini, Chair
Los Alamos National Laboratory

Scope: *The FWDCC is responsible for the preparation and maintenance of voluntary consensus standards as well as standards-related guidance documents, guidance standards, and technical reports supporting the design, operation, maintenance, operator selection and training, quality requirements of new and used fuel transport, storage and related handling facilities; including high level/transuranic, greater-than-Class C, low level, and mixed waste processing and facilities, and for the decommissioning of commercial, educational, research and government facilities. The ANS Standards Committee Procedures Manual for Consensus Committees shall be used to guide the activities of this consensus committee. The FWDCC supervises the work of the following three subcommittees:*

- *New and Used Fuel (Design Only)*
- *High Level GTCC, Low Level and Mixed Waste*
- *Decommissioning (Commercial and Research Facilities)*

Each subcommittee has established various working groups to develop specific proposed standards and maintain existing standards within its respective area of responsibility. These working groups create the text of FWDCC standards and resolve review and ballot comments.

FWDCC Membership:
Jean Francois Lucchini, Chair, Los Alamos National Laboratory
Maryanne Stasko, Vice Chair, Duke Energy Corporation
Kim Anthony, Energy Solutions
(Alternate: Katie McReynolds, Energy Solutions)
Sven O. Bader, Orano Federal Services
Sam Brinton, Core Solutions Consulting
Paul Cantonwine, Oak Ridge National Laboratory
Harry D. Felsher, U.S. Nuclear Regulatory Commission
Steven Frey, Individual
Jerry Golden, Individual
Robert Howard, Spectra Tech, Inc.
Robert Joseph, Idaho National Laboratory
D. Wayne Lewis, Westinghouse Government Services, LLC
Michael Lico, Individual
Coleman C. Miller, Pacific Gas & Electric Company
Jon Mitchell, Westinghouse Electric Company, LLC
Corey Munz, TLG Services Inc.
John Scaglione, Spectra Tech, Inc.
Steven W. Schithelm, BWX Technologies, Inc.
John Stamatakos, Southwest Research Institute
Joshua Vajda, UCOR United Cleanup Oak Ridge

Observer:
Anoop Kota, Individual
Rounette Nader, Duke Energy
Thomas Smedra, Westinghouse Electric Company, LLC

Report of FWDCC:

The FWDCC held hybrid meetings on June 19, 2024, and November 20, 2024. Paul Cantonwine, John Scaglione, Cantonwine, and Joshua Vajda were confirmed as new FWDCC members. Mitchell Sanders resigned from the FWDCC.

Approved in 2024:

ANSI/ANS-57.1-1992 (R2024), *Design Requirements for Light Water Reactor Fuel Handling Systems*, (reaffirmation of ANSI/ANS-57.1-1992; R2019)

Active Standards/Projects (Approved PINS):

ANS-55.6, *Liquid Radioactive Waste Processing System for Light-Water Cooled Reactor Plants* (new standard/historical revision of ANS-55.6-1993; R2007)

ANS-57.2, *Design Requirements for Light Water Reactor Spent Fuel Facilities at Nuclear Power Plants* (proposed new standard, historical revision of ANSI/ANS-57.2-1983)

ANS-57.9, *Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)* (new standard, historical revision of ANSI/ANS-57.9-1992; W2010)

New and Used Fuel (Design Only) Subcommittee

Membership:
John Scaglione, Chair, Spectra Tech, Inc.
Donald Lewis, Westinghouse Government Services
Rosemary Montgomery, Oak Ridge National Laboratory
John Stamatakos, Southwest Research Institute
Vivek Thangham, U.S. Department of Energy

The New and Used Fuel (Design Only) Subcommittee manages the following projects and standards:

ANSI/ANS-57.1-1992 (R2024), *Design Requirements for Light Water Reactor Fuel Handling Systems* (revision of ANSI/ANS-57.1-1980)

Scope: *This standard sets forth the required functions of fuel handling systems at light water reactor nuclear power plants. It provides minimum design requirements for equipment and tools to handle nuclear fuel and control components safely.*

Membership:
OPEN, Chair; Timothy Ake, Framatome, Inc.; Douglas Eisterhold, Westinghouse Electric Company, LLC; Wayne Lewis, Westinghouse Government Services, Robert Pinkston, Westinghouse Electric Company, LLC; Thomas Smedra, Individual

Status: Reaffirmation was approved by ANSI on 9/16/2024.

ANS-57.2, *Design Requirements for Light Water Reactor Spent Fuel Facilities at Nuclear Power Plants* (proposed new standard, historical revision of ANSI/ANS-57.2-1983)

Scope: *This standard defines design requirements for spent fuel pool storage and handling facilities at nuclear power plants for pool storage and preparation for shipment of spent fuel from light-water reactor nuclear power stations. It contains requirements for the design of: Fuel storage pool; Fuel storage racks; Pool makeup, instrumentation / cleanup systems; Pool structure / integrity; Radiation shielding; Residual heat removal; Ventilation, filtration and radiation monitoring systems; Shipping cask handling and decontamination; Building structure and integrity; Fire protection and communication.*

Membership:
Kaushik Banerjee, Chair, Idaho National Laboratory; Wayne Lewis, Vice Chair, Westinghouse Government Services; Timothy Ake, Framatome, Inc.; Gordon Bjorkman, U.S. Nuclear Regulatory Commission; Paul Cantonwine, Oak Ridge National Laboratory; Harry Felsher, U.S. Nuclear Regulatory Commission; Brian Gutherman, Gutherman Technical Services; Nathan Hottle, Framatome, Inc.; Ed Knuckles, Individual; Christian Lobscheid, Framatome Inc.; Mark Peres, Deep Fission, Inc.; Justin Schulte, Energy Solutions; Maryanne Stasko,

Duke Energy Corporation; Robert Tucker, Individual; Abdullah Weiss (Associate), NIST Center for Neutron Research

Status: The PINS was submitted to ANSI 2/8/2013. Kaushik Banerjee replaced Mitchell Sanders as working group chair to continue with the revision of this standard.

ANSI/ANS-57.3-2018 (R2023), *Design Requirements for New Fuel Storage Facilities at LWR Plants* (new standard, historical revision of ANSI/ANS-57.3-1983)

Scope: *This standard defines the required functions of wet or dry storage facilities for new fuel at light water reactor nuclear power plants. It provides minimum design requirements for safe storage of new nuclear fuel and control components at such plants. The fuel storage facilities covered by this standard are used for receiving, inspecting and storing fuel containing new and recycled uranium and mixed oxides.*

Membership:
OPEN, Chair; Brian Gutherman, Vice Chair, Gutherman Technical Services; Timothy Ake, Framatome, Inc.; Gordan Bjorkman, U.S. Nuclear Regulatory Commission; Nathan Hottle, Framatome.; Edward Knuckles, Individual; Wayne Lewis, Westinghouse Government Services; Christian Lobscheid, Framatome, Inc.; Mark Peres, Deep Fission Inc.; Justin Schulte, Energy Solutions; Maryanne Stasko, Duke Energy Corporation; Robert Tucker, Individual

Status: This standard was reaffirmed by ANSI on 1/3/2023.

ANS-57.5, *Light Water Reactors Fuel Assembly Mechanical Design and Evaluation* (proposed new standard, historical revision of ANSI/ANS-57.5-1996; R2006; W2016)

Scope: *This standard sets forth a series of design conditions and functional requirements for the design of fuel assemblies for light water cooled commercial power reactors. It includes specific requirements for design, as well as design criteria to ensure adequate fuel assembly performance. The standard establishes a procedure for performing an evaluation of the mechanical design of fuel assemblies. It does not address the various aspects of neutronic or thermal-hydraulic performance except where these factors impose loads or constraints on the mechanical design of the fuel assemblies.*

Membership:
Rosemary Montgomery, Chair, Oak Ridge National Laboratory; Sean Roy, ETA International, Inc.

Status: This standard was administratively withdrawn by ANSI on 2/27/2016 for lack of maintenance.

ANS-57.7, *Design Criteria for an Independent Spent Fuel Storage Installation (Water Pool Type)*, (proposed new standard, revision of historical ANS-57.7-1998; W2007)

Membership:
OPEN

Status: Revision of historical standard being considered.

ANSI/ANS-57.8-2020, *Fuel Assembly Identification* (revision of ANSI/ANS-57.8-1995; R2017)

Scope: *This standard provides requirements and detailed information for uniquely identifying nuclear fuel assemblies/elements, and the corresponding fuel plates or rods inside the assemblies. Detailed recommendations and*

requirements are provided for the numbering of the geometric orientation for the fuel plates, or fuel rods, inside the fuel assemblies. This standard is a detailed revision of ANSI/ANS-57.8-1995 (R2017).

Membership:
John Scaglione, Chair, Spectra Tech, Inc.; Caroline Duncan, Westinghouse Electric Company, LLC; Josh Jarrell, Idaho National Laboratory; Steven Maheras, Pacific Northwest National Laboratory; Robert Sachs, Individual

Status: A revision was approved by ANSI on 8/28/2020. Maintenance is due in 2025.

ANS-57.9, *Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)* (proposed new standard, supersedes ANSI/ANS-57.9-1992)

Scope: *This standard is intended to be used by the owner and operator of a dry storage-type independent spent fuel storage installation (ISFSI) in specifying the design requirements and by the designer in meeting the minimum requirements of such installations. The standard includes requirements for the following: the design of major buildings and structures, shipping cask unloading and handling facilities, cask decontamination, loading and unloading areas, spent fuel storage areas and racks, fuel handling equipment, radiation shielding, special equipment and area layout configurations, air or gas quality, storage area integrity, air or gas cleanup, fuel inspection, ventilation, residual heat removal, radiation monitoring, prevention of criticality, radwaste control and monitoring systems, provisions to facilitate decommissioning, quality assurance, materials accountability, and physical security. This standard continues the set of American National Standards on spent fuel storage. Similar standards are: (1) Design Requirements for Light Water Reactor Spent Fuel Storage Facilities at Nuclear Power Plants, ANSI/ANS-57.2-1983. (2) Design Criteria for an Independent Spent Fuel Storage Installation (Water Pool Type), ANSI/ANS-57.7-1988. (3) Guidelines for Establishing Site-Related Parameters for Site Selection and Design of an independent Spent Fuel Storage Installation (Water Pool Type), ANSI/ANS-2.19-1988(R1990); and (4) Design Criteria for Consolidation of LWR Spent Fuel, ANSI/ANS-57.10-1987.*

Membership:
Wayne Lewis, Co-Chair, Westinghouse Government Services; John Stamatakos, Co-Chair, Southwest Research Institute; Stephan Anton, Holtec International; Kaushik Banerjee, Idaho National Laboratory; Justin Clarity, Pacific Northwest National Laboratory; Harish Reddy Gadey, Idaho National Laboratory; Gabriel Grant, Southern Nuclear Operating Company; Brian Gutherman, Gutherman Technical Services, LLC; Kurt Harris, Flibe Energy Inc.; Robert Howard, Spectra Tech, Inc.; William Murphy, Duke Energy Corporation; Mark Richter, Nuclear Energy Institute; Javier Royo-Villanova, IDOM Consulting; Peter Stefanovic, Pacific Northwest National Laboratory

Status: A PINS was submitted to ANSI on 2/12/2020. Wayne Lewis and John Stamatakos are now co-chairs of the working group and have re-established work on this project.

ANSI/ANS-57.10-1996 (R2021), *Design Criteria for Consolidation of LWR Spent Fuel* (revision of ANSI/ANS-57.10-1987)

Scope: *This standard provides design criteria for the process of consolidating LWR spent nuclear fuel in either a wet or a dry environment. It addresses processes for consolidating fuel either horizontally or vertically. The standard sets forth requirements for utilizing equipment and systems to perform consolidation, handle fuel rods and nonfuel-bearing components, and handle broken fuel rods. This standard also contains requirements for facility or installation interfaces, nuclear safety, structural design, thermal design, accountability, safeguards, decommissioning, and quality assurance. The standard is not concerned with the storage of the spent fuel either before or after the consolidation process. These areas are covered in the following American National Standards: Design Requirements for Light Water Reactor Spent Fuel Facilities at Nuclear Power Plants, ANSI/ANS-57.2-1992. Design Criteria for an Independent Spent Fuel Storage Installation (Water Pool Type), ANSI/ANS-57.7-1992. Design Criteria for an Independent Spent Fuel Storage Installation (Dry Storage Type), ANSI/ANS-57.9-1992.*

Membership:
Vivek Thangam, Chair, U.S. Department of Energy; Debasish Chowdhury, Bangladesh Atomic Energy Commission; Harish Reddy Gadey, Pacific Northwest National Laboratory; Dale Lancaster, NuclearConsutlants.com; David Orr, Duke Energy Corporation; Ryan Smith, UCOR United Cleanup Oak Ridge; Sai Zhang, Idaho National Laboratory

Status: Reaffirmation was approved by ANSI on 1/28/2021. The PINS was prepared and issued to the FWDCC and Standards Board for approval in 2024. It is expected that the PINS will be approved and submitted to ANSI in early 2025. The previous version of the standard will be reviewed for potential changes.

High Level, GTCC, Low Level and Mixed Waste Subcommittee

Membership:
Robert Howard, Chair, Spectra Tech, Inc.
Sven O. Bader, Vice Chair, Orano Federal Services
D. Mark Gerboth, Washington River Protection Solutions
Robert Joseph, Idaho National Laboratory
Coleman Miller, Pacific Gas & Electric Company

The High Level, GTCC, Low Level and Mixed Waste Subcommittee manages the following projects and standards:

ANS-15.19, *Shipment and Receipt of Special Nuclear Material (SNM) by Research Reactor* (historical standard considered for reinvigoration)

Scope from historical standard: This *standard provides the necessary information for the shipping, receiving, and storing of fuel and other fabricated special nuclear material for research reactors. The areas addressed are data collection and analysis, packaging selection, preparation of the package or shipment, or both, safeguards, internal material control, records, and quality assurance for shipping.*

Membership:
OPEN

Status: Inactive project to be considered for revision of historical standard .

ANS-40.35, *Volume Reduction of Low-Level Radioactive Waste or Mixed Waste* (proposed new standard, historical revision of ANSI/ANS-40.35-1991)

***Scope from historical standard*:** *This standard sets forth the general design specifications, procurement, and performance requirements for operation of low-level waste (LLW) and mixed waste (MW) volume reduction (VR) processing systems for nuclear power plants and other nuclear facilities. This standard may be applied to the specification of other LLW VR systems (such as government nuclear facilities) if consideration is given to any additional design features required by the hazardous nature of the wastes to be processed by them. For the purpose of this standard, a nuclear facility's LLW VR processing systems begin at the point where treatment of aqueous waste generates a solid waste, or where solid, slurry, or liquid organics wastes are collected, and ends at a waste storage, shipping, or disposal area. VR techniques may include processes such as drying, incineration, chemical decomposition, flash boiling, mechanical, or high-temperature reduction or destruction techniques, or both. Some VR systems may include, as an integral part of the system, a means for immobilization of the waste. Compaction and solidification techniques are in the scope of American National Standard Solid Radioactive Waste Processing Systems for Light Water Reactor Plants, ANSI/ANS-55.1-1992.*

Membership:
Mark Gerboth, Chair, AtkinsRéalis US Nuclear; Mike Akins, Worley Parsons

Status: Inactive project to be considered for revision.

ANSI/ANS-40.37-2009 (R2021) *Mobile Low-Level Radioactive Waste Processing Systems* (new standard, historical revision of ANSI/ANS-40.37-1993)

Scope: *This standard sets forth design, fabrication, and performance recommendations and requirements for mobile low-level radioactive waste processing (MRWP) systems (including components) for nuclear facilities that generate low-level radioactive wastes (LLWs) as defined by the Atomic Energy Act as amended. The purpose of this standard is to provide guidance to ensure that the MRWP systems are designed, fabricated, installed, and operated in a manner commensurate with the need to protect the health and safety of the public and plant personnel.*

Membership:
Coleman Miller, Chair, Pacific Gas & Electric Company; Paul Saunders, Suncoast Solutions, Inc.

Status: Reaffirmation was approved by ANSI on 2/22/2021. No activity in 2024.

ANSI/ANS-55.1-2021, *Solid Radioactive Waste Processing System for Light Water Cooled Reactor Plants* (revision of ANSI/ANS-55.1-1992; R2017)

Scope: *This standard sets forth the design, construction, and performance requirements for a solid radioactive waste processing system for light water cooled reactor plants. For the purposes of this standard, the solid radioactive waste system begins at the interface with the liquid radioactive waste processing system boundary and at the inlets to the spent resin, filter sludge, evaporator concentrate, and phase separator tanks. In addition, this standard pertains to dry active waste, mixed waste, and other solid radioactive waste forms that are generated as part of the operation and maintenance of light water cooled reactor plants. The system includes facilities for temporary (up to 30 days of anticipated normal waste generation) on-site storage of packaged waste but terminates at the point of loading the filled drums and other containers on a vehicle for shipping off-site to a licensed disposal site or transfer to interim (up to 5 yr) on-site storage facilities. The solid radioactive waste processing system is not a safety-class system as defined by American National Standard Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants, ANSI/ANS-51.1-1983 (R1988) or as defined in American National Standard Nuclear Safety Criteria for the Design of Stationary Boiling Water Reactor Plants, ANSI/ ANS-52.1-1983 (R1988).*

Membership:
Coleman Miller, Chair, Pacific Gas & Electric Company; Paul Saunders, Vice Chair, Suncoast Solutions, Inc.; Calvin Hendrix, AVANTech, Inc.; Chad Hendrix, Atkins, SNC Lavalin; Stephen Liebenow, Energy Solutions; Kent Novotny, Sargent & Lundy; Nidamarthi Saikiran, TUV-India Pvt Ltd.

Status: The revision of the standard was approved by ANSI on 12/2/2021. No activity in 2024.

ANS-55.4, *Gaseous Radioactive Waste Processing System for Light Water Cooled Reactor Plants* (proposed new standard, historical revision of ANSI/ANS-55.4-1993)

Scope: *This standard sets forth minimum design, construction, and performance requirements, with due consideration for operation, for gaseous radioactive waste processing systems (GRWPS) for light water reactor (LWR) plants. It is applicable for routine operation, design basis fuel leakage, and other design basis occurrences.*

Membership:
OPEN

Status: This standard was administratively withdrawn on 5/14/2017 for lack of maintenance. The FWDCC does not feel there is a current need to reinvigorate this standard.

ANS-55.6, *Liquid Radioactive Waste Processing System for Light Water Reactor Plants* (proposed new standard, historical revision of ANSI/ANS-55.6-1993)

Scope: *This standard sets forth minimum design, construction, and performance requirements, with due consideration for operation, of the Liquid Radioactive Waste Processing System (LRWPS) for light water reactor (LWR) plants for design basis inputs. It is applicable to routine operation, including design basis fuel leakage and other design basis occurrences.*

Membership:
Coleman Miller, Chair, Pacific Gas & Electric; Calvin Hendrix, AVANTech Inc.; Chad Hendrix, Atkins-SNC Lavalin; Stephen Liebenow, Energy Solutions; Kent Novatny, Sargent & Lundy; Nidamarthi Saikiran, TUV-India Pvt Ltd.; George Wilhelmsen, Sargent & Lundy, LLC

Status: This standard was administratively withdrawn on 5/13/2017 for lack of maintenance. A PINS was submitted to ANSI on 5/4/2021 to resurrect this standard. A draft has been completed for large reactors. The working group is seeking input on liquid quantities for light water SMRs to finish the work.

Decommissioning (Commercial and Research Facilities) Subcommittee

Membership:
Joshua Vajda, Subcommittee Chair, United Cleanup Oak Ridge
Rounette Nader, Duke Energy Corporation

The Decommissioning (Commercial and Research Facilities) Subcommittee manages the following standard:

ANS-15.10, *Decommissioning of Research Reactors* (proposed new standard, revision of historical standard under consideration)

Scope from historical standard: *This standard provides requirements and criteria for the decommissioning of research reactors and includes decommissioning alternatives, planning, radiation criteria, surveillance and maintenance, environmental impacts, quality assurance, and reports and documentation.*

Joshua Vajda, Chair, United Cleanup Oak Ridge; Corey Munz, TLG Services, LLC

Status: A revision of the historical standard is being considered. Joshua Vajda was appointed chair of the Decommissioning Subcommittee and the ANS-15.10 Working Group in July 2024 and reviewed the withdrawn standard. Solicited general information from industry and government stakeholders about revitalization of this standard. Corey Munz was added to the roster. The first task of 2025 will be to draft a Project Initiation Notification Systems (PINS) form and to re-form the working group.

Fuel, Waste, and Decommissioning Consensus Committee (FWDCC) Organizational Chart

Chair: Jean Francois Lucchini Vice Chair: Maryanne Stasko

New and Used Fuel (Design Only)	*High Level, GTCC, Low Level, and Mixed Waste*	*Decommissioning (Commercial and Research Facilities)*
John Scaglione, Chair **Vice Chair (TBD)**	**Robert Howard, Chair** **Sven Bader, Vice Chair**	**Joshua Vajda, Chair** **Vice Chair (TBD)**
Ⓟ = PINS submitted to ANSI		
ANS-57.1-1992 (R2024) (A2) Design Requirements for LWR Fuel Handling Systems RF 9/16/24 (WGC: OPEN)	ANS-40.37-2009 (R2021) (A2) Mobile Low-Level Radioactive Waste Processing Systems RF 2/22/21 (WGC: C. Miller)	ANS-15.10 (W2004) (C2) Decommissioning of Research Reactors (reinvigoration being considered) (WGC: J. Vajda)
ANS-57.3-2018 (R2023) (A2) Design Requirements for New Fuel Storage Facilities at LWR Plants RF 1/3/23 (Acting WGC: OPEN)	ANS-55.1-2021 (A2) Solid Radioactive Waste Processing Systems for Light Water Cooled Reactor Plants App'd 12/2/21 (WGC: C. Miller)	
ANS-57.8-2020 (A2) Fuel Assembly Identification App'd 8/8/20 (WGC: J. Scaglione)	ANS-55.6 (W2017) @ (C1) Liquid Radioactive Waste Processing Systems for Light Water Reactor Plants (WGC: C. Miller)	
ANS-57.10-1996 (R2021) (A2) Design Criteria for Consolidation of LWR Spent Fuel RF 1/28/21 (WGC: V. Thangam)	ANS-15.19 (W2001) (C2) Shipment and Receipt of Special Nuclear Material (SNM) by Research Reactor (reinvigoration being considered)	
ANS-57.2 (W1993) @ (C1) Design Requirements for LWR Spent Fuel Facilities at Nuclear Power Plants (Acting WGC: K. Banerjee)	ANS-40.35 (W2001) (C2) Volume Reduction of Low-Level Radioactive Waste or Mixed Waste (WGC: M. Gerboth)	
ANS-57.9 (W2010) @ (C1) Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type) (Acting WGC: OPEN)	ANS-55.4 (W2017) (C2) Gaseous Radioactive Waste Processing Systems for Light Water Cooled Reactor Plants (WGC: OPEN)	
ANS-57.5 (W2016) (C2) LWR Fuel Assembly Mechanical Design and Evaluation (WGC: R. Montgomery)		
ANS-57.7 (W2007) (C2) Design Criteria for an Independent Spent Fuel Storage Installation (Water Pool Type) (reinvigoration being considered) (WGC: OPEN)		

(A1) Current Being Worked On Standards

(A2) Current Not Being Worked On Standards

(B1) Proposed Being Worked On Standards

(B2) Proposed Not Being Worked On Standards

(C1) Withdrawn Being Worked On Standards

(C2) Withdrawn Not Being Worked On Standards

Table 2 – FWDCC Organizational Chart

Large Light Water Reactor Consensus Committee (LLWRCC)

Michelle French, Chair
Westinghouse Government Services

Scope: *The LLWRCC is responsible for the preparation and maintenance of voluntary consensus standards as well as standards-related guidance documents, guidance standards, and technical reports supporting the design, operation, maintenance, operator selection and training, and quality requirements for current operating nuclear power plants and future nuclear power plants that employ large station light water moderated, water-cooled reactors. The standards include the reactor island, balance of plant, and other systems within the plant boundary that affect safety and operations. The ANS Standards Committee Procedures Manual for Consensus Committees shall be used to guide the activities of this consensus committee.*

The LLWRCC supervises the work of the following subcommittees:

- *Reactor and Plant Systems and Support Subcommittee*
- *Simulators, Instrumentation, Control Systems, Software and Testing*
- *Emergency Planning and Response*

Each subcommittee has established various working groups to develop specific proposed standards and maintain existing standards within its respective area of responsibility. These working groups create the text of LLWRCC standards and resolve review and ballot comments.

LLWRCC Membership:

Michelle French, Chair, Westinghouse Government Services
Earnestine Johnson, Vice Chair, Entergy Corporation
Ahmad Al Rashdan, Idaho National Laboratory
Robert Becse, Westinghouse Electric Company, LLC
(Alternate: Larkin Ison, Jr., Westinghouse Electric Company, LLC)
Robert Burg, Engineering Planning and Management, Inc.
David Desaulniers, Individual
James Florence, Individual
Robert Fuller, Entergy Corporation
Darrell Gardner, Kairos Power, LLC
Steven Gebers, Quantum Nuclear Services
James Glover, Fluxion Technologies
Franklin Hope, Jensen Hughes, Inc.
Richard Lagdon, Bechtel National, Inc.
Svetlana Lawrence, Idaho National Laboratory
Mark A. Linn, Individual
Ronald Markovich, Contingency Management Consultant
Sunil Weerakkody, U.S. Nuclear Regulatory Commission

Observers:
Charles H. Moseley, Jr., Edgewater Technical Associates, LLC
James C. Saldarini, Eden Radioisotopes, LLC
Donald Spellman, Individual

Report of LLWRCC:

The LLWRCC held three virtual meetings: March 7, 2024, July 15, 2024, and November 12, 2024. Earnestine Johnson was elected as LLWRCC Vice Chair. A topical meeting was held to discuss reorganization/synergies with RARCC. David Desaulniers retired from the NRC but remains on the LLWRCC as an individual. Sunil Weerakkody was confirmed as a new member to represent the NRC. Chip Lagdon resigned from the NRC. The importance of incorporating RIPB practices into LLWRCC standards was emphasized at meetings.

Approved in 2024:

ANSI/ANS-3.5-2018 (R2024), *Selection, Qualification, and Training of Personnel for Nuclear Power Plants* (reaffirmation of ANSI/ANS-3.5-2018)

ANSI/ANS-58.8-2019 (R2024), *Time Response Criteria for Manual Actions at Nuclear Power Plants* (reaffirmation of ANSI/ANS-58.8-2019)

Active Standards/Projects (Approved PINS):

ANS-3.5.1, *Nuclear Power Plant Simulators for Use in Simulation Assisted Engineering and Non-Operator Training* (proposed new standard)

ANS-3.13, *Nuclear Facility Reliability Assurance Program (RAP) Development* (proposed new standard)

ANS-3.15, *Cyber Security Criteria for Critical Digital Assets (CDAs) for Nuclear Power Plant Systems* (proposed new standard)

ANS-56.2, *Containment Isolation Provisions for Fluid Systems after a LOCA* (proposed new standard, historic revision of ANSI/ANS-56.1984; W1999)

ANS-60.1, *Civilian Nuclear Export Controls* (proposed new standard)

ANS-GD-3.8.X *Guidance for Risk-Informing Emergency Preparedness Programs for Nuclear Facilities* (proposed new guidance document)

Reactor and Plant Systems and Support Subcommittee

Membership:
Robert Burg, Chair, EPM, Inc.
Franklin Hope, Vice Chair, Jensen Hughes
Kenneth Geelhood, Pacific Northwest National Laboratory
James Glover, Fluxion Technologies
Margaret Harding, 4 Factor Consulting, LLC
Franklin Hope, Jensen Hughes, Inc.
Earnestine Johnson, Entergy Corporation
Mark Linn, Individual
Kent Welter, Nuscale Power, Inc.
Dong Zheng, U.S. Nuclear Regulatory Commission

The Reactor and Plant Systems and Support Subcommittee manages the following projects and current standards:

ANSI/ANS-18.1-2020, *Radioactive Source Term for Normal Operation of Light Water Reactors* (revision of ANSI/ANS-18.1-2016)

Scope: *This standard provides a set of typical radionuclide concentrations for estimating the radioactivity in the principal fluid systems of light water reactors and for projecting the expected releases of radioactivity from nuclear plants. It is not intended that the values be used as the sole basis for design but be used in environmental reports and elsewhere where expected operating conditions over the life of the plant would be appropriate.*

Membership:
Kenneth Geelhood, Chair, Pacific Northwest National Laboratory; Luis Benevides, U.S. Navy; Elijah Dickson, U.S. Nuclear Regulatory Commission; David Hindera, GE Hitachi; Dennis Hussey, Electric Power Research Institute; Timothy Lloyd, Westinghouse Electric Company, LLC; Mark Shaver, NuScale Power Inc.

Status: The standard was approved by ANSI 7/24/2020. Maintenance is due by 7/24/2025.

ANSI/ANS-30.3-2022, *Light-Water Reactor, Risk-Informed Performance-Based Design* (new standard)

Scope: *This standard provides requirements for using RIPB methods to support (1) definition of safety requirements; (2) licensing-basis event (LBE) selection; (3) design-basis safety analysis; (4) probabilistic risk assessments (PRAs); (5) severe accident analysis; (6) classification and categorization of structures, systems, and components (SSCs); (7) systematic defense-in-depth (DID) evaluations; and (8) performance-based decision analysis.*

The plant designer is responsible for selecting and implementing specific design requirements necessary for implementation of this standard, including support for defining accidents and expected operational characteristics through design analyses, models, conformance with applicable industrial codes and standards, or experience gained from similar designs. The designer is also responsible for the use of alternate or additional criteria and requirements to accommodate unique technologies, designs, or site characteristics not covered (or referenced) by this standard or its related documents. The inclusion of RIPB practices also supports a greater understanding of uncertainties surrounding deterministic safety evaluations and establishing compensatory actions for risk-significant uncertainties.

Membership:
Kent Welter, Chair, NuScale Power, LLC; David Blanchard, Vice Chair, Applied Reliability Engineering, Inc.; James August, Individual; Donald Dube, Individual; Gary Locklear, Kinectrics AES Inc.; Paul Sicard, Entergy Corporation; Douglas Van Bossuyt, Naval Postgraduate School; Christopher Van Wert, U.S. Nuclear Regulatory Commission; Sunil Weerakkody, U.S. Nuclear Regulatory Commission; Patrick White, Nuclear Innovation Alliance; Cindy Williams, NuScale Power LLC

Status: The standard was approved by ANSI on 7/22/2023 and published the next day. The standard was approved and issued after 5 years of hard work by the working group. A letter was sent from the ANS Standards Board to the NRC for endorsement via RG 1.206 and RG 1.233. A meeting was held 715/2024 with the NRC to discuss their comments on endorsement of ANS-30.3. The meeting was well attended by NRC staff and there was constructive dialogue on the level of detail of the standard and priority to the industry. The NRC plans to issue a formal letter with their comments on the standard, but due to current resource constraints, was unable to determine when that might occur. ANS is waiting on formal NRC comments before deciding on the next course of action with respect to continuing the request for NRC endorsement. Lessons learned from this valuable engagement were discussed at the RP3C and Standards Board.

ANSI/ANS-51.10-2020, *Auxiliary Feedwater System for Pressurized Water Reactors* (revision of ANSI/ANS-51.10-1991; R2018)

Scope: *This standard sets forth the safety-related functional requirements, performance requirements, design criteria, design requirements for testing and maintenance, and interfaces for the safety-related portion of the auxiliary feedwater system (AFS) of pressurized water reactor (PWR) plants. This standard is written for new facilities that rely on an auxiliary (emergency) feedwater system for a safety-related function.*

Membership:
Earnestine Johnson, Chair, Entergy Corporation

Status: The revision was approved by ANSI on 10/23/2020. The LLWRCC does not feel that this standard is needed and therefore does not warrant the resources to be maintained. The LLWRCC expects to allow this standard to be administratively withdrawn on its 10th anniversary.

ANS-56.1, *Containment Hydrogen Control* (proposed title) (proposed new standard)

Scope: *TBD*

Membership:
James Glover, Chair, Fluxion Technologies; James Gleason, GLSEQ, LLC; Sam Gyepi-Garbrah, Canadian Nuclear Safety Commission; Wison Luangdilok, H2Technology, LLC; Robert Pinkston, Westinghouse Electric Company, LLC; Edward Rodriguez, Global Nuclear Network Analysis LLC.; James Scobel, Westinghouse Electric Company, LLC; Andrew Smirnov, Individual

Status: The LLWRCC is considering the need and direction for this proposed standard.

ANS-56.2, *Containment Isolation Provisions for Fluid Systems After a LOCA* (proposed new standard, supersedes ANSI/ANS-56.2-1984; R1989; W1999)

Scope: *This standard specifies minimum design, actuation, testing, and maintenance requirements for the containment isolation of fluid systems after a loss-of-coolant accident (LOCA). These fluid systems penetrate the primary containment of light water reactors and include piping systems (including instrumentation and control) for all fluids entering or leaving the containment. Electrical systems are not included. The provisions for containment isolation impose additional requirements which are not required for the fluid system function. This standard does not consider any isolation requirements that may exist for controlled leakage areas either enclosing the primary containment or contiguous to the primary containment. Also, this standard does not address containment isolation requirements for events other than LOCAs.*

This standard presents requirements and conditions that are needed for the isolation of the containment and covers requirements for isolation barriers, their actuation, their operators, and connecting piping between isolation barriers. The standard does not cover penetration assemblies, protection systems, power supplies, and equipment qualification.

Membership:
Earnestine Johnson, Chair, Entergy Corporation; Robert McGowan, Vice Chair, True North Consulting, Robert Binz, Sunshine Consulting; James Bradford, Southern Nuclear Operating Company; Robert Fuller, Entergy Operations, Inc.; Jonathan Gomes, GE Hitachi Nuclear Energy; Paul Nichols, GE Hitachi; Glenda Patzch-Velasquez, Tennessee Valley Authority; Wyatt Schuldheiss (Associate Member)

Status: A PINS was submitted to ANSI on 6/27/2019. The standard has been revised to incorporate outstanding comments from the NRC and updated info and terminology considering the positions also of new technology. The draft was issued to the subcommittee, RP3C, and SCoRA for review. Comment resolution is on hold pending the acceptance of the RIPB justification statement.

ANS-58.2, *Design Basis for Protection of Light Water Nuclear Power Plants Against the Effects of Postulated Pipe Rupture* (proposed new standard, historic revision of ANSI/ANS-58.2-1988; W1998)

Scope: *This standard addresses the design basis for the protection of light water reactor nuclear power plants from the potentially adverse effects of postulated pipe ruptures.*

Membership:
Dong Zheng, Chair, U.S. Nuclear Regulatory Commission; Temi Adeyeye, TerraPower, LLC; Butch Bornt, Southern Nuclear Operating Company; Joseph Halackna, Westinghouse Electric Company, LLC; Julie Jarvis, Defense Nuclear Facilities Safety Board; Manoj Karki, Duke Energy Corporation; Wai Law, Tennessee Valley Authority; Simona Miteva, Technical University of Sofia; Anthony Trupiano, Westinghouse Electric Company, LLC; Oscar Vinals Atienza, Westinghouse Electric Company, LLC

Status: A PINS is needed to initiate a historical revision. Eq. D-10 in ANSI/ANS-58.2-1988 needs to be verified. Discussing collaboration with universities to revise the withdrawn standard. Continued effort to resolve the error in Equation D-10. Help is being sought from subject matter experts to validate the proposed jet model correction.

ANS-58.3, *Physical Protection for Nuclear Safety-Related Systems and Components* (proposed new standard, revision of historic ANS-58.3-1992; W2019)

Scope: *This standard sets forth physical protection criteria for nuclear safety-related systems and components in stations using light water reactors (LWRs). This standard includes an identification of potential hazards to nuclear safety-related systems and components and acceptable means of ensuring the protection of this equipment from these hazards.*

Membership:
OPEN, Chair; Robert Burg, EPM, Inc.; Anthony Trupiano, Westinghouse Electric Company, LLC

Status: The standard was administratively withdrawn on 2/21/2019. Further discussion has determined that a revised standard on physical protection for safety-related systems and components is unnecessary since ANS-30.1, ANS-30.2 and ANS-30.3 will include these criteria as the new standards are developed. Inactive project.

ANS-58.6, *Criteria for Remote Shutdown for Light Water Reactors Facilities* (proposed new standard, historical revision of ANSI/ANS-58.6-1996; R2001)

Scope from historical standard: *This standard provides design criteria for controls and monitoring instrumentation necessary to shut down a reactor and maintain it in a safe shutdown condition from outside the control room. The design criteria require that: (a) specific controls and monitoring instrumentation be provided; (b) these controls be installed at a location (or locations) that is physically separate from the control room and cable spreading areas; (c) simultaneous control from both locations be prevented by devices for transfer of control from the control room to the remote location(s); and (d) the remote controls be used as a defense-in-depth measure in addition to the control room shutdown controls and as a minimum provide for one complete channel of shutdown equipment.*

Membership:
OPEN

Status: Inactive project to be considered for reinvigoration.

ANSI/ANS-58.9-2002 (R2020), *Single Failure Criteria for Light Water Reactor Safety-Related Fluid Systems* (new standard, revision of historical ANS-58.9-1981; R1987)

Scope: *This standard provides criteria for the designer which interpret the requirements of Title 10, Code of Federal Regulations, Part 50, "Licensing of Production and Utilization Facilities," Appendix A, "General Design Criteria for Nuclear Power Plants," with respect to design against single failures in safety-related Light Water Reactor (LWR) fluid systems. Means of treating both active and passive failures are addressed for safety-related fluid systems following various initiating events. Current acceptable practice is used as a basis for these criteria.*

Failure criteria for the electric power systems and the protection systems are provided in IEEE Std 308-1980 "IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations", IEEE Std 279-1971 "IEEE Standard Criteria for Protection Systems for Nuclear Power Generating Stations" (N42.7-1972), IEEE Std 379-1977 "IEEE Standard for Application of the Single-Failure Criterion to Nuclear Power Generating Station Class IE Systems", and IEEE Std 603-1980 "Standard Criteria for Safety Systems for Nuclear Power Generating Stations." Failures of structural components, such as braces, supports, or restraints, as well as occurrences involving common mode failures, are excluded.

Membership:
OPEN, Chair; Robert Burg, EPM, Inc.; Tim Dodson, HukariAscendent; Matthew Hertel, X-Energy, LLC; Ethan Hunt, Nuclear Energy Consultants, Inc.; Earnestine Johnson, Entergy Corporation; Prasad Kadambi, Individual; Cherie Paugh, Westinghouse Electric Company, LLC

Status: Reaffirmation was approved by ANSI on 7/23/2020. The reaffirmation of ANSI/ANS-58.9-1981 (R1987) was not completed before the standard was administratively withdrawn; therefore, ANSI/ANS-58.9-1981 (R1987) was processed as a new standard receiving the designation of ANSI/ANS-58.9-2002. Maintenance will be due in 2025.

ANS-58.11, *Design Criteria for Safe Shutdown Following Selected Design Basis Events in Light Water Reactors* (proposed new standard, revision of historical ANSI/ANS-58.11-1995; R2002)

Scope from historical standard: *This standard provides design criteria for systems that perform the safety-related functions necessary to shut down a reactor and maintain it in a safe shutdown condition for selected design basis events; i.e., any design basis events that do not require operation of engineered safety features. For design basis events that require operation of engineered safety features, this standard can be selectively applied because of plant features specifically designed for these conditions. For systems that serve multiple functions, the design criteria associated with the most limiting function shall be applied.*

The following safety-related functions are required for safe shutdown and are addressed in this standard: (1) Reactor core reactivity control; (2) Reactor core heat removal; (3) Reactor coolant pressure boundary integrity provided by: (a) Temperature control (b) Pressure control, and (c) Inventory control.

Membership:
OPEN, Chair; Robert Kalantari, EPM, Inc.

Status: The standard was administratively withdrawn by ANSI on 7/23/2012 for lack of maintenance. A new working group chair and members are needed to update the standard. No activity in 2024.

ANSI/ANS-58.14-2011 (R2022), *Safety and Pressure Integrity Classification Criteria for Light Water Reactors* (new standard, historical revision of ANSI/ANS-58.14-1993)

Scope: *This standard specifies deterministic criteria for the safety classification of items (SSCs and parts, including consumables) in a light water reactor (LWR) nuclear power plant as either safety-related (Q), non-safety-related (N), or supplemented (S). In addition, pressure integrity classification criteria are provided for the assignment of Classes 1 to 5 to the pressure-retaining portions of items.*

Membership:
Mark Linn, Chair, Individual; David Blanchard, Applied Reliability Engineering; Paul Sicard, Entergy Corporation

Status: The standard was reaffirmed by ANSI on 2/4/2022. No activity in 2024.

ANS-59.3, *Nuclear Safety Criteria for Control Air Systems* (proposed new standard, historical revision of ANSI/ANS-59.3-1992; R2002)

Scope: *This standard provides criteria for the control air system that furnishes compressed air to nuclear safety-related components and other equipment that could affect any nuclear safety-related function in nuclear power plants. This standard provides: (1) the system nuclear safety design requirements and the non-nuclear safety design recommendations for equipment, piping, instruments, and controls that constitute the control air system; and (2) the nuclear safety design requirements and the non-nuclear safety design recommendations to accommodate the testing and maintenance necessary to ensure adequate performance of the control air system.*

Membership:
OPEN, Chair; Todd Anselmi, Idaho National Laboratory; James August, Individual; Chad Boyer, Electric Power Research Institute; Robert Burg, EPM, Inc.; Raul Hernandez, U.S. Nuclear Regulatory Commission; Matthew Hertel, X-Energy, LLC; Edward Knuckles, Individual

Status: The PINS was submitted to ANSI 1/10/2019. The project is currently on hold. No activity in 2024.

ANSI/ANS-59.51-1997 (R2020), *Fuel Oil Systems for Safety-Related Emergency Diesel Generators* (revision of ANSI/ANS-59.51-1989)

Scope: *This standard provides functional, performance, and initial design requirements for the fuel oil system for diesel generators that provide safety-related emergency onsite power for light water reactor nuclear power plants. This standard addresses the mechanical equipment associated with the fuel oil system, with the exception of the engine mounted components. These components, which are mounted directly to the engine structure itself, are excluded except to define interface requirements. It also includes the instrumentation and control functional requirements. The standard excludes motors, motor control centers, switchgear, cables, and other electrical equipment used in the operation of the fuel oil system, except to define interface requirements.*

Membership:
OPEN, Chair

Status: Reaffirmation received ANSI approval 7/27/2020. Maintenance will be due in 2025.

ANSI/ANS-59.52-1998 (R2020), *Lubricating Oil Systems for Safety-Related Emergency Diesel Generators* (new standard)

Scope: *This standard provides functional, performance, and design requirements for lubricating oil systems for diesel generators that provide emergency onsite power for light water reactor nuclear power plants. The standard addresses all mechanical equipment associated with the lubricating oil system, with the exception of engine mounted components. These components, which are mounted directly to engine structure itself, are excluded, except to define interface requirements. This*

standard also includes the lubricating oil system instrumentation and control functional requirements. It excludes motors, motor control centers, switchgear, cables, and other electrical equipment used in the operation of the lubricating oil system, except to define interface requirements.

Membership:
OPEN, Chair

Status: Reaffirmation received ANSI approval 7/27/2020. Maintenance will be due in 2025.

ANS-60.1, *Civilian Nuclear Export Controls* (proposed new standard)

Scope: *This standard addresses the requirements for compliance with U.S. export control regulations for civilian nuclear technology, equipment, and materials, as governed by 10 CFR Part 110 and 10 CFR Part 810. This includes various types of export information required by the NRC and DOE and reporting requirements that exist before and after an export has occurred. The standard also provides guidance for establishing and maintaining internal compliance programs, including as related to classification and jurisdictional determinations, personnel, security, information technology, records management, contractual provisions and certifications, and training.*

Membership:
Margaret Harding, Chair, 4 Factor Consulting, LLC; Elina Teplinsky, Vice Chair, Pillsbury Winthrop Shaw Pittman LLP; Jennifer Hart, Secretary, Pacific Northwest National Laboratory; Georgia Adams, Pacific Northwest National Laboratory; Steven Bullock, Pacific Northwest National Laboratory; Stefani Buster, University of Wisconsin-Madison; Adam Deatherage, AMS Corporation; Paul Dickman, Argonne National Laboratory; Tom Gray, Pacific Northwest National Laboratory; Chelsea Gunter, GNE Advisory Pty Ltd.; Peter Habighorst, U.S. Nuclear Regulatory Commission; Andrea Jones, U.S. Nuclear Regulatory Commission; Prasad Kadambi, Kadambi Engineering Consultants; Ajay Kuntamukkala, Hogan Lovells US LLP; Trudy Overlin, NuScale Power; Mark Peters, Pacific Northwest National Laboratory; Jo Anna Sellen Bredenkamp, Oak Ridge National Laboratory; William Wharton; Studsvik Scandpower

Status: The PINS was submitted to ANSI on 8/5/2021. Jennifer Hart led weekly meetings to develop the draft in 2024. The working group largely completed the requirements section of the standard and are working through the non-mandatory best practices. This has pointed out some shortfalls in the requirements and corrections to that section. We are expecting to complete the draft of the standard by April 2025 and complete final working group review and approval.

Simulators, Instrumentation, Control Systems, Software and Testing Subcommittee

Membership:
OPEN, Chair, Individual
Ahmad Al Rashdan, Vice Chair, Idaho National Laboratory
James August, Individual
Aaron England, Tennessee Valley Authority
Sarah Esparza, Constellation Nuclear
James Florence, Individual
James Glover, Fluxion Technologies
Huafei (Harry) Liao, X-energy, LLC
Michael Muhlheim, Oak Ridge National Laboratory
Timothy Riti, Nuclear Energy Institute
Kashmir Singh, EDF Energy
Barbara Stevens, Individual

The Simulators, Instrumentation, Control Systems, and Software Testing Subcommittee manages the following current standards and projects:

ANSI/ANS-3.1-2014 (R2020), ***Selection, Qualification, and Training of Personnel for Nuclear Power Plants*** **(new standard, historic revision of ANSI/ANS-3.1-1993; R1999)**

Scope: *This standard provides criteria for the selection, qualification, and training of personnel for nuclear power plants. The qualifications of personnel in the operating organizations appropriate to safe and efficient operation of a nuclear power plant are addressed in terms of the minimum education, experience, and training requirements.*

Membership:
Timothy Riti, Chair, Nuclear Energy Institute; Ahmad Al Rashdan, Idaho National Laboratory; Patrick Beery, Patrick Berry Consulting, LLC; Heather Davis, Constellation Nuclear; Daniel Fanella, U.S. Nuclear Regulatory Commission

Status: Reaffirmation was approved by ANSI on 2/4/2020. Revision 4 of RG 1.8, "Qualification and Training of Personnel for Nuclear Power Plants," was issued in June of 2019 endorsing ANSI/ANS-3.1-2014. The working group is addressing an inquiry from Entergy received 3/3/2024 on the 1978 edition of this standard. The working group held initial discussions to consider a future revision to add clarification to areas based on implementation lessons learned over the past 4 years that may help to eliminate some areas of confusion/concerns due to changes in industry workforce and pipelines. Maintenance is due in 2025.

ANSI/ANS-3.2-2012 (R2022), ***Managerial, Administrative, and Quality Assurance Controls for the Operational Phase of Nuclear Power Plants*** **(revision of ANSI/ANS-3.2-2006)**

Scope: *This standard provides requirements and recommendations for managerial and administrative controls to ensure that activities associated with operating a nuclear power plant are carried out without undue risk to the health and safety of the public.*

This standard provides requirements for implementing managerial and administrative controls consistent with requirements of 10 CFR 50, Appendix B.

This standard is not specifically intended for application to test, mobile, or experimental reactors, nor reactors not subject to U.S. Nuclear Regulatory Commission (NRC) licensing. Although this standard is based on NRC requirements, the approach is applicable with modifications to reflect the regulatory requirements in the country of application. Applicable sections of this standard may be used in those cases for activities similar to those addressed herein.

Membership:
Aaron England, Chair, Tennessee Valley Authority; Clint Eldridge, Vice Chair, Furgo USA Land Inc.; Ahmad Al Rashdan, Idaho National Laboratory; Eva Brown, U.S. Nuclear Regulatory Commission; Isaiah Morgan (Associate Member), University of Idaho; Charles H. Moseley, Individual; Rob Radulovich, Constellation Generation; Kerry Rhoads, Individual; David Taggart, Taggart Quality Consulting; Gordon Vytacil, Kairos Power LLC; Dennis Winchester, Winchester Nuclear Consulting Inc.

Status: Reaffirmation approved by ANSI on 5/26/2022. The team is reviewing previous revisions. Currently identifying redundant requirements with the other NCR regulatory requirements. In 2024, the working group (1) Determined that ANS-3.2-2012 (QA for operations) does not address the transition from construction to testing and the transition from testing to operations. NQA-1 discusses the transition for the different phases, however, the section is non-mandatory. (2) Determined that the standard does not address new requirements by the NRC such as the Regulatory Treatment of Nonsafety Systems (RTNSS). (3) Determined the scope of the standard has moved from its original intent of the 10 CFR 50 Appendix B and includes requirements that are not specific to 10 CFR 50 Appendix B. In other words, the standard has expanded the definition of quality. (4) Determined that the standard conflicts or duplicates other standards that the NRC has endorsed. (5) Determined that licensees do not use the Precaution and Limitation section of the standard as it is written. Either the licensees need to comply, or the section needs to be written. (6) The standard duplicates information in NQA-1.

ANSI/ANS-3.4-2013 (R2023), ***Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants*** **(revision of ANSI/ANS-3.4-1996; R2002)**

Scope: *This standard defines and updates medical, mental health, and physical requirements for licensing of nuclear power plant reactor operators and senior operators. It also addresses the content, extent, methods of examination, and continual monitoring of licensed operators' medical health.*

Membership:
Sarah Esparza, Co-Chair, Constellation Nuclear; Barbara Stevens, Co-Chair, Individual; George Rombold, Vice Chair, Scientech Inc.; Ahmad Al Rashdan, Idaho National Laboratory; Bernard Litkett, U.S. Nuclear Regulatory Commission

Status: This standard was reaffirmed by ANSI on 7/19/2023. ANSI/ANS-3.4-2013 was endorsed by the U.S. Nuclear Regulatory Commission in Regulatory Guide (RG) 1.134, *Medical Assessment of Licensed Operators or Applicants for Operator Licenses at Nuclear Power Plants*, (Revision 4), published September 2014. There was no activity in 2024.

ANSI/ANS-3.5-2018 (R2024), *Nuclear Power Plant Simulators for Use in Operator Training and Examination* (new standard, supersedes ANSI/ANS-3.5-2009)

Scope: *This standard establishes the functional requirements for full scope nuclear power plant control room simulators that are subject to U.S. Nuclear Regulatory Commission Regulation for use in operator training and examination. The standard also establishes criteria for the scope of simulation, performance, and functional capabilities of nuclear power plant control room simulators. This standard does not establish criteria for the use of simulators in operator training programs.*

Membership:
James Florence, Chair, Individual; Michael Peterson, Acting Vice Chair, Xcel Energy; Ahmad Al Rashdan, Idaho National Laboratory; Clay Cottingham, Ameren Missouri-Callaway Energy Center; Mark Cunningham, GE Hitachi Nuclear Energy; David Goodman, NuScholar, LLC; Jody Lawter, Dominion Energy; Bernard Litkett, U.S. Nuclear Regulatory Commission; George McCullough, Exitech Corporation; Pablo Rey, Tecnatom S.A.; Jesse Seymour, U.S. Nuclear Regulatory Commission

Status: ANSI approved a reaffirmation on 9/10/2024. The working group is currently coordinating with the NRC for a review of ANSI/ANS-3.5-2018 (R2024) with a request for endorsement (via RG 1.149).

ANS-3.5.1, *Nuclear Power Plant Simulators for Use in Simulation-Assisted Engineering and Non-Operator Training* (proposed new standard)

Scope: *This standard establishes the requirements for the use of nuclear power plant control room simulators in applications other than operator training and examination. Applications considered in this Standard include plant engineering design and modification verification and validation, engineering design optimization, plant performance optimization, control loop tuning, trip risk reduction, power uprate/ downrate pre-testing, human-factors engineering, safety assessment studies, procedure development and verification, and training of plant personnel other than operators. This standard does not establish criteria for the use of simulators in operator training programs.*

Membership:
Kashmir Singh, Chair, EDF Energy; Shane Akbar, Rolls-Royce SMR Limited; Ahmad Al Rashdan, Idaho National Laboratory; Ossama Ashy, WSC, Inc.; Mark Cunningham, GE Hitachi Nuclear Energy; Rama Deljouravesh, Ontario Power Generation; David Desauliniers, Individual; Cherif Desouky, Nawah Energy Company' Brandon Elliott, SNC Lavalin Inc.; James Florence, Individual; Gil Grady, GSE Systems; Brian Green, U.S. Nuclear Regulatory Commission; Wayne Marquino, GE Hitachi; George McCullough, Exitech Corporation; John Miller, Sargent & Lundy, LLC; Donald Mitchell, Individual; Bernard Panfil, Corys Inc.; David Rahn, U.S. Nuclear Regulatory Commission; Khalid Rizk, Atkins Realis (Candu Energy); Jose Antonio Ruiz, Westinghouse Electric Company, LLC; Robert Sanders, Corys, Inc.; Dong (Allen) Wang, Shandong Nuclear Power Company Ltd.; Joseph Yarbrough, Xcel Energy

The following highly technically qualified individuals provided additional expert assistance and advice to the working group during the development of this draft standard: S. Freel, Ultra Electronics Energy Group; B. Holl, KSG Essen, Germany; E. M. Lloyd, Exitech Corporation; A. Linsell, EDF Energy (UK); E. Rau, Duke Energy; D. E. Spielman, Southern Nuclear Operating Company

Status: The PINS was submitted to ANSI on 12/14/2018. Copies of the draft standard were sent out widely to increase awareness of the multi-million-dollar benefits experienced by other nuclear utilities and review comments

were welcomed, e.g. Utility Simulator Users Group (USUG) nuclear industry members worldwide, PWR Users Group, BWR User Group, and EPRI.

The draft standard was presented at a number of international conferences, e.g., Nuclear Power Plant Simulation Conference in Las Vegas in January 2022, and the European Union Nuclear Power Plant Simulation Forum in Barcelona, October 2022.

On May 26, 2023, a presentation was made to a major company operations directors on how engineering simulator models could be used as digital twins for operations and maintenance to achieve generation load capability factors of 99% as done by Rolls Royce in real time for aircraft whilst flying, so that there were no plant failures or power reductions.

All sections have been written. Work continued to review, revise, and finalize the draft. A number of working group face-face and/or virtual meetings were held in 2024, e.g. Nuclear Power Plant Simulation Conference at Myrtle Beach in February 2024, Surry Power Station in November 2024, etc. Several drafts of the standard have been prepared and reviewed. Several new persons joined the working group, whilst a member from Germany left and a NRC member retired but has continued on the working group.

ANS-3.13, *Nuclear Facility Reliability Assurance Program (RAP) Development* (proposed new standard)

Scope: *This standard provides criteria to describe nuclear facility reliability assurance programs and to perform scheduled maintenance and/or monitoring of operating conditions. This standard identifies and provides for scheduled maintenance based upon design principles. It provides guidance on how to select components' failure modes and maintenance requirements.*

Membership:
James August, Chair, Individual; Ettore Anselmi, Individual; Todd Anselmi, Idaho National Laboratory; Edward Chen, Idaho National Laboratory; John Dowling, Ameren Missouri-Callaway Energy Center; Aaron England, Tennessee Valley Authority; James Halderman, Bechtel Power Corporation; Prasad Kadambi, Individual; Majeed Khan, National Institute of Standards & Technology; Mark Linn, Individual; Alissa Neuhausen, U.S. Nuclear Regulatory Commission; Dong Thai Nguyen, Southern Nuclear Operating Company; J. Brandon Norris, X-Energy, LLC; James O'Brien, U.S. Department of Energy; Vincent Paglioni, Colorado State University; Mark Paul, Dominion Energy; Gregory Schoenebeck, U.S. Department of Energy; Andrei Smirnov, Individual; Cody Walker, Idaho National Laboratory

Status: A lengthy draft (~150 pages) was developed in 2014 but was overly focused on NRC expectations and not industry need. Little progress was made in 2016-2020 due to working group member work commitments. Renewed focus needs to establish appropriate goals and cut the original draft materials down. The original goal and work were too regulatory oriented to be useful to industry. We have reconstituted the approach to "RAP" and have reformed the working group. The entire process has been reviewed and evaluated for continued need and utility. The working group continued to meet bi-monthly in 2024 to develop an outline that will provide framework for the draft. In 2024, the outline has been finished. Many issues were discussed relating to RAP design and requirements feeding into operations at commissioning of a plant. Scope of RAP and practical ways to develop the RAP during design procurement of SSCs have all been well discussed, in process reducing requirements. The "what" of RAP RIPB is pretty well defined; how far to take the "how" by giving guidance where none exists, filling in the gaps of design fulfillment, tech spec development, Scheduled maintenance development to support surveillance and technical scheduled maintenance implementation, remains.

ANS-3.15, *Risk-Informing Critical Digital Assets (CDAs) for Nuclear Power Plant Systems* (proposed new standard)

Scope: *This standard will establish the principle criteria for achieving a level of cyber security that provides reasonable assurance for safe operation of a nuclear power plant. This approach takes advantage of the unique features of nuclear systems, including, reactor physics such as reactivity feedback mechanisms; mechanical systems design, such as safety valves; operator response, such as manual trip actions; non-digital I&C, such as interlocks; and structural features, such as shielding structures.*

Membership:
Michael Muhlheim, Chair, Oak Ridge National Laboratory; Gregory Hudson, Vice Chair, Metcalfe PLLC; Robert Youngblood, Vice Chair, Idaho National Laboratory; Ahmad Al Rashdan, Idaho National Laboratory; Eric Ball, Energy Research, Inc.; Ralph Branscomb, Florida Power & Light; Andrew Clark, Sandia National Laboratories; Ronald Cole, Enercon Federal Services; Shannon Eggers, Idaho National Laboratory; Nathan Faith, Constellation Generation Corporation, LLC; George Flanagan (Observer), Individual; Matthew Hertel, X-Energy, LLC; Jodine Jansen-Vehec, BWX Technologies, Inc.; Eric Lee, U.S. Nuclear Regulatory Commission; Gary Locklear, Kinetrics AES, Inc.; Frederich McCrory, Individual; Edward Quinn, Paragon Energy Solutions; Michael Rowland, Sandia National Laboratories; Michael Woodridge, Curtiss-Wright Corporation; Fan Zhang, Georgia Institute of Technology

Status: The working group is collaborating with JCNRM to produce a guidance document for nuclear power plants. The PINS was submitted to ANSI on 5/26/2020. Developing the standard is a more difficult problem than we anticipated. We learn that if the problem you are analyzing is simple, you get a simple answer that really isn't an answer and does not help in analyzing the problem. We are working on how to risk-inform the selection of critical digital assets (CDAs) in NPPs. We started with a simple system and because of its simplicity there weren't any CDAs that did not need protection, so we moved to a complex system. We should know soon if our proposed method is viable.

ANSI/ANS-56.8-2020, *Containment System Leakage Testing Requirements* (revision of ANSI/ANS-56.8-2002; R2016)

Scope: *This standard provides design criteria for controls and monitoring instrumentation necessary to shut down a reactor and maintain it in a safe shutdown condition from outside the control room. The design criteria require that: (a) specific controls and monitoring instrumentation be provided; (b) these controls be installed at a location (or locations) that is physically separate from the control room and cable spreading areas; (c) simultaneous control from both locations be prevented by devices for transfer of control from the control room to the remote location(s); and (d) the remote controls be used as a defense-in-depth measure in addition to the control room shutdown controls and as a minimum provide for one complete channel of shutdown equipment.*

Membership:
James Glover, Chair, Fluxion Technologies; Ahmad Al Rashdan, Idaho National Laboratory; Jerome Bettle, U.S. Nuclear Regulatory Commission; Kenneth Clark, Individual; Alexis Courtois, Electricite de France; Mark Gowin, Tennessee Valley Authority; Kelvin Green, Tennessee Valley Authority; Jeremy Gustafson, BWX Technologies, Inc.; Howard Hill, BCP Technical Services, Inc.; Gary Holtz, Pacific Gas & Electric Company; Earnestine Johnson, Entergy Corporation; Daniel Oakley, Constellation Corporation; Babul Patel, Individual; Raymond (Joe) Perry, Graftel, Inc.

Status: The revision was approved by ANSI on 12/11/2020. In progress to submit a PINS allowing for the revision to the 2020 standard to include SMRs.

ANSI/ANS-58.8-2019 (R2024), *Time Response Criteria for Manual Actions at Nuclear Power Plants* (revision of ANSI/ANS-58.8-1994; R2017)

Scope: *This standard establishes criteria and methods for identifying, calculating, validating, tracking, and documenting time requirements for the performance of nuclear power plant time-limited manual actions that are associated with either design basis events (DBEs) or licensing basis.*

Membership:
Huafei (Harry) Liao, Chair, X-energy LLC; Ahmad Al Rashdan, Idaho National Laboratory; David Desaulniers, U.S. Nuclear Regulatory Commission; Stephen Fleger, U.S. Nuclear Regulatory Commission; Jonathan Ford, Framatome; Robert Fuld, Individual; Susan Sallade, Constellation Corporation; Logan Schulze, Xcel Energy; Rachel Vail, AECOM; Michael Weiner, Duke Energy

Status: This standard was reaffirmed by ANSI on 10/4/2024.

Emergency Planning and Response Subcommittee

***Membership**:*
Ronald Markovich, Chair, Contingency Management Consulting
Steven Gebers, Vice Chair, Quantum Nuclear Services
Manit Shah, Canadian Nuclear Laboratories

The Emergency Planning and Response Subcommittee manages the following projects and current standards:

ANS-GD-3.8, *Guidance for Risk-Informing Emergency Preparedness Programs for Nuclear Facilities* (proposed Guidance Document)

***Scope:** The Guidance Documents will provide recommended practices for using risk analysis methods and insights to influence the properties of emergency preparedness and response functions for nuclear power plants and non-power nuclear facilities. Initial work products will focus on risk-informing development of site Emergency Response Organizations (e.g., identification of necessary functions, positions and response times) and technical bases for sizing Emergency Planning Zones (including the selection of accident sequences). This guidance may be provided as a logically integrated set of work products rather than a single document. In the event the Work Group identifies a need for EP Standards, a PINS form will be completed for each proposed Standard. All other RIEP work products will be prepared with concurrence of the sponsoring consensus committees.*

Membership:
Ronald Markovich, Co-Chair, Contingency Management Consulting; Gregory Hudson, Co-Chair, Metcalf PLLC; Amir Afzali, Individual; Dean Burnett, Entergy; Bradley Dolan, Tennessee Valley Authority; Jeremiah Doyle, NuScale Power; John Egdorf, Proactive Planning, LLC; David Grabaskas, Argonne National Laboratory; Jordan Hagaman, Kairos Power LLC; Justin Hawkins, Holtec International; Gary Hayner, Jensen Hughes Inc.; Justin Hiller, Callaway Nuclear Plant; Kyle Hope, Westinghouse Electric Company; Hovhannes Hovhannisyan, Holtec International; James Jones, Contingency Management Consulting; Mosin Khan, Ontario Power Generation Inc.; Gerry Kindred, Tennessee Valley Authority; Svetlana Lawrence, Idaho National Laboratory; Roy Linthicum, Constellation Energy Corporation; Scott McCain, Emergency Planning Technical Consultants, Inc.; Luke McSweeney, X-Energy LLC; Matthew Nee, Nebraska Public Power District—Cooper; Michael Norris, U.S. Nuclear Regulatory Commission; Robert Rishel, Duke Energy Corporation; Susan Sallade, Framatome, Inc.; Raymond Schneider, Westinghouse Electric Company LLC; Eric Schrader, U.S. Nuclear Regulatory Commission; Julia Sharma, X-Energy LLC; David Young, Nuclear Energy Institute

Status: The Standards Board approved the ANS-GD-3.8 RIEP PINS without comment.

A Risk-Informed Emergency Preparedness Working Group (RIEP WG) has been established as a collaborative effort between the ANS Large Light Water Consensus Committee's (LLWRCC) Emergency Planning and Response Subcommittee and the ASME/ANS Joint Committee on Nuclear Risk Management's (JCNRM) Subcommittee on Risk Applications. The RIEP WG mission is to develop guidance for using risk analysis methods and insights to influence emergency preparedness and response functions for nuclear facilities.

The initial two task groups and their draft scope statements are:

- EPZ Task Group (Chair: J. Doyle): Risk-inform technical bases for sizing Emergency Planning Zones including spectrum of accident sequences to be considered.
- ERO Task Group (Chair: E. Collins): Risk-inform site Emergency Response Organizations (e.g., identification of necessary functions, positions and response times to the event at hand, etc.)

To date, each task group has developed their mission statements and outlined the initial key deliverables. As the task groups move toward starting guidance document development, the details of developing guidance documents are being hashed out. This involves defining the format, numbering, and content of the RIEP Guidance Documents. RIEP guidance documents would generally follow the format of ANS standards except that the document specifies recommended practices instead of requirements (not using should/shall wording).

ANS-3.8.1, *Properties of Radiological Emergency Response Functions and Organizations for Nuclear Facilities* (proposed new standard, historic revision of ANSI/ANS-3.8.1-1995)

Scope: *This standard establishes properties for identifying emergency response functions and subsequently developing an overall pre-planned emergency response organization for nuclear facilities. The properties address a) basic emergency response functions, b) emergency response support functions, c) emergency response organization, and d) personnel responsibilities.*

Membership:
Ronald Markovich, Contingency Management Consulting Group, LLC; Steve Hook, Individual

Status: Project Initiation Notification System (PINS) forms were approved and submitted to ANSI for historical revisions to seven emergency preparedness standards; ANS-3.8.1, ANS-3.8.2, ANS-3.8.3 (to incorporate ANS-3.8.4), ANS-3.8.6 (to incorporate ANS-3.8.5), and ANS-3.8.7. These projects are not currently active.

ANS-3.8.2, *Properties of Functional and Physical Characteristics of Radiological Emergency Response Facilities at Nuclear Facilities* (proposed new standard, historic revision of ANSI/ANS-3.8.2-1995)

Scope: *This standard establishes functional and physical properties for facilities needed to provide an adequate overall emergency response. The properties address a) emergency response facilities, b) facility features and requirements, and c) parameters needed to provide a basis for determining an adequate inventory of equipment and supplies for anticipated emergency responses.*

Membership:
Ronald Markovich, Chair, Contingency Management Consulting Group, LLC; Steve Hook, Individual

Status: Project Initiation Notification System (PINS) forms were approved and submitted to ANSI for historical revisions to seven emergency preparedness standards; ANS-3.8.1, ANS-3.8.2, ANS-3.8.3 (to incorporate ANS-3.8.4), ANS-3.8.6 (to incorporate ANS-3.8.5), and ANS-3.8.7. These projects are not currently active.

ANS-3.8.3, *Properties of Radiological Emergency Response Plans and Implementing Procedures and Maintaining Emergency Response Capability for Nuclear Facilities* (proposed new standard, historic revision and consolidation of ANSI/ANS-3.8.3-1995 and ANSI/ANS-3.8.4-1995)

Scope: *This standard establishes properties for developing a radiological emergency response plan, emergency plan implementing procedures, and emergency plan administrative procedures for nuclear facilities. Properties include exercises, drills, surveillance, and training.*

Membership:
Ronald Markovich, Chair, Contingency Management Consulting Group, LLC; Steve Hook, Individual

Status: Project Initiation Notification System (PINS) forms were approved and submitted to ANSI for historical revisions to seven emergency preparedness standards; ANS-3.8.1, ANS-3.8.2, ANS-3.8.3 (to incorporate ANS-3.8.4), ANS-3.8.6 (to incorporate ANS-3.8.5), and ANS-3.8.7. These projects are not currently active.

ANS-3.8.6 *Properties of the Conduct of Offsite Radiological Assessment for Emergency Response and Emergency Radiological Field Monitoring, Sampling and Analysis for Nuclear Facilities* (proposed new standard, historic revision and consolidation of ANSI/ANS-3.8.5-1992 and ANSI/ANS-3.8.6-1995)

Scope: *This standard establishes properties for consequence assessment properties, as well as field monitoring, and sampling and analysis strategy during all phases of and after an emergency to be used for Protective Action Recommendations for nuclear facilities.*

Membership:
Ronald Markovich, Chair, Contingency Management Consulting Group, LLC

Status: Project Initiation Notification System (PINS) forms were approved and submitted to ANSI for historical revisions to seven emergency preparedness standards; ANS-3.8.1, ANS-3.8.2, ANS-3.8.3 (to incorporate ANS-3.8.4), ANS-3.8.6 (to incorporate ANS-3.8.5), and ANS-3.8.7. These projects are not currently active.

ANS-3.8.7, *Properties of Planning, Development, Conduct, and Evaluation of Drills and Exercises for Emergency Preparedness at Nuclear Facilities* (proposed new standard, historic revision of ANSI/ANS-3.8.7-1998)

Scope: *This standard establishes properties for the planning, development, conduct and evaluation of radiological emergency response drills and exercises in support of emergency preparedness at nuclear facilities. In addition, this standard will incorporate the requirements for the conduct of Hostile Action-Based Emergency Response drills.*

Membership:
Ronald Markovich, Chair, Contingency Management Consulting Group, LLC; Steve Hook, Individual; Eric Schrader, U.S. Nuclear Regulatory Commission

Status: ANS-3.8.7 was initiated as a pilot for the proposed emergency preparedness standards. It was to be used by both the commercial nuclear industry and DOE. The concept was to develop the standard (since the NRC new rulemaking addressed this area) and then present for incorporation of their requirements. Unfortunately, push back was received by the commercial nuclear industry, and the working group was unable to engage DOE to provide input. Issuance of this standard without DOE involvement would not serve a purpose as the commercial nuclear industry is not supportive of its development/issuance. This project is currently on hold.

Large Light Water Reactor Consensus Committee (LLWRCC)
Organizational Chart

Chair: Michelle French Vice Chair: Earnestine Johnson

Reactor and Plant Systems and Support		Simulators, Instrumentation, Control Systems, Software and Testing	Emergency Planning and Response
Chair: Robert Burg **Vice Chair: Franklin Hope**		**Chair: Pranab Guha** **Vice Chair: OPEN**	**Chair: Ronald Markovich** **Vice Chair: Steven Gebers**
Ⓟ = PINS submitted to ANSI (PINS for guidance documents are approved but not submitted to ANSIP			
ANS-18.1-2020 (A2) Radioactive Source Term for Normal Operation of Light Water Reactors App'd 7/24/2020 (WGC: K. Geelhood)	ANS-30.3-2022 (A2) Light-Water Reactor Risk-Informed Performance-Based Design App'd 7/21/2022 (WGC: K. Welter)	ANS-3.1-2014 (R2020) (A2) Selection, Qualification, and Training of Personnel for Nuclear Power Plants RF 2/4/2020 (WGC: T. Riti)	ANS-GD-3.8.x Ⓟ (B1) Guidance for Risk-Informing Emergency Preparedness Programs for Nuclear Facilities (new guidance document) (WGCs: R. Markovich & G. Hudson)
ANS-51.10-2020 (A2) Auxiliary Feedwater System for Pressurized Water Reactors App'd 10/23/2020 (WGC: E. Johnson)	ANS-58.9-2002 (R2020) (A2) Single Failure Criteria for Light Water Reactor Safety-Related Fluid Systems RF 7/23/2020 (WGC: OPEN)	ANS-3.2-2012 (R2022) (A2) Managerial, Administrative, and Quality Assurance Controls for the Operational Phase of NPPs RF 5/26/22 (WGC: A. England)	ANS-3.8.1 (W2005) Ⓟ (C2) Properties of Radiological Emergency Response Functions and Organizations for Nuclear Facilities (WGC: R. Markovich) ON HOLD
ANS-58.14-2011 (R2022) (A2) Safety and Pressure Integrity Classification Criteria for Light Water Reactors RF 2/4/2022 (WGC: M. Linn)	ANS-59.51-1997 (R2020) (A2) Fuel Oil Systems for Safety-Related Emergency Diesel Generators RF 7/27/2020 (WGC: OPEN)	ANS-3.4-2013 (R2018) (A2) Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants RF 7/2/2018 (WGC: B. Stevens & S. Esparza)	ANS-3.8.2 (W2005) Ⓟ (C2) Properties of Functional and Physical Characteristics of Radiological Emergency Response Facilities at Nuclear Facilities (WGC: R. Markovich) ON HOLD
ANS-59.52-1998 (R2020) (A2) Lubricating Oil Systems for Safety-Related Emergency Diesel Generators RF 7/24/2020 (WGC: OPEN)	ANS-60.1 (NEW) Ⓟ (B1) Civilian Nuclear Export Controls (WGC: M. Harding)	ANS-3.5-2018 (R2024) (A2) Nuclear Power Plant Simulators for Use in Operator Training and Examination RF 9/11/2024 (WGC: J. Florence)	ANS-3.8.3 (W2005) Ⓟ (C2) Properties of Radiological Emergency Response Plans and Implementing Procedures and Maintaining Emergency Response Capability for Nuclear Facilities (WGC: R. Markovich) ON HOLD
ANS-56.1 (NEW) (B2) Containment Hydrogen Control (WGC: J. Glover) (project in consideration)	ANS-56.2 (W1999) Ⓟ (C1) Containment Isolation Provisions for Fluid Systems After a LOCA (WGC: E. Johnson)	ANS-56.8-2020 (A2) Containment System Leakage Testing Requirements App'd 12/11/2020 (WGC: J. Glover)	ANS-3.8.6 (W2005) Ⓟ (C2) Properties of the Conduct of Offsite Radiological Assessment for Emergency Response and Emergency Radiological Field Monitoring, Sampling and Analysis for Nuclear Facilities (WGC: R. Markovich) ON HOLD
ANS-58.2 (W1998) (C2) Design Basis for Protection of Light Water Nuclear Power Plants Against the Effects of Postulated Pipe Rupture (WGC: D. Zheng)	ANS-58.3 (W2019) (C2) Physical Protection for Nuclear Safety-Related Systems and Components (WGC: OPEN)	ANS-58.8-2019 (R2024) (A2) Time Response Criteria for Manual Actions at Nuclear Power Plants RF 10/4/2024 (WGC: H. Liao)	
ANS-58.6 (W2011) (C2) Criteria for Remote Shutdown for Light Water Reactors Facilities (WGC: OPEN)	ANS-59.3 (W2012) Ⓟ (C2) Nuclear Safety Criteria for Control Air Systems (WGC: OPEN) ON HOLD	ANS-3.5.1 (NEW) Ⓟ (B1) Nuclear Power Plant Simulators for Use in Simulation Assisted Engineering and Non-Operator Training (WGC: K. Singh)	
	ANS-58.11 (W2012) (C2) Design Criteria for Safe Shutdown Following Selected Design Basis Events in Light Water Reactors (project being considered) (WGC: OPEN)	ANS-3.13 (NEW) Ⓟ (B1) Nuclear Facility Reliability Assurance Program Development (WGC: J. August)	
		ANS-3.15 (NEW) Ⓟ (B1) Risk-Informing Critical Digital Assets (CDAs) for Nuclear Power Plant Systems (WGC: M. Muhlheim)	

(A1) Current Being Worked On Standards
(A2) Current Not Being Worked On Standards
(B1) Proposed Being Worked On Standards
(B2) Proposed Not Being Worked On Standards
(C1) Withdrawn Being Worked On Standards
(C1) Withdrawn Being Worked On Standards

Table 3 – LLWRCC Organizational Chart

Nonreactor Nuclear Facilities Consensus Committee (NRNFCC)

Mark Joseph, Chair
Navarro Research & Engineering, Inc.

Scope: *The NRNFCC is responsible for the preparation and maintenance of voluntary consensus standards as well as standards-related guidance documents, guidance standards, and technical reports supporting the safety analysis, design, maintenance, operator selection and training, and quality requirements for nonreactor nuclear facilities including facilities using radioactive isotopes, remote handling of radioactive materials, fuel processing, mixed oxide fuel processing and other fuel cycle facilities other than spent fuel handling and storage. The ANS Standards Committee Procedures Manual for Consensus Committees shall be used to guide the activities of this consensus committee.*

NRNFCC Membership:

Mark Joseph, Chair, Navarro Research & Engineering, Inc.
Andrew De La Paz, Vice Chair, U.S. Department of Energy
David Andersen, Defense Nuclear Facilities Safety Board
Todd M. Anselmi, Idaho National Laboratory
Kim Anthony, Energy Solutions
Nima Ashkeboussi, Global Laser Enrichment, LLC
Lawrence Berg, U.S. Department of Energy
Daniel Eggers, Simpson Gumpertz & Heger, Inc.
Mukesh K. Gupta, Amentum Technical Services
Kevin Kimball, Individual
Herbert Massie, Jr., Massie Consulting, LLC
Carl A. Mazzola, Los Alamos National Laboratory
Ryan McClarren, University of Notre Dame
James O'Brien, U.S. Department of Energy

Observers and Associate Members:
Margaret Kotzalas, Observer, U.S. Department of Energy
Alexander Kunz, Associate Member, Terrapower

Report of NRNFCC:

The NRNFCC held hybrid meetings on June 19, 2024, and November 14, 2024. H. M. Hashemian, his alternate Adam Deatherage, and Tracy Radel resigned from the NRNFCC.

Approved in 2024:

No standards were approved in 2024.

Active Standards/Projects (Approved PINS):

ANS-2.36, *Accident Analysis for Aircraft Crash into Reactor and Nonreactor Nuclear Facilities* (proposed new standard)

ANS-57.11, *Integrated Safety Assessments for Fuel Cycle Facilities* (proposed new standard)

The NRNFCC supervises the work of the following projects:

ANS-2.36, *Accident Analysis for Aircraft Crash into Reactor and Nonreactor Nuclear Facilities* (proposed new standard)

Scope: *This standard's broad reactor and nonreactor nuclear facility applicability provides the user the requirements and guidance to evaluate and assess the significance of aircraft crash risk on nuclear facility safety and provides a framework of stepwise increases in analytical sophistication aimed to demonstrate that an aircraft crash either does or does not exceed a risk level of concern equivalent to other generally applied sources of risk from the operation of nuclear facilities.*

Membership: Mark Joseph, Chair, Navarro Research & Engineering, Inc.; William Walker, Secretary, Oak Ridge National Laboratory; David Andersen, Defense Nuclear Facilities Safety Board; Firdu Bati, Federal Aviation Administration; Ronald Beaulieu, Mission Support & Test Services; Kermit Bunde, U.S. Department of Energy; Nestor Castaneda, Simpson Gumpertz & Heger Inc.; Darwin Damba, U.S. Department of Energy; Andrew De La Paz, U.S. Department of Energy; Daniel Eggers, Simpson Gumpertz & Heger Inc.; Patrick Frias, U.S. Department of Energy; Nancy Fujikado, Los Alamos National Laboratory; Richard Funk, Naval Nuclear Laboratory–Bettis; Amitava Ghosh, U.S. Nuclear Regulatory Commission; Ian Goethert, Oak Ridge National Laboratory; Loren Groff, National Transportation Safety Board; Randy James, Structural Solutions Consulting, LLC; Paul Kalowski, Federal Aviation Administration; Roman Kazban, National Nuclear Security Administration; Oscar Martinez, Individual; Devlan Maxwell, Federal Aviation Administration; John McAllister, Hukari Ascendent; Jinsuo Nie, Individual; Kevin O'Kula, Individual; David Pinkston, Lawrence Livermore National Laboratory; Jacob Platfoot, Oak Ridge National Laboratory; Troy Reiss, Idaho National Laboratory; Samuel Rosenbloom, Individual; Kristofer Torgerson, Oak Ridge National Laboratory; Peter Washburn, U.S. Department of Energy

Status: PINS submitted to ANSI 7/13/2021. The working group has the following 5 subgroups:
- Subgroup 1 - Implementation Guidance, Methodology Overview;
- Subgroup 2 - Methodology for Evaluating Aircraft Impact Frequency;
- Subgroup 3 - Methodology for Evaluating Integrity of Structures, Systems, and Components Subjected to Aircraft Impact;
- Subgroup 4 - Methodology for Evaluating Exposure Due to Aircraft Impact-Consequence
- Subgroup 5 - Methodology for Evaluation of Unmanned Aerial Systems - Drones

The three main task groups under ANS-2.36 met monthly in 2024 producing a draft of the standard that is ~ 90% complete. The task groups are reviewing the draft and expect to complete the working group review in January 2025. The standard is expected to begin the first level or review outside the working group (i.e., NDCC, RP3C, SCoRA) in early 2025.

ANSI/ANS-3.14-2021, *Process for Aging Management and Life Extension for Nonreactor Nuclear Facilities* (new standard)

Scope: *This standard addresses requirements for systematically evaluating structures, systems, and components (SSCs) for extending the life of nonreactor nuclear facilities. This standard is applicable to facilities that are 15 to 30 years old and expect to operate for an additional 20 to 30 years. This standard provides a systematic process to determine the scope of the aging management/life extension program in terms of SSCs. For those SSCs, a process for the evaluation of remaining lifetime and determining the need for additional analysis, repairs, inspections, and replacements is developed.*

Membership:
Todd Anselmi, Co-Chair, Idaho National Laboratory; Craig McMullin, Co-Chair, Individual; Brendan Burns, U.S. Department of Energy; Joseph Crociata, Consolidated Nuclear Security, LLC; Margie Kotzalas, U.S. Department of Energy; Herbert Massie, Massie Consulting, LLC; Michael Mudlock, Simpson Gumpertz & Heger, Inc.; James O'Brien, U.S. Department of Energy; Cameron Samuelson-Sanford, Simpson Gumpertz & Heger, Inc.

Status: This standard received ANSI approval on 8/5/2021. No specific revision activity in 2024; currently monitoring for questions and interpretation needs.

ANS-57.11, *Integrated Safety Assessments for Nonreactor Nuclear Facilities* (proposed new standard)

Scope: *This standard provides an ISA method consistent with 10 CFR Part 70 regulations to identify credible accident sequences that can lead to "high" or "intermediate" consequences as outlined in performance requirements. The ISA also specifies safety controls to prevent or mitigate those potential accidents and assess the likelihood that the facilities would meet the performance requirements, and management measures a facility operator will rely on to ensure that safety controls are available to perform their function. ISAs evaluate not just radiological and nuclear criticality hazards, but chemical and fire hazards as well.*

The emphasis of this standard is aimed at making nonreactor nuclear facility safety requirements more risk-informed, performance-based, predictable and objective. The results of this standard, i.e., identification of hazards and design events can be integrated into that of ANS-58.16 Safety Categorization and Design Criteria for Nonreactor Nuclear Facilities.

Membership:
Margaret Kotzalas, Chair, U.S. Department of Energy; Todd Anselmi, Idaho National Laboratory; Sven Bader, Orano Federal Services; Michael Dunlevy, Defense Nuclear Facilities Safety Board; Rani Franovich, Nuclear ROSE Consulting, LLC; Chelsea Gunter, Global Nuclear Energy Advisory; Gary Kaplan, RSL Safety; Alexander Kunz, TerraPower Isotopes; Eloura Phelps, General Matter; April Smith, The MITRE Corporation; Robert Youngblood, Idaho National Laboratory

Status: A PINS was submitted to ANSI on 2/27/2013 with a revision resubmitted to ANSI on 2/25/2015. A draft was issued to the NRNFCC for a preliminary review in November of 2015. A revised draft was issued to the NRNFCC for formal ballot on 4/3/2019. The draft was also provided to the RP3C and the NCSCC for review and comments. Significant comments and objections were received. The working group has completely revised the draft to address numerous ballot comments. Items left to be completed prior to re-balloting include formatting, making the references consistent, and making the definitions consistent within ANS standards. In 2024, we addressed comments from the working group and are rewriting the standard. We met several times during the year.

ANSI/ANS-58.16-2014 (R2020), *Safety Categorization and Design Criteria for Nonreactor Nuclear Facilities* (new standard)

Scope: *This standard provides guidance and criteria for safety categorization of items structures, systems, components (SSCs) and administrative controls associated with nuclear safety in nonreactor nuclear facilities such as: nuclear storage and processing facilities, nuclear material and radioactive waste facilities, and nuclear fuel examination facilities. This standard elaborates on how to derive safety functions and develop design and operational requirements to satisfy these functions. It also associates the safety categorization of items to engineering (e.g., civil/structural, mechanical, electrical) and programmatic (e.g., QA) classification levels. Finally, this Standard defines functional and boundary criteria for safety SSCs to include associated SSCs necessary for the operation of a safety SSC when called upon to provide its safety function.*

Membership:
Todd Anselmi, Chair, Idaho National Laboratory; Douglas Clark, Consolidated Nuclear Security; Jerry Golden, Individual; Alexander Kunz, TerraPower Isotopes; James O'Brien, U.S. Department of Energy; Hahn Phan, U.S. Nuclear Regulatory Commission; Reginald Seay, Jacobs Technology, Inc.

Status: ANSI approved the reaffirmation of this standard on 4/9/2020. The working group is currently monitoring work on the revision of ANSI/ANS-2.26-2004 (R2021), *Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design*, to determine whether a revision of ANS-58.16 is needed. Working group membership has been updated with new members to consider making changes (commencing in 2024) to reflect changes driven by ANS-2.26 and other actions the new membership identifies as needing update. Maintenance will be due in 2025.

Nonreactor Nuclear Facilities Consensus Committee (NRNFCC) List of Standards/Projects Chair: Mark Joseph Vice Chair: Andrew De La Paz		
Ⓟ = PINS submitted to ANSI		
ANS-3.14-2021 (A2)	Process for Infrastructure Aging Management and Life Extension of Nonreactor Nuclear Facilities	APP'D 8/5/2021 (WGCs: T. Anselmi & C. McMullin)
ANS-58.16-2014 (R2020) (A2)	Safety Classification and Design Criteria for Nonreactor Nuclear Facilities	RF 4/9/2020 (WGC: T. Anselmi)
ANS-2.36 (NEW) Ⓟ (B1)	Accident Analysis for Aircraft Crash into Hazardous Facilities	Active Project (WGC: M. Joseph)
ANS-57.11 (NEW) Ⓟ (B1)	Integrated Safety Assessments for Nonreactor Nuclear Facilities	Active Project (WGC: M. Kotzalas)
ANS-3.6 (NEW) (B2)	Requirements for Preoperational and Startup Testing	(Project in Consideration) (WGC: OPEN)
(A1) Current Being Worked On Standards		
(A2) Current Not Being Worked On Standards		
(B1) Proposed Being Worked On Standards		
(B2) Proposed Not Being Worked On Standards		
(C1) Withdrawn Being Worked On Standards		
(C2) Withdrawn Not Being Worked On Standards		

Table 4 – NRNFCC List of Standards/Projects

Nuclear Criticality Safety Consensus Committee (NCSCC)

Larry L. Wetzel, Chair
Individual

Scope: *The NCSCC (formerly known as N16) is responsible for the preparation and maintenance of voluntary consensus standards as well as standards-related guidance documents, guidance standards, and technical reports supporting the determination of the potential for nuclear criticality of fissile material outside reactors, for the prevention of accidental criticality, for mitigating consequences of accidents should they occur, and for the prevention of nuclear chain reactions in activities associated with handling, storing, transporting, processing, and treating fissionable nuclides. The ANS Standards Committee Procedures Manual for Consensus Committees shall be used to guide the activities of this consensus committee.*

NCSCC Membership:

Larry L. Wetzel, Chair, Individual
William R. Shackelford, Vice Chair, Paschal Solutions Inc.
Roger W. Bartholomay, C.S. Engineering, Inc.
Lawrence J. Berg, U.S. Department of Energy
Douglas Bowen, Oak Ridge National Laboratory
Kermit Bunde, U.S. Department of Energy
Robert D. Busch, University of New Mexico
William Doane, Framatome, Inc.
Ernest Elliott, BWX Technologies, Inc.
Calvin M. Hopper, Individual
Kevin Kimball, Individual
Ronald A. Knief, INMM Representative
John A. Miller, Sandia National Laboratories
Jeremy Munson, U.S. Nuclear Regulatory Commission
Scott P. Murray, HPS Representative
Robert E. Wilson, Individual

Observer:
Andrew Prichard, Individual

Report of NCSCC:

NCSCC is continuing its efforts to review and determine standard definitions for terms used in the ANS-8 standards. The working groups will then be given the list of definitions and will be requested to use the definitions unless there is a compelling reason not to. The committee has also begun a more in-depth review of RIPB principles in order to understand where the ANS-8 standards fall in this structure.

The NCSCC held a hybrid meeting on November 18, 2024, during the ANS Winter Meeting in Orlando, FL, with 13 of the 16 members in attendance, either in person or virtually. The NCSCC had 10 ballots with an average participation of over 95%. The committee had two recirculation ballots on draft standards, two member appointment/interest category concurrences, and four reaffirmations of standards. The NCSCC balance of interest is good, but the committee does not have 20 members as has been suggested.

Robert Wilson retired from DOE and remains on the NCSCC as an individual. Kermit Bunde was confirmed as a member of the NCSCC to replace Wilson in his role at DOE.

Approved in 2024

ANSI/ANS-8.15-2014 (R2024), *Nuclear Criticality Safety Control of Selected Actinide Nuclides* (reaffirmation of ANSI/ANS-8.15-2014 (R2019)

ANSI/ANS-8.17-2004 (R2024), *Criticality Safety Criteria for the Handling, Storage, and Transportation of LWR Fuel Outside Reactors* (reaffirmation of ANSI/ANS-8.17-2004; R2019)

ANSI/ANS-8.19-2014 (R2024), *Administrative Practices for Nuclear Criticality Safety* (reaffirmation of ANSI/ANS-8.19-2014; R2019)

ANSI/ANS-8.23-2019 (R2024), *Nuclear Criticality Accident Emergency Planning and Response* (reaffirmation of ANSI/ANS-8.23-2019)

ANSI/ANS-8.26-2024, *Criticality Safety Engineer Training and Qualification Program* (revision of ANSI/ANS-8.26-2007; R2022)

ANSI/ANS-8.28-2024, *Administrative Practices for the Use of Non-Destructive Assay Measurements for Nuclear Criticality Safety* (new standard)

Active Standards/Projects (Approved PINS):

ANS-8.1, *Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors* (revision of ANSI/ANS-8.1-2014; R2018)

ANS-8.12, *Nuclear Criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors* (revision of ANSI/ANS-8.12-1987; R1993; R2002; R2016; R2021)

ANS-8.20, *Nuclear Criticality Safety Training* (revision of ANSI/ANS-8.20-1991; R1999; R2005; R2015; R2020)

ANS-8.22, *Nuclear Criticality Safety Based on Limiting and Controlling Moderators* (revision of ANSI/ANS-8.22-1997; R2016; R2021)

Fissionable Material Outside Reactors Subcommittee (ANS-8 Subcommittee)
(This subcommittee is sponsored by the ANS Nuclear Criticality Safety Division.)

Scope: *The aim of this committee is to establish standards providing guidance in the prevention of nuclear chain reactions in all procedures for handling, storing, transporting, processing, and treating fissionable nuclides. ANS-8 is responsible to the Nuclear Criticality Safety Consensus Committee.*

Membership:
Douglas Bowen, Chair, Oak Ridge National Laboratory
Kevin Reynolds, Vice Chair, Consolidated Nuclear Security, LLC
Deborah Hill, Secretary, National Nuclear Laboratory, U.K.
James Baker, Spectra Tech, LLC
Marvin Barnett, Savannah River Nuclear Solutions
Nicholas Brown, Nuclear Fuel Services, Inc.
Michael Crouse, Consolidated Nuclear Security
Theresa Cutler, Los Alamos National Laboratory
David Erickson, Individual
Jerry Hicks, Individual
Billy Lee, Oak Ridge National Laboratory
James Morman, Argonne National Laboratory
Lon Paulson, GE Hitachi Nuclear Energy

Catherine Percher, Lawrence Livermore National Laboratory
Andrew Prichard, Individual
Tracy Stover, Savannah River Nuclear Solutions, LLC
Dominic Winstanley, Sellafield Ltd. (UK)

Observers:
Peter Angelo, Consolidated Nuclear Security, LLC
Jeffrey Chapman, National Nuclear Security Administration
Ernest Elliott, BWX Technologies, Inc.
Ronald Knief, Individual
James Kuropatwinski, Los Alamos National Laboratory
Alex Lang, Oak Ridge National Laboratory
William Marshall, Oak Ridge National Laboratory
John Miller, Sandia National Laboratories
Brandon O'Donnell, Spectra Tech, Inc.
Charles Rombough, CTR Technical Services, Inc.
Ellen Saylor, Individual
Christopher Tripp, Tripp Nuclear Consulting Services
Kristan Wessels, Consolidated Nuclear Security, LLC
Larry Wetzel, Individual

Fissionable Material Outside Reactors Subcommittee (ANS-8) Report:

Two ANS-8 Subcommittee meetings were held in June and November, the week before the Annual and Winter ANS meetings to discuss ANS-8 standards in revision and business related to standard maintenance and membership. Two ANS-8 Forum sessions under the Nuclear Criticality Safety Division (NCSD) were held at the Annual and Winter ANS meetings to discuss ANS-8 business with the broader NCS community. Working group chairs were involved in these meetings to discuss work ongoing with ANS-8 standards for those standards undergoing revision or the generation of basis statements to train new working group members and to prepare items for upcoming revisions.

ANS-8 Subcommittee Membership Changes:

Chris Haught and Thomas P. McLaughlin resigned from ANS-8 and other standards duties.
Deb Hill from the UK replaced Michael Crouse as ANS-8 Secretary.

Current Standards and Active Projects:

ANSI/ANS-8.1-2014 (R2023), *Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors* (revision of ANSI/ANS-8.1-1998; R2007)

Scope: *This standard is applicable to operations with fissionable materials outside nuclear reactors, except for the assembly of these materials under controlled conditions, such as in critical experiments. Generalized basic criteria are presented and limits are specified for some single fissionable units of simple shape containing ^{233}U, ^{235}U, or ^{239}Pu, but not for multiunit arrays. Requirements are stated for establishing the validity and areas of applicability of any calculational method used in assessing nuclear criticality safety. This standard does not include the details of administrative controls, the design of processes or equipment, the description of instrumentation for process control, nor detailed criteria to be met in transporting fissionable materials.*

Membership:
Nicholas Brown, Chair, Paschal Solutions Inc.; Andrew Arend, NuScale Power; Lawrence Berg, U.S. Department of Energy; Douglas Bowen, Oak Ridge National Laboratory; STravis Greene, Oak Ridge National Laboratory; Jerry Hicks, Individual Tom Marenchin, National Nuclear Security Administration; Joshua Marshall, Grounded Engineering Consultants; John Miller, Sandia National Laboratories; James Morman, Argonne National Laboratory; Dallas Moser, TRISO-X LLC; Jeremy Munson, U.S. Nuclear Regulatory Commission; Quentin Newell, Urenco USA; Katherine Norton, C.S. Engineering, Inc.; Andrew Prichard, Individual; Kevin Reynolds, Consolidated Nuclear Security, LLC; Ellen Saylor, Individual; Blake Thompson, Consolidated Nuclear Security, LLC; Matthew Wilson, Paschal Solutions, Inc., Dominic Winstanley, Sellafield Ltd.

Status: Reaffirmation of this standard was approved on 6/5/2023. A PINS for the revision was submitted to ANSI on 12/8/17 and resubmitted after the 2023 reaffirmation. The working group continues to move forward with a revision to the standard to include additional subcritical limits for the intermediate enriched U-235 compounds. Final wording changes have been agreed upon to enhance the use and applicability of the standard. Additional subcritical limits have been calculated and changes to the limits are being drafted to extend the U-235 lower enrichment values up to 20 wt. %. The standard was reaffirmed in 2023 to allow the final technical editing of the revised standard and anticipated comment resolution during approval of the revision. Work continues on the next revision to add additional subcritical limits to include HALEU enrichments. Wording changes to address comments from the CSSG have been drafted as part of the next revision. The working group still methodically progresses toward inclusion of new subcritical limits for HALEU in addition to crafting wording changes to address suggestions from the CSSG.

ANSI/ANS-8.3-2022, *Criticality Accident Alarm System* (revision of ANSI/ANS-8.3-1997; R2017)

Scope: *This standard is applicable to operations with fissionable materials in which inadvertent criticality leading to a radiation dose to personnel immediately dangerous to life and health could occur. This standard is not applicable to the operation of nuclear reactors or the conduct of critical experiments.*

Membership:
Jerry Hicks, Chair, Individual; Peter Angelo, Consolidated Nuclear Security, LLC; James Baker, Spectra Tech, Inc.; James Banfield, Global Nuclear Fuel; Lawrence Berg, U.S. Department of Energy; Debdas Biswas, Lawrence Livermore National Laboratory; Douglas Bowen, Oak Ridge National Laboratory; Kermit Bunde, U.S. Department of Energy; Konner Casanova, Idaho National Laboratory; Jeffrey Chapman, National Nuclear Security Administration; Joseph Christianson, U.S. Department of Energy; Theresa Cutler, Los Alamos National Laboratory; Matthieu Duluc, Institute for Radiological Protection & Nuclear Safety; Scott Finfrock, Fluor Government Group; John Kirkpatrick, Mirion Technologies Inc.; James Miller-Marquez, Naval Nuclear Laboratory; Hannah Morbach (Associate Member), Los Alamos National Laboratory; Bruce Pierson, Pacific Northwest National Laboratory; Andrew Prichard, Individual; Timothy Sippel, U.S. Nuclear Regulatory Commission; Daniel Speaker, Savannah River Nuclear Solutions; Jingjing Wang, Canadian Nuclear Laboratories; William Zywiec, Lawrence Livermore National Laboratory

Status: The revised standard was approved by ANSI on 9/9/2022 and published shortly after. Work on basis statements for the requirements and recommendations will begin soon. This work will serve the working group and consensus committee if interpretations are needed. The basis statements are not intended to be public.

ANSI/ANS-8.6-1983 (R2022), *Safety in Conducting Subcritical Neutron-Multiplication Measurements in Situ* (revision of N16.3-1975)

Scope: *This standard provides safety guidance for conducting subcritical neutron-multiplication measurements where physical protection of personnel against the consequences of a criticality accident is not provided. The objectives of in situ measurements are either to confirm an adequate safety margin or to improve an estimate of such a margin. The first objective may constitute a test of the criticality safety of a design that is based on calculations. The second may affect improved operating conditions by reducing the uncertainty of safety margins and providing guidance to new designs.*

Membership:
Theresa Cutler, Chair, Los Alamos National Laboratory; Ernie Elliott, BWX Technologies, Inc.; David Hayes, Los Alamos National Laboratory; Jerry Hicks, Individual; Jesson Hutchinson, Los Alamos National Laboratory; John Miller, Sandia National Laboratories; William Myers, Individual; Norman Schwers, Sandia National Laboratories

Status: Reaffirmation received ANSI approval on 9/9/2022. No response to solicited feedback from anyone currently using the standard was received. The working group is monitoring for potential use but are not making any updates at this time. This standard will be administratively withdrawn on its tenth anniversary.

ANSI/ANS-8.7-2022, *Nuclear Criticality Safety in the Storage of Fissile Materials* (revision of ANSI/ANS-8.7-1998; R2017)

Scope: *This standard is applicable to the storage of fissile materials. Mass and spacing limits are tabulated for uranium containing greater than 30 wt-% ^{235}U, and for plutonium, as metals and oxides. Criteria for the range of application of these limits are provided.*

Membership:
James Kuropatwinski, Chair, Los Alamos National Laboratory; Kermit Bunde, U.S. Department of Energy; Theresa Cutler, Los Alamos National Laboratory; Denise Edwards, U.S. Nuclear Regulatory Commission; Christy Gibson, Consolidated Nuclear Security, LLC; Kevin Kimball, Individual; Sarah Lim, Consolidated Nuclear Security; Ellen Saylor, Individual; James Smith, BWXT Nuclear Fuel Services; Trevor Stewart (Associate Member), Los Alamos National Laboratory; Brittany Williamson, Spectra Tech, Inc.; Travis Wilson (Associate Member), X-Energy LLC

Status: The revised standard was approved by ANSI on 5/6/2022 and published shortly after. James Kuropatwinski replaced Kevin Kimball as chair. Monthly telecons conducted in September and October to begin transition of knowledge to newer members as well as to start the development of basis statements.

ANSI/ANS-8.10-2015 (R2020), *Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement* (revision of ANSI/ANS-8.10-1983; R2012)

Scope: *This standard provides criteria that may be used for operations outside of nuclear reactors with ^{235}U, ^{233}U, ^{239}Pu, and other fissile and fissionable materials in which shielding and confinement are provided for protection of personnel and the public, except for the assembly of these materials under controlled conditions (e.g., critical experiments). The standard does not include details of administrative procedures for control (i.e., management prerogatives) nor details regarding design of processes and equipment or descriptions of instrumentation for process control.*

Membership:
Andrew Prichard, Chair, Individual; Linda Andrews, Framatome, Inc.; James Baker, Spectra Tech, Inc.; Andrew Barto, U.S. Nuclear Regulatory Commission; Douglas Bowen, Oak Ridge National Laboratory; Nicholas Brown, Nuclear Fuel Services, Inc.; Joseph Christensen, International Atomic Energy Agency; Jason Crye (Associate Member), Consolidated Nuclear Security, LLC; Theresa Cutler, Los Alamos National Laboratory; Jerry Hicks, Individual; Krista Kaiser, Pacific Northwest National Laboratory; Darby Kimball, Lawrence Livermore National Laboratory; Lon Paulson, GE Hitachi, Nuclear Energy; Rebecca Rice, Savannah River Nuclear Solutions, LLC

Status: ANSI approved the reaffirmation of this standard on 3/26/2020. It is anticipated that a revision will be initiated.

ANSI/ANS-8.12-1987 (R2021), *Nuclear Criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors* (revision of ANSI/ANS-8.12-1978)

Scope: *This standard is applicable to operations with homogeneous mixtures of plutonium and uranium. The mixtures may be solutions, suspended solids, precipitates, or may have been formed mechanically. Basic criteria are presented for plutonium-uranium fuel mixtures containing no more than 30 wt% plutonium combined with uranium containing no more than 0.71 wt% ^{235}U. This standard does not include the details of administrative controls, the design of processes or equipment, the description of instrumentation for process control, or detailed criteria to be met in transporting fissionable materials. The limits of this standard are not applicable to heterogeneous systems such as lattices of rods in water, mixtures in which particles are large enough to introduce lumping effects, or mixtures in which the concentrations of components are nonuniform. The limits are applicable, however, to homogeneous mixtures and slurries in which the particles constituting the mixture are uniformly distributed and have a diameter no larger than 127 mm (0.005 in.), i.e., are capable of being passed through a 120 mesh screen.*

Membership:
Christopher Tripp, Co-Chair, Tripp Nuclear Consulting Services; Tracy Stover, Co-Chair, Savannah River Nuclear Solutions, LLC; Kermit Bunde, U.S. Department of Energy; Katherine McCurry, U.S. Nuclear Regulatory Commission; Dennis Mennerdahl, E. Mennerdahl Systems; Quentin Newell, Urenco USA; Dominic Winstanley, Sellafield Limited

Status: Reaffirmation received ANSI approval 8/16/2021. A PINS for the revision was submitted to ANSI on 9/27/2007 and resubmitted after subsequent reaffirmations. The ANS-8.12 standard was first approved in July 1978 and was revised in 1987. It was reaffirmed in 2002, 2011, 2016, and most recently in 2021. A major revision activity was initiated. A decision was made to follow the ISO MOX standard specifications (related to MOX density and isotopics) and develop a new set of subcritical limits for homogeneous systems for the revision of ANS-8.12. The working group has completed MCNP and SCALE calculations for six (6) sets of subcritical data. This is a significant progress in generating subcritical limits by Monte Carlo calculations using the ISO MOX specifications. A set of critical benchmark experiments was selected for validation work. Paucity of benchmark experiments in certain energy region was identified. Work is continuing to validate the calculated values and to come up with a set of subcritical parameters.

ANSI/ANS-8.14-2004 (R2021), ***Use of Soluble Neutron Absorbers in Nuclear Facilities Outside Reactors*** **(new standard)**

Scope: *This standard provides guidance for the use of soluble neutron absorbers for criticality control. This standard addresses neutron absorber selection, system design and modifications, safety evaluations, and quality control programs.*

Membership:
Kristan Wessels, Consolidated Nuclear Security, LLC, Chair; Lawrence Berg, U.S. Department of Energy; Joshua Butler, Consolidated Nuclear Security, LLC; Justin Clarity, Pacific Northwest National Laboratory; Darwin Damba, U.S. Department of Energy; Nathan Devine, Savannah River Nuclear Solutions; Victor Lollar, BWX Technologies, Inc.; Josiah Moore, U.S. Department of Energy; Jeremy Smith, U.S. Nuclear Regulatory Commission; Ryan Smith, United Cleanup Oak Ridge (UCOR); Clifford Stanley, Individual

Status: The standard received ANSI approval of a reaffirmation on 8/5/2021. The chair is reforming the working group to initiate a revision of the standard.

ANSI/ANS-8.15-2014 (R2024), ***Nuclear Criticality Control of Selected Actinide Nuclides*** **(revision of ANSI/ANS-8.15-1981; R1987; R1995; R2005)**

Scope: *This standard is applicable to operations with the following nuclides:* ^{232}U, ^{234}U, ^{237}Np, ^{236}Pu, ^{238}Pu, ^{240}Pu, ^{241}Pu, ^{242}Pu, ^{241}Am, ^{242m}Am, ^{243}Am, ^{242}Cm, ^{243}Cm, ^{244}Cm, ^{245}Cm, ^{246}Cm, ^{247}Cm, ^{249}Cf, and ^{251}Cf. *Subcritical mass limits are presented for isolated units. The limits are not applicable to interacting units.*

Membership:
Charles Rombough, Chair, CTR Technical Services, Inc.; Andrew Barto, U.S. Nuclear Regulatory Commission; Joshua Butler, Oak Ridge National Laboratory; Giovanni Lozano (Associate Member), Los Alamos National Laboratory; Hiroshi Okuno, Japan Atomic Energy Research Institute; Ning Zhang, Los Alamos National Laboratory

Status: The standard was reaffirmed by ANSI on 7/8/2024. The 2014 revision revises most of the subcritical limits for the original 14 nuclides in the 1981 edition of this standard and adds 5 additional nuclides bringing the total number of nuclides to 19.

ANSI/ANS-8.17-2004 (R2024), ***Criticality Safety Criteria for the Handling, Storage, and Transportation of LWR Fuel Outside Reactors*** **(revision of ANSI/ANS-8.17-1984; R1989; R1997)**

Scope: *This standard provides nuclear criticality safety criteria for the handling, storage, and transportation of light water reactor fuel rods and units outside reactor cores.*

Membership:
Alexander Lang, Co-Chair, Oak Ridge National Laboratory; Ellen Saylor, Co-Chair, Individual; Andrew Barto, U.S. Nuclear Regulatory Commission; William Cook, Sandia National Laboratories; Deborah Hill, National Nuclear Laboratory; Noah Kleedtke, Los Alamos National Laboratory; Dale Lancaster, NuclearConsultants.com; Calvin Manning, Framatome, Inc.; William Marshall, Oak Ridge National Laboratory; Austin McGee, Consolidated Nuclear Facilities, LLC; Kyle Neumann, Naval Nuclear Laboratory; Cecil Parks, Boston Government Services; Kristina Spencer (Associate Member), Idaho National Laboratory; Joshua Thomas, Global Nuclear Fuel; Blake Thompson, Consolidated Nuclear Security, LLC

Status: A reaffirmation was approved by ANSI 9/12/2024. Three new members were added to the working group -- Mac Cook as a full member and Noak Kleedtke and Blake Thompson as associate members. The group has begun discussing the current and potential future use of the standard. Members have reached out for input on the current use of the standard. Work has begun on drafting a PINS form for a revision to the standard.

ANSI/ANS-8.19-2014 (R2024), ***Administrative Practices for Nuclear Criticality Safety*** **(revision of ANSI/ANS-8.19-2005)**

Scope: *This standard provides criteria for the administration of a nuclear criticality safety program for outside-of-reactor operations in which there exists a potential for criticality accidents. Responsibilities of management, supervision, and the nuclear criticality safety staff are addressed. Objectives and characteristics of operating and emergency procedures are included.*

Membership:
John Miller, Chair, Sandia National Laboratories; Jeremy Munson, Vice Chair, U.S. Nuclear Regulatory Commission; Gary Ly (Secretary), U.S. Department of Energy; Kelsey Amundson, Los Alamos National Laboratory; James Baker, Spectra Tech, LLC; James Bunsen, Zeno Power Systems; Matthew Chapa, NovaRei Solutions, LLC; Darwin Damba (Associate Member), U.S. Department of Energy; Spencer Jordan, Y-12 National Security Complex; Sandra Larson, 21 Consulting Group Inc.; Jennifer Lyons, Pacific Northwest National Laboratory; Josiah Moore (Associate Member), U.S. Department of Energy; Ellen Saylor, Individual

Status: A reaffirmation received ANSI approval on 6/13/2024. In 2021, the working group held regular online meetings focused on developing a “basis statements” document, per an ANS-8 Subcommittee request. This documentation is now in place for internal use only and will be maintained as necessary by the working group. This effort was time-consuming but very beneficial for the working group, as it helped build a common foundation and identified topics for consideration during a future revision.

The working group was active in 2024; initially with a reaffirmation effort that was approved, as well as the start to discussions about a revision effort. The working group decided to undertake a revision and worked with those on the group about having the time and interest to undertake such an effort that resulted in a few changes to membership. Individuals have been assigned to various sections of the standard to start the revision process. The working group held a meeting at the 2024 ANS Winter meeting that was attended by ~26 individuals (12 working group members). That meeting focused on the PINS for the revision documentation and discussions about ideas to consider during the revision process. The PINS is expected to be approved in early 2025 and the working group plans to hold regular meetings moving forward.

ANSI/ANS-8.20-1991 (R2020), *Nuclear Criticality Safety Training* (new standard)

Scope: *This standard provides criteria for nuclear criticality safety training for personnel associated with operations outside reactors where a potential exists for criticality accidents. It is not sufficient for the training of nuclear criticality safety staff.*

Membership:
Deborah Hill, Chair, National Nuclear Laboratory (UK); Nichole Ellis, Vice Chair, Ellis Nuclear Engineering, Inc.; Kelsey Amundson, Los Alamos National Laboratory; Paul Burdick, C.S. Engineering, Inc.; Theresa Cutler, Los Alamos National Laboratory; Ryan Hedrick, Y-12 National Security Complex, LLC; Ronald Knief, Individual; Jesse McBurney-Rebol, Naval Nuclear Laboratory; Christine McNally, CALIAN; Catherine Percher, Lawrence Livermore National Laboratory; Randy Shackelford, Paschal Solutions, Inc.; Robert Taylor, Atkins Nuclear Solutions; Brittany Williamson, Spectra Tech, Inc.

Status: ANSI approved the reaffirmation of this standard on 5/8/2020. A PINS for the revision was submitted to ANSI on 3/10/2011 and resubmitted after subsequent reaffirmations. The working group has been actively working on a revision of ANSI/ANS-8.20-1991 for a number of years. The draft was issued to ANS-8 for ballot in 2019. In parallel with this, the existing standard was reaffirmed to allow more time to work on the revision. The key working group activity in 2021 was the resolution of the outstanding ANS-8 ballot comments. The latest version of the draft went to NCSCC for ballot in late January 2022, receiving 7 affirmative votes and 7 negative votes. An initial proposed response to the comments was formulated in late 2022. In late 2023, the draft standard underwent a NCSCC recirculation ballot to approve substantive changes. The ballot closed in January 2024 with 14 affirmative votes and 1 negative vote. Efforts in 2024 were focused on resolving the comments and negative vote.

ANSI/ANS-8.21-2023, *Use of Fixed Neutron Absorbers in Nuclear Facilities Outside Reactors* (revision of ANSI/ANS-8.21-1995; R2019)

Scope: *This standard provides guidance for the use of fixed neutron absorbers as an integral part of nuclear facilities and fissionable material process equipment outside reactors, where such absorbers provide criticality safety control.*

Membership:
David Erickson, Chair, Individual; James Bunsen, Zeno Power Systems; Kevin Carroll, Pacific Northwest National Laboratory; Phillip Chou, Lawrence Livermore National Laboratory; Jerry Hicks, Individual; Dennis Mennerdahl, E Mennerdahl Systems; Katherine Norton, C.S. Engineering, Inc.; Jeremy Smith, U.S. Nuclear Regulatory Commission; Kristan Wessels, Y-12 National Security Complex; Robert Wilson, Individual

Status: The revision received ANSI approval on 6/20/2023. With the completion of the revision in 2023, the working group took a break. The group recently began re-engaging on the effort to develop basis statements for each of the requirements/recommendations in the standard.

ANSI/ANS-8.22-1997 (R2021), *Nuclear Criticality Safety Based on Limiting and Controlling Moderators* (new standard)

Scope: *This standard applies to limiting and controlling moderators to achieve criticality safety in operations with fissile materials in a moderator control area. This standard does not apply to concentration control of fissile materials.*

Membership:
Michael Crouse, Co-Chair, Consolidated Nuclear Security, LLC; Lon Paulson, Co-Chair, GE Power Portfolio; Brannen Adkins, U.S. Nuclear Regulatory Commission; Marvin Barnett, Savannah River Nuclear Solutions; Derrick Faunce, Nuclear Safety & Technology Services; Michael Fendler, Sigma Science Inc.; Deborah Hill, National Nuclear Laboratory; Tom Lewis, Los Alamos National Laboratory; Alan Wilkinson, Consolidated Nuclear Security, LLC

Status: This standard was reaffirmed on 8/5/2021. A PINS was submitted to ANSI on 11/22/2019 and was resubmitted after the reaffirmation was approved. This revision reduces duplication and ensures terminology consistency with other ANS standards on nuclear criticality safety, updates moderation control guidance, requirements, and references. A draft was submitted to ANS-8 for ballot at the end of 2021. The draft was revised

to incorporate comments and issued to ANS-8 for a second ballot that closed 11/29/2022. The second ballot received 11 Affirmative and 4 Negative votes. Working group meetings were held in 2023 to address second round comments. The intent of the proposed ANS-8.22-202x revision is to intentionally introduce more modern terminology; namely moderation controlled area (MCA) and moderation restricted area (MRA) definitions. In an MCA, you are controlling moderation as well as another parameter; in an MRA loss of control of moderation alone could result in a criticality. These are both factual statements, as currently defined in the 8.22-202x ballot 2 version. Based on discussions with the former ANS-8.22 chair, the following statements are made:

- The current 1997 definition of moderator control area does not explicitly exclude the MCA or MRA approach to moderation control; it applies to both and is therefore generic.
- The current 1997 definition of moderator control area is not specific to current proposed MRA definition, which a select few ANS-8 members have inferred/commented as factual.

The working group continues to resolve outstanding negative ballots from the 2nd ANS-8 Subcommittee ballot. At present we have 12 of 16 subcommittee members voting affirmative. The current deliberations are focused on the expanded moderator control area definitions and perceived impact on select non-reactor facilities. Direct input and active participation with the working group is now being pursued during “weekly” recurring meetings from the remaining 4 negative balloters in order to resolve remaining issues.

ANSI/ANS-8.23-2019 (R2024), *Nuclear Criticality Accident Emergency Planning and Response* (revision of ANSI/ANS-8.23-2007; R2012)

Scope: *This standard provides criteria for minimizing risks to personnel during emergency response to a nuclear criticality accident outside reactors. This standard applies to those facilities for which a criticality accident alarm system, as specified in American National Standard Criticality Accident Alarm System, ANSI/ANS-8.3-1997 (R2017),is in use. This standard does not apply to nuclear power plant sites, or to those licensed research reactor facilities, which are addressed by other standards.*

Membership:
Brandon O’Donnell, Chair, Spectra Tech, LLC; James Baker, Chair, Spectra Tech, LLC; Konner Casanova, Idaho National Laboratory; James Cole, Sandia National Laboratories; Theresa Cutler, Los Alamos National Laboratory; Patricia Glenn, U.S. Nuclear Regulatory Commission; Jerry Hicks, Individual; Timothy Jackson, Y-12 National Security Complex, ; Krista Kaiser, ; Ashley Luksic, : Patrick Moss, U.S. Department of Energy; Brandon O’Donnell, BWX Technologies, Inc.; Blaine Rice, Paschal Solutions, Inc.; Ellen Saylor, Individual; Jingjing Wang, Canadian Nuclear Laboratories; Ralph Winiarski, Paschal Solutions, Inc.; Dominic Winstanley, Sellafield Ltd.

Status: A reaffirmation was approved by ANSI on 2/29/2024. The working group was re-constituted and met to kick-off the next revision cycle in May 2023 in Oak Ridge, TN / videoconference, with subsequent videoconference in July 2023. The draft basis statements were reviewed and have been effectively completed for the time being. The working group has created a list of over 20 items or issues to consider as potential modifications to the standard. Two official meetings were held in June and November 2024. The working group has made great progress on proposed revisions to the text and scope, in furtherance of the PINS submittal for revision.

ANSI/ANS-8.24-2017 (R2023), *Validation of Neutron Transport Methods for Nuclear Criticality Safety Calculations* (revision of ANSI/ANS-8.24-2007; R2012)

Scope: *This standard provides requirements for validation, including establishing applicability, of neutron transport calculational methods used in determining critical or subcritical conditions for nuclear criticality safety analyses.*

Membership:
Larry Wetzel, Chair, Individual; Robert Busch, University of New Mexico; Scott Finfrock, Savannah River Nuclear Solutions; Shawn Henderson (Associate Member), Sandia National Laboratories; JDerek Hounshel, Los Alamos National Laboratory; Timothy Jackson, Consolidated Nuclear Security, LLC; Jeremy Munson, U.S. Nuclear Regulatory Commission; Cecil Parks, Boston Government Services; Christopher Perfetti, University of New Mexico; Andrew Prichard, Individual; Aaron Tamashiro, Lawrence Livermore National Laboratory; Blake Thompson, Consolidated Nuclear Security, LLC; Christopher Tripp, Tripp Nuclear Consulting Services

Status: A reaffirmation of the standard was approved by ANSI on 1/3/2023. The working group developed basis statements for the current standard. Plans are to begin a revision in 2025.

ANSI/ANS-8.26-2024, *Criticality Safety Engineer Training and Qualification Program* (revision of ANSI/ANS-8.26-2007; R2022*)*

Scope: *This standard presents the fundamental content elements of a training and qualification program for Individuals with responsibilities for performing the various technical aspects of criticality safety engineering. The standard presents a flexible array of competencies for use by management to develop tailored training and qualification programs applicable to site-specific job functions, facilities and operations.*

Membership:
Kevin Reynolds, Chair, Consolidated Nuclear Security; James Baker, Spectra Tech, LLC; Douglas Bowen, Oak Ridge National Laboratory; Kevin Carroll, Pacific Northwest National Laboratory; Theresa Cutler, Los Alamos National Security, LLC; David Erickson, Individual; Makenzie Gorham, Idaho State University; David Hayes, Los Alamos National Laboratory; Jerry Hicks, Individual; Ronald Knief, Individual; Gary Ly, U.S. Department of Energy; James Morman, Argonne National Laboratory; Lon Paulson, GE Hitachi Nuclear Energy; Nicholas Peterka, U.S. Nuclear Regulatory Commission; Chad Pope, Idaho State University; Andrew Prichard, Individual; Alicia Walls, BWX Technologies, Inc.; Robert Wilson, Individual

Status: ANSI approved a revision of this standard on 11/21/2024. NCSCC comments were resolved, and the standard was approved in 2024. Editing and publication will be completed in early 2025.

ANSI/ANS-8.27-2015 (R2020), *Burnup Credit for LWR Fuel* (revision of ANSI/ANS-8.27-2008)

Scope: *The standard provides criteria for processes and techniques used for criticality safety evaluations of irradiated light water reactor fuel assemblies in storage, transportation and disposal.*

Membership:
William Marshall, Oak Ridge National Laboratory; Charles Rombough, Secretary, CTR Technical Services, Inc.; Stefan Anton, Hotlec International; Steve Baker, TransWare Enterprises; Andrew Barto, U.S. Nuclear Regulatory Commission; Mark DeHart, Idaho National Laboratory; John Hannah, Global Nuclear Fuels; Ed Knuckles, Individual; Dale Lancaster, NuclearConsultants.com; Zita Martin, Tennessee Valley Authority; John Massari, Constellation Generation; Dennis Mennerdahl, E. Mennerdahl Systems; Prakash Narayanan, Orano TN; Greg O'Connor, Office for Nuclear Regulation; Cecil Parks, Boston Government Services; Holger Pfiefer, NAC International; Meraj Rahimi, U.S. Nuclear Regulatory Commission; Alan Wells, Individual; Kent Wood, U.S. Nuclear Regulatory Commission; John Zino, GE Hitachi Nuclear Energy

Status: ANSI approved a reaffirmation of this standard on 8/27/2020. Activities in 2024 were limited to reviewing the roster for members still active in the community. A reaffirmation will start soon with a review to potentially revise the standard.

ANSI/ANS-8.28-2024, *Administrative Practices for the Use of Non-Destructive Assay Measurements for Nuclear Criticality Safety* (new standard)

Scope: *This standard provides administrative practices covering the interface between the criticality safety community and the NDA community including in-situ measurements and measurements of containerized materials.*

Membership:
Jeffrey Chapman, Co-chair, National Nuclear Safety Administration; Ernest Elliott, Co-chair, BWX Technologies, Inc.; Roger Bartholomay, C.S. Engineering Inc.; Lawrence Berg, U.S. Department of Energy; Douglas Bowen, Oak Ridge National Laboratory; David Dolin, Savannah River Solutions; Michael Dunn, Spectra Tech, Inc.; A. Nichole Ellis, Ellis Nuclear Engineering, LLC; Patricia Glenn, U.S. Nuclear Regulatory Commission; Jerry Hicks, Individual; Sandra Larson, 21 Consulting Group, Inc.; Katherine Norton, C.S. Engineering, Inc.; Megan Pritchard, Nuclear Safety & Technology Services; Thomas Sampson, Sampson Professional Services; Gladys Udenta, U.S. Department of Energy; Robert Wilson, Individual; John Winkel, CH2M Hill Plateau Remediation Company; Dominic Winstanley, Sellafield, Limited

Status: ANSI approved the new standard on 3/12/2024. The standard was published in July 2024. The working group is taking a break and looking for comments from those implementing this standard at their sites.

Nuclear Criticality Safety Consensus Committee (NCSCC)
List of Standards/Projects

Chair: Larry L. Wetzel Vice Chair: William R. Shackelford

Fissionable Materials Outside Reactors Subcommittee (ANS-8)
Subcommittee Chair: Douglas Bowen

Ⓟ = PINS submitted to ANSI

ANS-8.1-2014 (R2023) Ⓟ (A1)	Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors	RF 6/5/2023 (WGC: N. Brown)
ANS-8.12-1987 (R2021) Ⓟ (A1)	Nuclear Criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors	RF 8/16/2021 (WGC: C. Tripp / T. Stover)
ANS-8.20-1991 (R2020) Ⓟ (A1)	Nuclear Criticality Safety Training	RF 5/8/2020 (WGC: D. Hill)
ANS-8.3-2022 (A2)	Criticality Accident Alarm System	RV 9/8/2022 (WGC: J. Hicks)
ANS-8.6-1983 (R2022) (A2)	Safety in Conducting Subcritical Neutron-Multiplication Measurements In Situ	RF 9/9/2022 (WGC: T. Cutler)
ANS-8.7-2022 (A2)	Nuclear Criticality Safety in the Storage of Fissile Materials	RV 5/6/2022 (WGC: J. Kuropatwinski)
ANS-8.10-2015 (R2020) (A2)	Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement	RF 3/26/2020 (WGC: A. Prichard)
ANS-8.14-2004 (R2021) (A2)	Use of Soluable Neutron Absorbers in Nuclear Facilities Outside Reactors	RF 8/5/2021 (WGC: K. Wessels)
ANS-8.15-2014 (R2024) (A2)	Nuclear Criticality Control of Special Actinide Elements	RF 7/8/2024 (WGC: C. Rombough)
ANS-8.17-2004 (R2024) (A2)	Criticality Safety Criteria for the Handling, Storage, and Transportation of LWR Fuel Outside Reactors	RF 9/12/2024 (WGC: E. Saylor & A. Lang)
ANS-8.19-2014 (R2024) (A2)	Administrative Practices for Nuclear Criticality Safety	RF 6/13/2024 (WGC: J. Miller)
ANS-8.21-2023 (A1)	Use of Fixed Neutron Absorbers in Nuclear Facilities Outside Reactors	RV 6/20/2023 (WGC: D. Erickson)
ANS-8.23-2019 (R2024) (A2)	Nuclear Criticality Accident Emergency Planning and Response	RF 2/29/2024 (WGC: B. O'Donnell)
ANS-8.24-2017 (R2023) (A2)	Validation of Neutron Transport Methods for Nuclear Criticality Safety Calculations	RV 1/3/2023 (WGC: L. Wetzel)
ANS-8.26-2024 (A2)	Criticality Safety Engineer Training and Qualification Program	RV 11/21/2024 (WGC: K. Reynolds)
ANS-8.27-2015 (R2020) (A2)	Burnup Credit for Light Water Reactor Fuel	RF 8/7/2020 (WGC: B. J. Marshall)
ANS-8.28-2024 (NEW) (A2)	Administrative Practices for the Use of Non-Destructive Assay Measurements for Nuclear Criticality Safety	Approved 3/12/2024 (WGCs: J. Chapman / E. Elliott)

(A1) Current Being Worked On Standards
(A2) Current Not Being Worked On Standards
(B1) Proposed Being Worked On Standards
(B2) Proposed Not Being Worked On Standards
(C1) Withdrawn Being Worked On Standards
(C2) Withdrawn Not Being Worked On Standards

Table 5 – NCSCC List of Standards/Projects

Research and Advanced Reactors Consensus Committee (RARCC)

Gale Hauck
Oak Ridge National Laboratory

Scope: *The RARCC is responsible for the preparation and maintenance of voluntary consensus standards as well as standards-related guidance documents, guidance standards, and technical reports supporting the design, operation, maintenance, operator selection and training, and quality requirements for current and future research and test reactors including pulsed critical facilities, reactors used for the production of isotopes for industrial, educational, and medical purposes and current and advanced non-large LWRs. The scope includes but is not limited to: water-cooled and non-water cooled Small Modular Reactors, Generation III+ and IV reactors, and future non-light water cooled/moderated large commercial reactors.*

The RARCC standards include but are not limited to the design and operation of the nuclear island, the balance of plant, and other systems within the plant boundary affecting safety and operations. The ANS Standards Committee Procedures Manual for Consensus Committees shall be used to guide the activities of this consensus committee.

These subcommittees have been organized as follows:

- *Operation of Research Reactors (ANS-15)*
- *Advanced Initiatives (ANS-29)*

Each subcommittee has established various working groups to develop specific proposed standards and maintain existing standards within its respective area of responsibility. These working groups create the text of RARCC standards and resolve review and ballot comments.

RARCC Membership:
Gale Hauck, Chair, Oak Ridge National Laboratory
Jason Andrus, Vice Chair, Idaho National Laboratory
Thomas Newton, Vice Chair, National Institute of Standards & Technology
Amir Afzali, Individual
James August, Individual
Bruce B. Bevard, Oak Ridge National Laboratory
Matthew Bucknor, Argonne National Laboratory
Casey Cadman, Westinghouse Electric Co. LLC
Brandon Chisholm, Southern Nuclear Operating Company
Patrick Everett, Oklo, Inc.
George Flanagan, Individual
Leslie Foyto, University of Illinois, Urbana-Champaign
Tony Grenci, Salt River Project
Brian Grimes, Individual
Edward Helvenston, U.S. Nuclear Regulatory Commission
Matthew Hertel, X-energy, LLC
Jere Jenkins, Texas A&M University
William Kennedy, U.S. Nuclear Regulatory Commission
Brendan Kochunas, University of Michigan, Ann Arbor
Matthew Kravec, Westinghouse Electric Company, LLC
David Lawson, U.S. Department of Energy
Ben Lindley, University of Wisconsin, Madison
Mark A. Linn, Individual
D. Sean O'Kelly, Idaho National Laboratory
Mark Pérès, Individual
Steven Reese, Oregon State University
Donald Spellman, Individual
Anthony Veca, General Atomics
Matthew Wargon, TerraPower, LLC

Observers:
David E. Holcomb, Idaho National Laboratory
Majeed Kahn, National Institute of Standards & Technology

Report of RARCC:

The RARCC met June 19, 2024, at the ANS Annual Meeting in Las Vegas, and on November 20, 2024, at the ANS Winter Meeting in Orlando, FL. Jere Jenkins and Patrick Everett were confirmed as members of the RARCC.

Approved in 2024:

ANSI/ANS-1-2000 (R2024), *Conduct of Critical Experiments* (reaffirmation of ANSI/ANS-1-2004; R2019)

ANSI/ANS-14.1-2004 (R2024), *Operation of Fast Pulse Reactors* (reaffirmation of ANSI/ANS-14.1-2004; R2019)

ANSI/ANS-15.16-2015 (R2024), *Emergency Planning for Research Reactors* (reaffirmation of ANSI/ANS-15.16-2015 (R2020)

ANSI/ANS-20.2-2023, *Nuclear Safety Design Criteria and Functional Performance Requirements for Liquid-Fuel Molten-Salt Reactor Nuclear Power Plants* (new standard)

Active Standards/Projects (Approved PINS):

ANS-1, *Conduct of Critical Experiments* (revision of ANSI/ANS-1-2000; R2019; R2024)

ANS-15.22, *Classification of Structures, Systems, and Components for Research Reactors* (proposed new standard)

ANS-GS-30.1, *Integrating Risk and Performance Objectives into New Reactor Nuclear Safety Designs* (proposed new guidance standard)

ANS-30.2, *Structures, Systems, and Component Classification for Nuclear Power Plants* (proposed new standard)

ANS-53.1, *Nuclear Safety Criteria for the Design of High Temperature Gas-Cooled Reactor Plants* (revision of ANSI/ANS-53.1-2011; R2021)

ANS-54.8, Liquid Metal Fire Protection (proposed new standard – revision of withdrawn standard ANS-54.8-1988)

Advanced Initiatives Subcommittee (ANS-29)

Membership:
Jason Andrus, Chair, Idaho National Laboratory
James August, Individual
Matthew Bucknor, Argonne National Laboratory
Matthew Denman, Kairos Power LLC
Mihai Diaconeasa, North Carolina University
George Flanagan, Individual
Joseph Halackna, Westinghouse Electric Company, LLC
David Holcomb, Idaho National Laboratory
Mark Linn, Individual
Robert Sachs, Individual

The Advanced Initiatives Subcommittee manages the following projects and current standards:

ANS-20.1, *Nuclear Safety Design Criteria for Fluoride Salt-Cooled High-Temperature Reactor Nuclear Power Plants* (proposed new standard)

Scope: *This standard establishes the nuclear safety design criteria and design requirements for a fluoride salt-cooled, high-temperature reactor. The standard reflects performance-based, risk-informed criteria wherever possible. It also describes the design process to establish those criteria and addresses structures, systems, and component classifications.*

Membership:
Matthew Denman, Chair, Kairos Power LLC

Status: The PINS was submitted to ANSI on 5/31/2013. Project on indefinite hold.

ANS-20.2-2023, *Nuclear Safety Design Criteria and Functional Performance Requirements for Liquid-Fuel Molten Salt Reactor Nuclear Power Plants* (new standard)

Scope: *This standard establishes the nuclear safety design criteria and functional performance requirements for liquid-fuel molten salt reactor nuclear power plants. The document uses performance-based, risk-informed criteria wherever possible. It also describes the design process to be followed to establish those criteria and perform structures, systems, and component classifications.*

Membership:
David Holcomb, Chair, Idaho National Laboratory; Vincent Lackowski (Secretary), Thorium Energy Alliance; Abdalla Abou-Jaoude, Idaho National Laboratory; Amir Afzali, Individual; Francis Akstulewicz, Terrestrial Energy USA; Edward Blandford, Kairos Power LLC; Daniel Carleton, Terrestrial Energy USA; Bernard Carluec, Framatome, Inc.; Kun Chen, Atomoverde Canada Inc.; Brandon Chisholm, Southern Nuclear Operating Company; Ondrej Chvala, University of Tennessee; Stephen Cook, Individual; Ronald English, Individual; George Flanagan, Oak Ridge National Laboratory; Charles Forsberg, Massachusetts Institute of Technology; Massimilano Fratoni, University of California–Berkley; Jess Gehin, Idaho National Laboratory; Kurt Harris, Flibe Energy, Inc.; Chris Johns, TerraPower LLC; Brian Johnson, TerraPower LLC; Lars Jorgensen, Thorcon Power;Takashi Kamei, Research Institute for Applied Science; John Kutsch, Thorium Energy Alliance; Vince Lackowski, Thorium Energy Alliance; Imtiaz Madni; U.S. Nuclear Regulatory Commission; Stewart Magruder, AdSTM; Zander Mausolff, TerraPower, LLC; Laurence Miller, University of Tennessee; Ashkhen Nalbandyan, DTU Physics; Thomas Pederson, Copenhagen Atomics; Per Peterson, Kairos Power; Edward Pheil, Exodys Energy; Wendy Reed, U.S. Nuclear Regulatory Commission; Raluca Scarlat, University of California–Berkley; Shayan Shahbazi, Argonne National Laboratory; Nicholas Smith, Idaho National Laboratory; Andrew Sowder, Electric Power Research Institute; Aslak Stubsgaard, Copenhagen Atomics; Nam-il Tak, Korea Atomic Energy Institute; Christopher Van Wert, U.S. Nuclear Regulatory Commission; Lorenzo Vergari (Associate Member), University of California–Berkley; Edward Wallace, GNBC Associates, Inc.

Status: The PINS was approved and submitted to ANSI on 7/7/2016. A recirculation ballot was issued in August 2023 to approve substantive changes to the draft and to notify members of a maintained negative vote. Consensus was declared and a request was submitted to ANSI for their approval on 12/12/2023. The standard received ANSI approval on 1/4/2024 and was published 1/25/2024.

ANS-GS-30.1, *Integrating Risk and Performance Objectives into New Reactor Nuclear Safety Designs* (proposed new guidance standard)

Scope: *This technology-neutral guidance standard provides information for preparation of technology-specific new reactor design standards and supporting documents. New reactor designs include modular reactors using light water nuclear technologies and advanced reactors using non-light water nuclear technologies as the basis for their respective designs. This guidance standard is focused at a high-level to enable risk-informed and performance-based (RIPB) results to be consistently applied across all stages of plant lifecycle and to be integrated throughout design development. The guidance provided in this document can be applied beyond reactor safety into the areas of project risk, and reliable and economical plant operation.*

***Membership**:*
Mark Linn, Chair, Individual; David Johnson, Vice Chair, Individual; Mihai Diaconeasa, North Carolina University; Jordan Hagaman, Kairos Power LLC; Ralph Hill, Individual; Darvin Kapitz, Individual; Patrick O'Regan, Electric Power Research Institute; Russell Williston, Individual

Status: The PINS was submitted to ANSI on 8/11/2015. The Standards Board held several long discussions on the path forward for this project in 2021 in light of comments received from the subcommittee ballot and non-developing consensus committee reviews. The Standards Board directed that the project continues to be pursued as a guidance standard. The document was revised accordingly and was re-balloted in 2023 reaching approval by the Advanced Initiatives Subcommittee. The consensus committee ballot was issued in October of 2024. The working group continues to resolve comments submitted with the consensus committee ballot.

ANS-30.2, *Categorization and Classification of Structures, Systems, and Components for New Nuclear Power Plants* (proposed new standard)

Scope: *This standard provides a single technology neutral categorization and classification process for SSCs for new nuclear power plants that is, where possible, risk informed and performance based. This process will then be used to determine special treatment of SSCs to meet the safety basis. This standard applies only to those new design facilities (i.e., greater than Generation III) that must obtain an operating license from the proper regulatory authority. It provides a complete (e.g., necessary and sufficient) repeatable logical process based upon risk-informed, performance-based objectives. Other voluntary consensus standards (VCS) may often be required in order to complete the entire process for all SSCs. Those standards are incorporated by reference.*

Membership:
Mihai Diaconeasa, Chair, North Carolina State University; Amir Afzali, Individual; Jason Andrus, Idaho National Laboratory; James August, Individual; David Blanchard, Applied Reliability Engineering; Robert Burg, EPM, Inc.; Stephen Cook, NL Nuclear Technology Support Inc.; Jonathen Facemire, Nuclear Energy Institute; Matthew Hertel, X-Energy, LLC; Ralph Hill, Hill Engineering Solutions LLC; Brian Johnson, TerraPower LLC; Prasad Kadambi, Kadambi Engineering Consultants; Vicken Khatchadourian, EPM, Inc.; Svetlana Lawrence, Idaho National Laboratory; Gary Locklear, Kinectrics AES, Inc.; Patrick O'Regan, Electric Power Research Institute; James Pappas (Observer), Westinghouse Electric Company, LLC; Hanh Phan, U.S. Nuclear Regulatory Commission; Johannes Pickelmann, Framatome GmbH; Alexandra Renner, Oklo, Inc.; Andrew Smolinski, Armed Forces Radiobiology Research Institute; Edward Wallace, GNBC Associates; Kent Welter, NuScale Power, Inc.

Status: PINS was submitted to ANSI on 7/7/2016. The working group continues to hold bi-weekly meetings to work on the draft. Slow progress continues to be made on the draft.

ANSI/ANS-53.1-2011 (R2021), *Nuclear Safety Design Process for Modular Helium-Cooled Reactor Plants* (new standard)

***Scope:** This standard applies to the safety design process for MHR nuclear power plants. This standard provides a process for establishing top-level safety criteria (TLSC), safety functions, top-level design criteria (TLDC), licensing basis events (LBEs), design basis accidents (DBAs), safety classification of systems, structures, and components (SSC), safety analyses, defense-in-depth (DID), and adequate assurance of special treatment requirements for safety-related SSC throughout the operating life of the plant. The standard does not provide detailed guidance for design; other existing standards cover those.*

Membership:
James August, Chair, Individual; John Bolin, General Atomics; Alok Deshpande, Simpson, Gumpertz & Heger, Inc.; John Fletcher, Individual; James Glover, Fluxion Technologies; Izabela Gutowska, Oregon State University; Matthew Hertel, X-Energy, LLC; Howard Iskyan, Iskyan LLC; William Kennedy, U.S. Nuclear Regulatory Commission; Brendan Kochunas, University of Michigan-Ann Arbor; Ben Lindley, University of Wisconsin-Madison; Fatih Sarikurt, TerraPower; Liang Shi, Constellation Nuclear

Status: The standard was reaffirmed on 10/7/2021. A PINS for a revision was approved and submitted to ANSI on 1/13/2023. Interest was expressed at the September 2018 NRC Standards Forum for this standard. A discussion at the RARCC November 2018 meeting recommended that a revision should be initiated. The PINS changes the title for the revision of the standard to *Nuclear Safety Criteria for the Design of High Temperature Gas-Cooled Reactor Plants*. The revision will cover gas-cooled reactors and will define the term "reactor." Most of the content has been

exhaustively discussed in the process of developing a new outline. The work areas are primarily in the areas of defense in depth and special treatments. The working group continues to meet bi-weekly to develop the draft.

ANSI/ANS-54.1-2020, *Nuclear Safety Criteria and Design Process for Sodium Fast Reactor Nuclear Power Plants* (new standard, historical revision of ANSI/ANS-54.1-1989)

Scope: *The scope of this standard covers the nuclear safety of these facilities, meaning the elements of the design aimed at preventing or mitigating accidental damage to the facility which could lead to radiological releases that would harm the public or the facility's workers. Any facility design must also be concerned with preventing and mitigating damage caused by a security breach arising from either inside or outside the facility, and a general criterion related to that subject is included in the scope of this standard.*

Membership:
George Flanagan, Chair, Individual, Robert Bari, Brookhaven National Laboratory; Robert Budnitz, Consultant; Peter Gaillard, TerraPower; Michael Garrett, Individual; Christopher Grandy, Argonne National Laboratory; Tony Grenci Salt River Project; Prasad Kadambi, Individual; Thomas King, Information Systems Laboratory, Inc; Christian Lobscheid, Advent Engineering Services; Imitiaz Madni, U.S. Nuclear Regulatory Commission; Hisato Matsumiya, Toshiba Corporation; Jan Mazza, U.S. Nuclear Regulatory Commission; Yasushi Okano, Japan Atomic Energy Agency; Roald Wigeland, Idaho National Laboratory

Status: This standard was approved by ANSI on 3/23/2020. A reaffirmation will be pursued in 2025. Chair plans to step down when a replacement can be found.

Operation of Research Reactors Subcommittee (ANS-15)

Membership:
Thomas Newton, Chair, National Institute of Standards & Technology
Michael Balazik, U.S. Nuclear Regulatory Commission
Joshua Borromeo, U.S. Nuclear Regulatory Commission
Kevan Crawford, Precision Engineering, Inc.
Byron Curnutt, Idaho National Laboratory
Michelle Dudley, National Institute of Standards & Technology
Leslie Foyto, University of Illinois-Champaign-Urbana
David Hayes, Los Alamos National Laboratory
Jere Jenkins, Texas A&M University
Sean O'Kelly, Idaho National Laboratory
Steven Reese, Oregon State University
Andrew Smolinski, Armed Forces Radiobiology Institute
Darren Talley, Sandia National Laboratories
Travis Tate, U.S. Nuclear Regulatory Commission

Activities
Incorporation of advanced (research) reactor needs into all applicable standards is in progress.

Operation of Research Reactors Subcommittee manages the following projects and current standards:

ANSI/ANS-1-2000 (R2024), *Conduct of Critical Experiments* (revision of ANSI/ANS-1-1987; R1992)

Scope: *This standard provides for the safe conduct of critical experiments. Such experiments study neutron behavior in a fission device where the energy produced is insufficient to require auxiliary cooling, and the power history is such that the inventory of long-lived fission products is insignificant.*

Membership:
David Hayes, Chair, Los Alamos National Laboratory; Lawrence Berg, U.S. Department of Energy; Robert Busch, University of New Mexico; Rafe Campbell, Sandia National Laboratories; Theresa Cutler, Los Alamos National Laboratory; John Ford, Sandia National Laboratories; Ronald Knief, Individual; Abraham Weitzberg, Individual

Status: ANSI approved a reaffirmation on 6/5/2024. A PINS for a revision was submitted to ANSI on 7/7/2017 and resubmitted after the reaffirmation. The reaffirmation was processed to keep the standard current while the revision is completed. The working group will add a few members, revise the previously submitted PINS, and initiate the revision process in 2025.

ANSI/ANS-14.1-2004 (R2024), *Operation of Fast Pulse Reactors* (revision of ANSI/ANS-14.1-1975; R1982; R1989; R2000)

Scope: *This standard is for those involved in the design, operation, and review of fast pulse reactors. It has been formulated in general terms to be applicable to all current fast pulse reactors. This standard does not apply to periodically pulsed reactors or booster assemblies.*

Membership:
Darren Talley, Chair, Sandia National Laboratories; Richard Anderson, Los Alamos National Laboratory; James Bryson, Sandia National Laboratories; Michael Flanders, White Sands Missile Range; John Ford, Sandia National Laboratories; Joetta Goda, Los Alamos National Laboratory; Ronald Knief, Individual; Douglas Minnema, Defense Nuclear Facilities Safety Board

Status: ANSI approved a reaffirmation on 8/19/2024.

ANSI/ANS-15.1-2007 (R2023), *The Development of Technical Specifications for Research Reactors* (revision of ANSI/ANS-15.1-1990; R1999)

Scope: *This standard identifies and establishes the content of technical specifications (TS) for research and test reactors. Areas addressed are: Definitions, Safety Limits (SL), Limiting Safety System Settings (LSSS), Limiting Conditions for Operation (LCO), Surveillance Requirements (SR), Design Features, and Administrative Controls. Sufficient detail is incorporated so that applicable specifications can be derived or extracted.*

Membership:
Les Foyto, Chair, University of Illinois–Champaign Urbana; Evan Beese, Risk IQ; Leo Bobek, University of Massachusetts at Lowell; Justin Hudson, Jr., U.S. Nuclear Regulatory Commission; Sean O'Kelly, Idaho National Laboratory; Steve Reese, Oregon State University; Brian Shea, University of Florida

Status: This standard received ANSI approval of a reaffirmation on 4/27/2023. The working group will be working with the NRC in the near future to incorporate "lessons learned" during relicensing of facilities. No major activity to report in calendar year 2024.

ANSI/ANS-15.2-1999 (R2021), *Quality Control for Plate-Type Uranium-Aluminum Fuel Elements* (revision of ANSI/ANS-15.2-1990)

Scope: *This standard sets forth general requirements for the establishment and execution of a program designed to verify that the quality of plate-type uranium-aluminum fuel elements being purchased for research reactors conforms to the requirements of the contract and applicable technical documents, including specifications, standards, and drawings.*

Membership:
Bryon Curnutt, Chair, Idaho National Laboratory; Jeffrey Brower, Idaho National Laboratory; Clinton Cooper, Idaho National Laboratory; Cindy Montgomery, U.S. Nuclear Regulatory Commission; Daniel Pinkston, Oak Ridge National Laboratory; Randolph Strader, National Institute of Standards and Technology

Status: The reaffirmation of this standard was approved by ANSI on 1/28/2021. The reaffirmation will keep the standard current while progress is made on new high power LEU conversions. A revision to ANSI/ANS-15.2-1999 (R2009) was issued for ballot to N17 (previous consensus committee). Significant comments were received directing that new high power LEU conversion fuel be incorporated into the next revision of the standard. The revision was put on hold until sufficient progress is made on the new fuel type. This progress has yet to be made and is not expected to be available for some time. The subcommittee and working group chairs do not recommend

that the PINS, as previously approved, be administratively resubmitted to ANSI and have committed to submitting a new PINS form acknowledging the incorporation of LEU fuel type and possibly other changes when sufficient information is available.

ANSI/ANS-15.4-2016 (R2021), *Selection and Training of Personnel for Research Reactors* (revision of ANSI/ANS-15.4-2007)

Scope: *This standard sets the qualification, training, and certification criteria for operations personnel at research reactors and establishes the elements of a program for periodic re-qualification and re-certification. The standard is predicated on levels of responsibility rather than on a particular organizational concept.*

Membership:
Jere Jenkins, Chair, Idaho National Laboratory; JohnPeter Bekker (Associate Member), University of Texas at Austin; Patrick Berry, Patrick Berry Consulting, LLC Michelle DeSouza, U.S. Nuclear Regulatory Commission; Luke Gilde, University of Maryland; Cameron Goodwin, Rhode Island Nuclear Science Center; Jordan Hagaman, Kairos Power LLC; Christopher Heysel, McMaster University Library; Christopher Hines, Washington State University; James Klein, NASA-Glenn Research Center; Lance Lippert, Sandia National Laboratories; Celia Oney, Oregon State University; Edward Sierra, Brookhaven National Laboratory; Randolph Strader, National Institute of Standards & Technology; Travis Tate, U.S. Nuclear Regulatory Commission; Jonathan Wallick, U.S. Geological Survey

Status: ANSI approved a reaffirmation on 7/23/2021. The working group is being restarted.

ANSI/ANS-15.8-1995 (R2023), *Quality Assurance Program Requirements for Research Reactors* (revision of ANSI/ANS-15.8-1976; R1986)

Scope: *The standard provides criteria for quality assurance in the design, construction, operation, and decommissioning of research reactors.*

Membership:
Michelle Dudley, Chair, National Institute of Standards & Technology; Jeffrey Bartelme, SHINE Technologies, LLC; Patrick Boyle, U.S. Nuclear Regulatory Commission; Robert Burg, EPM, Inc.; William Fowler, EPM, Inc.; Jordan Hagaman, Kairos Power LLC; Matthew Hertel, X-Energy, LLC; Jere Jenkins, Texas A&M University; Ryan Marcum, Consultant; Shannon McCall, University of Missouri Research Reactor; Daniel Menchaca, Texas A&M University; Keith Miller, Sargent & Lundy, LLC; Robert Newby, National Institute of Standards & Technology; Auden Oliveri, Reed College Research Reactor; Richard Pratt, Sandia National Laboratories; Jesse Vien, National Institute of Standards & Technology; Guanyi Wang, Argonne National Laboratory; Michael Worrall, Idaho National Laboratory; Dillon Yi, Individual

Status: A reaffirmation was approved by ANSI on 11/27/2023. During the reaffirmation review, the working group determined the standard would benefit from a revision to enhance the content to align with improvements in various process and supporting reference sources since the last revision completed in 1995. A solicitation to the ANS and test and research reactor communities for working group volunteers to support the revision effort resulted in increased representation from across the test and research reactors and private sector communities. The working group needs to review the PINS submitted to ANSI in 2010 to determine if it remains current.

ANSI/ANS-15.11-2016 (R2021), *Radiation Protection at Research Reactor Facilities* (revision of ANSI/ANS-15.11-2009)

Scope: *This standard establishes the elements of a radiation protection program and the criteria necessary to provide an acceptable level of radiation protection for personnel at research reactor facilities and the public consistent with keeping exposures and releases as low as is reasonably achievable (ALARA).*

Membership:
Steven Reese, Chair, Oregon State University; Craig Bassett, U.S. Nuclear Regulatory Commission; Ronald Dobey, Individual; Wesley Frey, University of California–Davis; Abby Kurwitz, Texas A&M University; Jake Nichols,

Status: ANSI approved a reaffirmation on 7/20/2021. We have begun reviewing the standard to determine whether a revision is necessary. The maintenance cycle ends in 2025.

ANSI/ANS-15.16-2015 (R2024), *Emergency Planning for Research Reactors* (revision of ANSI/ANS-15.16-2008)

Scope: *This standard identifies the elements of an emergency plan which describes the approach to coping with emergencies and minimizing the consequences of accidents at research reactor facilities. The emphasis given each of these elements shall be commensurate with the potential risk involved. The emergency plan shall be implemented by emergency procedures.*

Membership:
Steven Reese, Chair, Oregon State University; Leo Bobek, University of Massachusetts–Lowell; James Bryson, Sandia National Laboratories; Les Foyto, University of Illinois–Champagne Urbana; Michael Norris, U.S. Nuclear Regulatory Commission; Sean O'Kelly, Idaho National Laboratory

Status: A reaffirmation was approved by ANSI on 12/9/2024.

ANSI/ANS-15.21-2012 (R2023)*, Format and Content for Safety Analysis Reports for Research Reactors* (revision of ANSI/ANS-15.21-1996; R2006)

Scope: *This standard identifies specific information and analyses for inclusion in the safety analysis report for research reactors and establishes a uniform format for the report. This standard provides the criteria for the format and content for safety analysis reports for research reactors.*

Membership:
Michael Balazik, Chair, U.S. Nuclear Regulatory Commission; Jerry Newhouse, Reed College; Steven Reese, Oregon State University; Clifford Stanley, Individual

Status: The standard was reaffirmed by ANSI on 1/19/2023. The working group plans to meet after update to NUREG-1537, *Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors*, is issued.

ANS-15.22, *Classification of Structures, Systems, and Components for Research Reactors* (proposed new standard)

Scope: *This standard provides one technology neutral SSC classification process for research reactors that is, where possible, performance-based and risk-informed. This standard applies to existing and future research and test reactors.*

Membership:
Andrew Smolinski, Chair, Armed Forces Radiobiology Research Institute; Leo Bobek, University of Massachusetts-Lowell; Mihai Diaconeasa, North Carolina State University; Jordan Hagaman, Kairos Power LLC; Duane Hardesty, U.S. Nuclear Regulatory Commission; Brenden Heidrich, Idaho National Laboratory; Jere Jenkins, Texas A&M University; Bryce Kelly, Idaho National Laboratory; Steven Reese, Oregon State University; Patrick Snouffer, Zeno Power Systems, Inc.; Clifford Stanley, Individual; Randy Strader, National Institute of Standards & Technology; Carroll Trull, EPM, Inc.; Guanyi Wang, Argonne National Laboratory

Status: The PINS was submitted to ANSI on 3/27/2017. Andrew Smolinski took over the chair role from Dagistan Sahin in 2024.

Research Advanced Reactors Consensus Committee (RARCC) Organizational Chart

Chair: Gale Hauck

Vice Chairs: Jason Andrus, Thomas Newton

ANS-15	ANS-29
Operation of Research Reactors	**Advanced Initiatives**
Thomas Newton (Chair)	Jason Andrus (Chair)
Ⓟ = PINS submitted to ANSI	
ANS-1-2000 (R2024) Ⓟ (A1) Conduct of Critical Experiments RF 6/5/2024 (WGC: D. Hayes)	ANS-53.1-2011 (R2021) Ⓟ (A1) Nuclear Safety Design Process for Modular Helium-Cooled Reactor Plants RF 10/7/2021 (WGC: J. August)
ANS-15.8-1995 (R2023) Ⓟ (A1) Quality Assurance Program Requirements for Research Reactors RF 11/27/23 (WGC: M. Dudley)	ANS-54.1-2020 (A2) Nuclear Safety Criteria and Design Process for Sodium Fast Reactor Nuclear Power Plants APP'D 3/23/2020 (WGC: G. Flanagan)
ANS-14.1-2004 (R2024) (A2) Operation of Fast Pulse Reactors RF 8/19/2024 (WGC: D. Talley)	ANS-20.2-2023 (NEW) (A2) Nuclear Safety Design Criteria and Functional Performance Requirements for Liquid-Fuel, Molten-Salt Reactor Nuclear Power Plants APP'D 1/4/2024 (WGC: D. Holcomb)
ANS-15.1-2007 (R2023) (A2) Development of Technical Specifications for Research Reactors RF 4/27/2023 (WGC: L. Foyto)	ANS-GS-30.1 (NEW) Ⓟ (B1) Integrating Risk and Performance Objectives into New Reactor Nuclear Safety Designs (Guidance Standard) (WGC: M. Linn)
ANS-15.2-1999 (R2021) (A2) Quality Control for Plate-Type Uranium-Aluminum Fuel Elements RF 1/28/2021 (WGC: B. Curnutt)	ANS-30.2 (NEW) Ⓟ (B1) Classification and Categorization of Structures, Systems, and Components for New Nuclear Power Plants (WGC: K. Welter)
ANS-15.4-2016 (R2021) (A2) Selection and Training of Personnel for Research Reactors RF 7/23/2021 (WGC: J. Jenkins)	ANS-20.1 (NEW) Ⓟ (B2) **PROJECT ON INDEFINITE HOLD** Nuclear Safety Design Criteria for Fluoride Salt-Cooled High-Temperature Reactor NPPs (WGC: E. Blandford)
ANS-15.11-2016 (R2021) (A2) Radiation Protection at Research Reactors RF 7/20/2021 (WGC: S. Reese)	
ANS-15.16-2015 (R2024) (A2) Emergency Planning for Research Reactors RF 12/9/2024 (WGC: S. Reese)	
ANS-15.21-2012 (R2023) (A2) Format and Content for Safety Analysis Reports for Research Reactors RF 1/19/2023 WGC: M. Balazik)	
ANS-15.22 (NEW) Ⓟ (B1) Classification of Structures, Systems and Components for Research Reactors (WGC: D. Sahin)	
(A1) Current Being Worked On Standards	
(A2) Current Not Being Worked On Standards	
(B1) Proposed Being Worked On Standards	
(B2) Proposed Not Being Worked On Standards	
(C1) Withdrawn Being Worked On Standards	
(C2) Withdrawn Not Being Worked On Standards	

Table 6 – RARCC Organizational Chart

Safety and Radiological Analyses Consensus Committee (SRACC)

Andrew O. Smetana, Chair
Individual

Scope: *The SRACC is responsible for the preparation and maintenance of voluntary consensus standards as well as standards-related guidance documents, guidance standards, and technical reports supporting physics methods and measurements for nuclear facilities, shielding materials and methods for shielding analyses, safety analyses and for the associated computational methods and computer codes. Input data for calculations and codes, such as nuclear cross sections, are included in this scope. The ANS Standards Committee Procedures Manual for Consensus Committees shall be used to guide the activities of this consensus committee.*

Subcommittees have been established to manage the activities of working groups and to perform detailed reviews of proposed standards for technical need, relevance, and acceptability. Each subcommittee has been assigned a unique and specific area of technical responsibility.

These subcommittees have been organized as follows:

- *Mathematics and Computation (ANS-10)*
- *Reactor Physics (ANS-19)*
- *Shielding (ANS-6)*

Each subcommittee has established various working groups to develop specific proposed standards and maintain existing standards within its respective area of responsibility. These working groups create the text of SRACC standards and resolve review and ballot comments.

SRACC Membership:
Andrew O. Smetana, Chair, Individual
Julie Jarvis, Vice Chair, Defense Nuclear Facilities Safety Board
F. Arzu Alpan, Oak Ridge National Laboratory
Richard S. Amato, Individual
John Bess, JFoster and Associates, LLC
Dimitrios M. Cokinos, Individual
Donald J. Dudziak, Los Alamos National Laboratory
Eric Giavedoni, Grove Engineering, Inc.
Mukesh K. Gupta, Amentum Technical Services
Paul Hulse, Sellafield, Limited
Moussa Mahgerefteh, Individual
Peter Norgard, University of Missouri Research Reactor
Donald E. Palmrose, U.S. Nuclear Regulatory Commission
Japan Patel, The Ohio State University
Charles T. Rombough, CTR Technical Services, Inc.
Charlotta E. Sanders, University of Nevada, Las Vegas
Jonathan Stephens, BWX Technologies, Inc.
Abraham Weitzberg, Consultant

Report of SRACC:

The SRACC held a virtual meeting on November 18, 2024. Nolan Hertel retired from standards activities. Jonathan Stephens was confirmed as a member, and Japan Patel was promoted from associate member to full member of the RARCC.

Approved in 2024:

ANSI/ANS-5.10-2019 (R2024), *Airborne Release Fractions at Non-Reactor Nuclear Facilities* (reaffirmation of ANSI/ANS-5.10-2019)

ANSI/ANS-19.1-2019 (R2024), *Nuclear Data Sets for Reactor Design Calculations* (reaffirmation of ANSI/ANS-19.1-2019)

ANSI/ANS-19.6.1-2019 (R2024), *Reload Startup Physics Tests for Pressurized Water Reactors* (reaffirmation of ANSI/ANS-19.6.1-2019)

ANSI/ANS-19.13-2024, *Initial Fuel Loading and Startup Physics Tests for First-of-a-Kind Advanced Reactors* (new standard)

Active Standards/Projects (Approved PINS):

ANS-6.4.2, *Specification for Radiation Shielding Materials* (revision of ANSI/ANS-6.4.2-2006)

ANS-6.4.3, *Gamma-Ray Attenuation Coefficients and Buildup Factors for Engineering Materials* (historical revision of ANSI/ANS-6.4.3-1991–proposed new standard)

ANS-10.4, *Verification and Validation of Non-Safety-Related Scientific and Engineering Computer Programs for the Nuclear Industry* (revision of ANSI/ANS-10.4-2008; R2021)

ANS-19.10, *Methods for Determining Neutron Fluence in BWR and PWR Pressure Vessel and Reactor Internals* (revision of ANSI/ANS-19.10-2009; R2021)

Mathematics and Computations Subcommittee (ANS-10)

Scope: *The scope of the Mathematics and Computations Subcommittee includes the development of standards which will promote effective utilization and enhance the reliability of computer programs throughout the nuclear community. The intent of such standards is to improve the ease of use, facilitate the exchange, and simplify the conversion of programs.*

Membership:
Paul Hulse, Chair, Sellafield Ltd.
Mark Baird, Oak Ridge National Laboratory
Phillip Ellison, GE-Hitachi Nuclear Energy
Nima Fathi, University of New Mexico
Byron Frank, Westinghouse Electric Company, LLC
Bernadette Kirk, Kirk Nuclear Information Services
Yuri Orechwa, U.S. Nuclear Regulatory Commission
Paul Romano (Associate Member), Argonne National Laboratory
Robert Singleterry, NASA Langley Research Center
Andrew Smetana, Individual
Charles Sparrow, Mississippi State University

The Mathematics and Computations Subcommittee manages the following active projects and current standards:

ANS-10.2, *Portability of Scientific and Engineering Software* (new standard, historical revision to be considered)

Scope: *This standard provides recommended programming practices and requirements to facilitate the portability of computer programs prepared for scientific and engineering computations.*

Membership:
Robert Singleterry, Chair, NASA Langley Research Center

Status: The standard was administratively withdrawn 8/14/2019. The working group recommended letting the standard be withdrawn administratively on its 10th anniversary. This is because the standard will need a major re-write to remain current, and this is not currently possible given the changes that are occurring in software development at this time. A revision will be considered at a later date.

ANSI/ANS-10.4-2008 (R2021), *Verification and Validation of Non-Safety Related Scientific and Engineering Computer Programs for the Nuclear Industry* (new standard, historical revision of ANSI/ANS-10.4-1987; R1998)

Scope: *This standard provides requirements for the verification and validation (V&V) of scientific and engineering computer programs developed for use by the nuclear industry.*

Membership:
Nima Fathi, Chair, Texas A&M University; Patrick McDaniel, Vice Chair, University of New Mexico; Byron Frank, Westinghouse Electric Company, LLC; Douglas Hardtmayer, MPR Associates, Inc.; Paul Hulse, Sellafield Ltd.; Ana Jambrina (Associate Member). VTT Technical Research Centre of Finland; Brian Krystek, GE-Hitachi; Wai Law, Tennessee Valley Authority; Giulio Malinverno (Associate Member), FIMAc; Salvador Rodriguez, Sandia National Laboratories; Paul Romano (Associate Member), Argonne National Laboratory; Ralph Schwartzbeck, Highland TEMS, LLC; Andrew Smetana, Individual

Status: The standard was reaffirmed on 6/15/21. A PINS to initiate a revision was submitted to ANSI on 7/17/2018. The working group is updating the standard for release in 2026.

ANSI/ANS-10.5-2006 (R2021), *Accommodating User Needs in Scientific and Engineering Computer Software Development* (new standard, historical revision of ANSI/ANS-10.5-1994)

Scope: *This standard presents criteria for accommodating user needs in the preparation of computer software for scientific and engineering applications.*

Membership:
Andrew Smetana, Chair, Individual

Status: The standard was reaffirmed on 8/23/2021. No activity in 2024. The standard will need revision or reaffirmation by 2026.

ANSI/ANS-10.7-2013 (R2023), *Non-Real Time, High Integrity Software for the Nuclear Industry—Developer Requirements* (new standard)

Scope: *This standard addresses rigorous, systematic development of high integrity, non-real time safety analysis, design, simulation software which includes calculations or simulations that can have critical consequences if errors are not detected, but that are so complex that typical peer reviews are not likely to identify errors. This may include nuclear design and performance codes, codes used to assign safety classification levels to systems, structures and components at nuclear facilities, computational fluid dynamics or structural mechanics codes, complex Monte Carlo simulations, radiation dosimetry analysis codes, and nuclear medical physics analytical codes.*

Membership:
Bernadette Kirk, Chair, Kirk Nuclear Information Services; Amani Cheniour, Oak Ridge National Laboratory; Nikola Draganic, Lawrence Livermore National Laboratory; Mason Fox, University of Tennessee; Paul Hulse, Sellafield Limited; Ana Jambrina, VTT Technical Research Centre of Finland; Brendan Kochunas, University of Michigan; Giulio Malinverno, FIMAc SpA; Ryan McClarren, University of Notre Dame; Kyle Metzroth, X-Energy LLC; Duy-Thien Nguyen, Oak Ridge National Laboratory; Japan Patel, The Ohio State University; Eric Pearson, GE Hitachi Nuclear Energy; Vince Penkrot, Westinghouse Electric Company, LLC; Hawk Schulmeisters (Associate), Embry-Riddle Aeronautical University; Charles Sparrow (Observer), Mississippi State University; Peter Stefanovic, Pacific Northwest National Laboratory

Status: Reaffirmation of this standard was approved by ANSI on 4/19/2023. The working group is reviewing the standard to see if a revision is needed. There is a need to include risk-informed methods to the standard. The working group had its first meeting on 11/1/2024. Members were to familiarize themselves with the ANS-10.7 standards and to consider the possible inclusion of risk-informed or performance-based methods. Of the attendees, Vincent Penkrot was a participant in the drawing up of the ANS-10.7 standard. Nikola Draganic and Eric Pearson were promoted to full members. Hawk Schulmeisters was appointed as an associate member. The working group will meet in early 2025.

ANSI/ANS-10.8-2015 (R2020), *Non-Real Time, High-Integrity Software for the Nuclear Industry—User Requirements* (new standard)

Scope: *This standard provides minimum requirements for assurance that high-integrity design and analysis software developed for use by the nuclear industry meets state of the practice expectations for quality when employed by end users to solve complex physical problems. Final validation of such software for its intended use is ultimately the responsibility of the user. The developer is responsible for validation of the software over the parameter space defined by the developer; however, the end user may extrapolate beyond the intended validation envelope providing additional benchmarks or appropriate non-dimensional scaling analysis. The requirements in this standard may be graded or tailored for less significant applications than high-integrity software. The intent is to set a minimum level of quality assurance and critical technical process requirements to satisfy due diligence.*

Membership:
OPEN, Chair; Mark Baird, Oak Ridge National Laboratory; Byron Frank, Westinghouse Electric Company, LLC; Paul Hulse, Sellafield Ltd.; Charles Martin, Longenecker & Associates, Inc.; Ryan McClarren, University of Notre Dame; Vincent S. Penkrot, Westinghouse Electric Company, LLC; Shivajli Seth, U.S. Department of Energy; John Shultz, U.S. Department of Energy; Andrew Smetana, Savannah River Nuclear Solutions; Peter Stefanovic, Oak Ridge National Laboratory

Status: ANSI approved the reaffirmation of this standard on 10/29/2020.This standard is a complement to ANSI/ANS-10.7-2013, *Non-Real Time, High-Integrity Software Industry—Developer Requirements.* It is likely that this standard will be reaffirmed in 2025, awaiting the release of an updated ANS-10.7.

Reactor Physics Subcommittee (ANS-19)

Membership:
Dimitrios Cokinos, Chair, Individual
Charles Rombough, Secretary, CTR Technical Services, Inc
F. Arzu Alpan, Oak Ridge National Laboratory
Samuel Bays, Idaho National Laboratory
John Bess, J Foster and Associates, LLC
Friederike Bostelmann, Oak Ridge National Laboratory
Jianwei Chen (Observer), Westinghouse Electric Company, LLC
Ren-Tai Chiang, Individual
Mark DeHart, Idaho National Laboratory
David Diamond (Observer), Brookhaven National Laboratory
Mark Eckenrode, Framatome, Inc.
Alireza Haghighat, Virginia Tech Research Center
Jesse Klingensmith, Westinghouse Electric Company
Edward Knuckles, Individual
Robert Little, Los Alamos National Laboratory
Moussa Mahgerefteh, Individual
Nicholas Martin, Idaho National Laboratory
Eleodor Nichita, Ontario Tech University
Georgeta Radulescu, Oak Ridge National Laboratory
Benjamin Rouben, Individual
Abraham Weitzberg, Consultant

Note: The following ANS-19 standards have now become international standards and are designated as ISO 18075, ISO 18077, and ISO 19226, respectively with the same titles as in their ANS versions:

- ANS-19.3, *Steady State Neutronics Methods for the Analysis of Power Reactors*
- ANS-19.6.6, *Reload Startup Physics Tests in Pressurized Water Reactors*
- ANS-19.10, *Methods for Determining Neutron Fluence in BWR and PWR Pressure Vessel and Reactor Internals*

The Reactor Physics Subcommittee manages the following projects and current standards:

ANSI/ANS-5.1-2014 (R2023), *Decay Heat Power in Light Water Reactors* (revision of ANSI/ANS-5.1-2005)

Scope: *This standard sets forth values for the decay heat power from fission products and ^{239}U and ^{239}Np following shutdown of light water reactors containing ^{235}U, ^{238}U, and plutonium. The decay heat power from fission products is presented in tables and equivalent analytical representations. Methods are described that account for the reactor operating history, for the effect of neutron capture in fission products, and for assessing the uncertainty in the resultant decay heat power. Decay heat power from other actinides and activation products in structural materials, and fission power from delayed neutron-induced fission, are not included in this standard.*

Membership:
Jesse Klingensmith, Chair, Westinghouse Electric Company, LLC; Ryan Buratti, Framatome, Inc.; Ian Gauld, Individual; Ryan Buratti, Framatome Inc.; Anna Jambrina (Associate Member), VTT Technical Research Centre of Finland; Edward Knuckles, Individual; John Lehning, U.S. Nuclear Regulatory Commission; Dmitri Ziabletsev, AREVA NP

Status: Reaffirmation was approved by ANSI on 12/4/2023. A survey of active users of the standard in industry, research, and regulatory agencies was completed in 2022 to help assess user needs and the future direction of the standard's development. Based on industry feedback and discussion with working group members, no new enhancements of ANS-5.1 are planned in the near future. Communication will continue with international committees (i.e., ISO).

ANSI/ANS-19.1-2019 (R2024), *Nuclear Data Sets for Reactor Design Calculations* (revision of ANSI/ANS-19.1-2002; R2011)

Scope: *The purpose of this standard is to provide criteria for the use of nuclear data in reactor design calculations. Thus, the standard identifies and describes the specifications for developing, preparing, and documenting nuclear data sets. The nuclear data sets considered are evaluated data sets, processed continuous data sets and processed averaged data sets. These data sets enable the analysts to generate cross section data which are used as input in neutronics codes.*

Membership:
Robert Little, Co-Chair, Los Alamos National Laboratory; Friederike Bostelmann, Co-Chair, Oak Ridge National Laboratory; F. Arzu Alpan, Oak Ridge National Laboratory; John Bess, J Foster and Associates, LLC; Dimitrios Cokinos, Individual; Ian Gauld, Individual; Edward Knuckles, Individual; Georgetta Radulescu, Oak Ridge National Laboratory; Benjamin Rouben, Individual

Status: A reaffirmation was approved by ANSI on 1/5/2024.

ANSI/ANS-19.3-2022, *Steady-State Neutronics Methods for Power Reactor Analysis* (revision of ANSI/ANS-19.3-2011; R2017)

Scope: *This standard provides guidance for performing and validating the sequence of steady-state calculations leading to prediction, in all types of commercial nuclear reactors, of (1) reaction-rate spatial distributions; 2) reactivity; 3) change of isotopic compositions with time. The standard provides 1) guidance for the selection of computational methods; 2) criteria for verification and validation of calculational methods used by reactor core analysts; 3) criteria for evaluation of accuracy and range of applicability of data and methods; 4) requirements for documentation of the preceding.*

Membership:
Eleodor Nichita, Chair, University of Ontario Institute of Technology; John Bess, JFoster Associates, LLC; Ren-Tai Chiang, Individual; Dimitrios Cokinos, Individual; Ronald Ellis, Individual; Godfree Gert, Lawrence Livermore National Laboratory; Greg Hobson, Framatome, Inc.; Guy Marleau, Ecole Polytechnique de Montreal; Charles Rombough, CTR Technical Services; Benjamin Rouben, 12 & 1 Consulting; Wei Shen, Xi'an Jiaotong University; William Walters, Pennsylvania State University; Peter Yarsky, U.S. Nuclear Regulatory Commission; Baocheng Zhang, Westinghouse Electric Company, LLC

Status: ANSI approval was received on 10/10/2022 and published on 2/1/2023. No activity in 2024.

ANSI/ANS-19.3.4-2022, *The Determination of Thermal Energy Deposition Rates in Nuclear Reactors* (revision of ANSI/ANS-19.3.4-2002; R2017)

Scope: *It is the purpose of this standard to provide criteria for 1) determination of the energy allocation among the principal particles and photons produced in fission, both prompt and delayed; 2) adoption of appropriate treatment of heavy charged particle and electron slowing down in matter; 3) determination of the spatial energy deposition rates resulting from the interactions of neutrons; 4) calculation of the spatial energy deposition rates resulting from the various interactions of photons with matter; and 5) presentation of the results of such computations, including verification of accuracy and specification of uncertainty. This standard addresses the energy generation and deposition rates for all types of nuclear reactors where the neutron reaction rate distribution and photon and beta emitter distributions are known. Its scope is limited to the reactor core, including blanket zones, control elements and core internals, pressure vessel, and the thermal and biological shielding.*

Membership:
Georgeta Radulescu, Chair, Oak Ridge National Laboratory; F. Arzu Alpan, Oak Ridge National Laboratory; John Bess, JFoster and Associates; Dimitrios Cokinos, Individual; Adolpho Ferrer, Studsvik Scandpower Inc.; Ana Jambrina, VTT Technical Research Centre of Finland; Yuxuan Liu, GE Hitachi/Global Nuclear Fuel-Americas; Joel Rhodes, Studsvik Scandpower Inc.; Meng-Jen Wang, Radiant Industries; Baocheng Zhang, Westinghouse Electric Company, LLC

Status: This standard received ANSI approval on 6/12/2022. The current revision contains editorial changes to the standard. An appendix, which contains no requirements of the standard, was added. The appendix contains reference energy deposition calculations. No activity in 2024.

ANSI/ANS-19.4-2017 (R2022), *A Guide for Acquisition and Documentation of Reference Power Reactor Physics Measurements for Nuclear Analysis Verification* (new standard, supersedes ANSI/ANS-19.4-1976; R2000)

Scope: *This standard specifies and provides requirements for the reference measurements of reactor geometry, reactivity, and operation parameters in light water power reactors. The measurement data are used in the verification of reactor physics computational methods used for nuclear core designs and analyses. This standard identifies the types of parameters, a brief description of test conditions and experimental data required for such reference measurements, problems and concerns that may affect the accuracy or interpretation of the data, and the criteria to be used in documenting the results of reference measurements.*

Membership:
Edward Knuckles, Chair, Individual; John Bess, JFoster and Associates, LLC; Ren-Tai Chiang, Individual, Dimitrios Cokinos, Individual; Dwayne Fitts, Framatome, Inc.; Moussa Mahgerefteh, Individual; Jeremy Roberts, Kansas State University; Charles Rombough, CTR Technical Services, Inc.; Benjamin Rouben, 12 & 1 Consulting; Patrick Sebastiani, Westinghouse Electric Company, LLC

Status: The standard received ANSI approval of a reaffirmation 8/24/2022. The working group believes that the standard would benefit from modifications to improve its clarity in some areas and has forwarded recommendations to the chair for further action.

ANS-19.5, *Requirements for Reference Reactor Physics Measurements* (proposed new standard, historical revision of ANSI/ANS-19.5-1995)

Scope: *This standard provides criteria for the qualification of reference reactor physics measurements obtained from subcritical (including non-multiplying), critical and experiments performed in any nuclear facility for verification of nuclear design and analysis methods. It also provides criteria for documentation of reference data and review of proposed reference reactor physics data to ensure compliance with this standard. The burden falls upon the user to determine the applicability and relevance of such experimental data to a given reactor design.*

Membership:
Mark DeHart, Chair, Idaho National Laboratory; Julian Atfield, Canadian Nuclear Laboratories; John Bess, JFoster and Associates, LLC; Rowdy Davis, University of New Mexico; Ronald Ellis, Individual; Albert Hsieh, U.S. Nuclear Regulatory Commission; Kyoung Lee, Oak Ridge National Laboratory; Matthew Lund, Idaho National Laboratory; Nicholas Martin, Idaho National Laboratory; Japan Patel, The Ohio State University; Patrick Sebastiani, Westinghouse Electric Company, LLC; Andrew Smolinski, Armed Forces Radiobiology Research Institute; Nazila Tehrani, U.S. Nuclear Regulatory Commission; Alan Wells, Individual; Luke Yaraskavitch, Canadian Nuclear Laboratories

Status: A PINS was approved and submitted to ANSI on 11/6/2012 for a resurrection of historic standard ANSI/ANS-19.5-1995 (W2005). An outline for the revised standard was developed by remote collaboration, and a very rough first draft was developed based on the outline. A hybrid in-person/virtual meeting was held at the 2024 ANS Winter Meeting to begin editing and expanding the draft, focusing on the first three subsections of the initial draft.

ANSI/ANS-19.6.1-2019 (R2024), *Reload Startup Physics Tests for Pressurized Water Reactors* (revision of ANSI/ANS-19.6.1-2011 (R2016)

Scope: *This standard applies to the reactor physics tests that are performed following a refueling or other core alteration of a PWR for which nuclear design calculations are required. This standard does not address the physics test program for the initial core of a commercial PWR.*

This standard specifies the minimum acceptable startup reactor physics test program to determine if the operating characteristics of the core are consistent with the design predictions, which provides assurance that the core can be operated as designed. This standard does not address surveillance of reactor physics parameters during operation or other required tests, such as mechanical tests of system components (for example, the rod drop time test), visual verification requirements for fuel assembly loading, or the calibration of instrumentation or control systems (even though these tests are an integral part of an overall program to ensure that the core behaves as designed).

This standard assumes that the same previously accepted analytical methods are used for both the design of the reactor core and the startup test predictions. It also assumes that the expected operation of the core will fall within the historical database established for the plant and/or sister plants.

Membership:
Charles Rombough, Chair, CTR Technical Services, Inc.; Paul Adam, Individual; Aaron Norm Austin, Duke Energy–McGuire Nuclear Station; Kaushik Banerjee, Idaho National Laboratory; John Bess, J Foster and Associates, LLC; Robert Borchert, Individual; Ryan Buratti, Framatome, Inc.; Anthony Campos, Framatome, Inc.; Charles Cohen, Naval Nuclear Laboratory; Jason Dever, Framatome, Inc.; Moussa Mahgerefteh, Individual; Michael Presnell, Duke Energy Corporation; Michael Prible, Westinghouse Electric Company, LLC; Ken Sahadewan, Constellation Nuclear; Patrick Sebastiani, Westinghouse Electric Company, LLC; Patrick Sebastiani, Westinghouse Electric Company, LLC

Status: A reaffirmation was approved by ANSI on 1/5/2024. There has been no activity since the standard was revised in 2019. The international version of the standard, ISO 18077:2022, Reload startup physics tests for pressurized water reactors, was issued in 2022.

ANS-19.8, *Fission Product Yields for 235U, 238U, and 239P* (proposed new standard)

Proposed Scope: *This standard provides a reference set of fission yield data for thermal and fast neutron-induced fission of ^{233} U, ^{235}U, ^{239}Pu, and ^{241}Pu; fast neutron-fission of ^{232}Th, ^{238}U, and ^{240}PU; and spontaneous fission of ^{252}CF. The standard includes an extensive compilation of mass chain yields and uncertainties in tabular form. This new standard is particularly important in the characterization of radioactive wastes, predicting radiation source terms production of delayed neutrons, reactor spectra, burnup calculations, and various dosimetry applications including medical applications.*

Membership:
Robert Little, Chair, Los Alamos National Laboratory; Dimitrios Cokinos, Individual

Status: ANS-19.8 was previously designated ANS-5.2. A PINS will be the first task if the decision is made to proceed with this proposed standard. No activity in 2024.

ANS-19.9, *Delayed Neutron Parameters for Light Water Reactors* (proposed new standard)

Scope: *This standard provides energy-dependent delayed neutron yield and decay data for Light Water Reactor design and control. The standard addresses the identification and characterization of fission products leading to delayed neutron emission; the total delayed neutron yield as a function of energy for U-233, U-235, U-238 and Pu-239; and fractions associated with Individual emitters, half-lives and spectra for the classical group representation of delayed neutron data.*

Membership:
Dimitrios Cokinos, Chair pro temp, Individual

Status: A PINS was submitted to ANSI on 3/6/2006. A skeleton of the standard has been completed. A working group of active participants is needed to move forward. No activity in 202r.

ANSI/ANS-19.10-2009 (R2021), *Methods for Determining Neutron Fluence in BWR and PWR Pressure Vessel and Reactor Internals* (new standard)

Scope: *This standard provides criteria for performing and validating the sequence of calculations required for the prediction of the fast neutron fluence t in the reactor vessel. Applicable to PWR and BWR plants the standard addresses flux attenuation from the core through the vessel to the cavity and provides criteria for generating cross sections, spectra, transport and comparisons with in- and ex-vessel measurements, validation, uncertainties and flux extrapolation to the inside vessel surface.*

Membership:
Alireza Haghighat, Chair, Virginia Tech; Fariz Abdul Rahman, GE Hitachi; F. Arzu Alpan, Oak Ridge National Laboratory; Jianwei Chen, Westinghouse Electric Company; LLC; Dimitrios Cokinos, Individual; Christopher Edgar, GE Hitachi; Ari Foley, Los Alamos National Laboratory; Edward Knuckles, Individual; Robert Little, Los Alamos National Laboratory; Moussa Mahgerefteh, Individual; Benjamin Parks, U.S. Nuclear Regulatory Commission; Amrit Patel, Oklo, Inc.; Joes Risner, Oak Ridge National Laboratory; Brandon Wise, U.S. Nuclear Regulatory Commission

Status: A reaffirmation was approved by ANSI on 10/7/2021. A PINS for a revision was approved and submitted to ANSI on 4/15/2022. The draft was issued to the SRACC for ballot in September 2024. The working group resolved ballot comments. Approval is expected in early 2025.

ANSI/ANS-19.11-2017 (R2022), *Calculation and Measurement of the Moderator Temperature Coefficient of Reactivity for Pressurized Water Reactors* (revision of ANSI/ANS-19.11-1997; R2011)

Scope: *This standard provides guidance and specifies criteria for determining the MTC in water moderated power reactors. Measurement of the isothermal temperature coefficient of reactivity (ITC) at hot zero power (HZP) conditions is covered in ANSI/ANS-19.6.1-2005, Reload Startup Physics Tests for Pressurized Water Reactors. This standard therefore addresses the calculation of the ITC at HZP and the calculation and measurement of the MTC at power. At present, this standard addresses the calculation and measurement of the MTC only in PWRs, because that is the only type of power reactor currently sited in the United States for which measurement of the MTC is required.*

Membership:
Moussa Mahgerefteh, Chair, Individual; Dimitrios Cokinos, Individual; Edward Knuckles, Individual; Patrick Sebastiani, Westinghouse Electric Company, LLC; Robert St. Clair, Duke Energy Corporation

Status: A reaffirmation was approved by ANSI on 6/2/2022. No activity in 2024.

ANS-19.12, *Nuclear Data for the Production of Radioisotope* (proposed new standard)

Scope: *This standard establishes criteria for developing evaluated neutron cross section and branching ratio data for isotope production pathways for fast and thermal reactor systems, providing the data needed to calculate production of the desired medical and other isotopes and associated impurities.*

Membership:
Dimitrios Cokinos, Chair pro temp, Individual

Status: PINS was approved and submitted to ANSI on 11/1/2007. The project is in need of a permanent chair and members to proceed. No activity in 2024.

ANSI/ANS-19.13-2024, *Initial Fuel Loading and Startup Tests for First-of-a Kind Advanced Reactors* (new standard)

Scope: *This standard will provide best practices for reactor startup of First-of-a-Kind (FOAK) Advanced Reactors (AR) to confirm basic safety, operational, and fundamental property data for technical and safety specifications. The standard will also provide guidance leveraging startup procedures to support software validation methods to retire the operational and regulatory risk associated with the validation performed during reactor design.*

Best practices for startup of heritage reactors and modern light water reactors (LWR) will be assimilated into generic recommended startup procedures for future FOAK-ARs. This standard will provide traceability between such recommended best practices and the identified key datasets. It will thus allow auditing the methodology of new FOAK ARs.

Membership:
Samuel Bays, Co-Chair, Idaho National Laboratory; Nicolas Martin, Co-Chair, Idaho National Laboratory; Abraham Weitzberg, Co-Chair, Consultant; Hany Abdel-Khalik, Purdue University; Andrea Alfonsi, Nucube Energy, Inc.; John Bess, Jfoster and Associates, LLC; Benjamin Betzler (Associate Member), Radiant Nuclear; Jesse Cheatham, TerraPower; Marie Cuvelier, TerraPower; Mark DeHart, Idaho National Laboratory; David Diamond, Brookhaven National Laboratory; Thomas Downar, University of Michigan; Nozomu Fuimoto, Kyushu University; Nozomu Fujimoto Kyushu University; Hans Gougar, X-Energy, LLC; David Hayes, Los Alamos National Laboratory; Mustafa Jaradat, Idaho National Laboratory; Timothy Kiefer, Individual; David Livingston, BWX Technologies, Inc.; Matthew Lund, Idaho National Laboratory; Jon McWhirter, TerraPower; Scott Palmtag, North Carolina State University; Charles Rombough, CTR Technical Services, Inc.; Nader Satvat, Kairos Power, LLC; Matthew Wargon, TerraPower; Luke Yaraskavitch, Canadian Nuclear Laboratories; Michael Zerkle, Naval Nuclear Laboratory; Haihua Zhao, Kairos Power, LLC

Status: The PINS was submitted to ANSI 2/2/2023. The draft was issued to the SRACC for approval in July 2024. Comments were addressed without substantive changes made to the draft. ANSI approval was received on 10/7/2024 and was published the same day.

Shielding Subcommittee (ANS-6)

Scope: *The purpose of this committee is to establish standards in connection with radiation shields, radiation analysis, and radiation protection insofar as it affects design of structures or equipment containing or near radiation sources, to provide shielding information to other standards groups, and to prepare and make available recommended related nuclear data and test problem solutions.*

Membership:
Charlotta Sanders, Chair, University of Nevada, Las Vegas
F. Arzu Alpan, Oak Ridge National Laboratory
Richard Amato, Individual

Peter Caracappa, Columbia University
Mukesh Gupta, Amentum
Brian Hinderliter, University of Minnesota–Duluth
Sharad (Ken) Jha, Bechtel Power Corporation
Steven Nathan, Savannah River Nuclear Solutions

Shielding Subcommittee (ANS-6) Report

The Shielding Subcommittee (ANS-6) activities fall under the shielding track of the Safety & Radiological Analyses Consensus Committee (SRACC). Reports on all subcommittee projects are found below.

The Shielding Subcommittee manages the following active and current standards:

ANSI/ANS-5.4-2011 (R2020), *Method for Calculating the Fractional Release of Volatile Fission Products from Oxide Fuel* (new standard, historical revision of ANSI/ANS-5.4-1982)

Scope: *This standard provides an analytical method for calculating the release of volatile fission products from oxide fuel pellets during normal reactor operation. When used with nuclide yields, this method will give the so-called "gap activity," which is the inventory of volatile fission products that could be available for release from the fuel rod if the cladding were breached. The standard considers high-temperature (up to the melting point) and low-temperature (where temperature-independent processes dominate) releases and distinguishes between short-halflife (halflife less than one year) and long-halflife (halflife greater than one year) nuclides. This standard requires that releases for nuclides of interest be calculated with both the high-temperature and the low-temperature models, and the larger of the two calculated releases is to be taken as the result.*

Membership:
OPEN, Chair; Yun Long, Westinghouse Electric Company, LLC; Leigh Martin, Oak Ridge National Laboratory; Christopher Van Wert, U.S. Nuclear Regulatory Commission

Status: ANSI approved a reaffirmation of this standard on 4/9/2020. No activity in 2024. Maintenance is due in 2025.

ANSI/ANS-5.10-1998 (R2024), *Airborne Release Fractions at Non-Reactor Nuclear Facilities* (new standard)

Scope: *This standard provides criteria for defining Airborne Release Fractions (ARFs) for radioactive materials under accident conditions (excluding nuclear criticalities) at non-reactor nuclear facilities. The criteria in this standard provide requirements for selecting ARFs based on the calculated or assumed forms of radioactive material released. This standard may be applied to determine the ARFs for certain applicable reactor plant events for which alternative methodologies are not mandated by regulatory requirements. Because the predominant physical forms of radioactive materials in non-reactor facilities are solids and liquids, the standard focuses on these forms. Criteria are also provided for gases and materials that can be converted into the form of a vapor.*

Membership:
Mukesh Gupta, Chair, Amentum Technical Services; James Dishaw, MeV Technology Consulting

Status: Reaffirmation approved by ANSI on 7/18/2024.

ANSI/ANS-6.1.1-2020, *Neutron and Photon Fluence-to-Dose Conversion* (new standard, historical revision of ANSI/ANS-6.1.1-1991)

Scope: *This standard presents data recommended for computing the biologically relevant dosimetric quantity in photon and neutron radiation fields. Specifically, this standard is intended for use by radiation shielding designers for the calculation of effective dose. Fit coefficients are given for evaluating whole body effective dose per unit fluence for photons with energy between 10 keV to 10 GeV and for neutrons with energy between 0.001 eV to 10 GeV. Eight different irradiation geometries are considered. Establishing exposure limits is outside the scope of this standard.*

Membership:
OPEN, Chair; Elijah Dickson, U.S. Nuclear Regulatory Commission; Matthew Mille, National Cancer Institute

Status: This standard was approved by ANSI on 9/10/2020. Paul Bergstrom and Nolan Hertel resigned as working group co-chairs in 2024. No activity in 2024.

ANSI/ANS-6.1.2-2013 (R2023), *Group-Averaged Neutron and Gamma-Ray Cross Sections for Radiation Protection and Shielding Calculations for Nuclear Power Plants* (revision of ANSI/ANS-6.1.2-1999; R2009)

Scope: *This standard provides information on acceptable evaluated nuclear data and group-averaged neutron and gamma-ray cross section libraries based on the energy range and materials of importance in nuclear radiation protection and shielding calculations for nuclear power plants.*

Membership:
F. Arzu Alpan, Chair, Oak Ridge National Laboratories; Alireza Haghighat, Virginia Tech; Robert Little, Los Alamos National Laboratory; Yuri Orechwa, U.S. Nuclear Regulatory Commission; Jeffrey Ryman, Individual

Status: A reaffirmation was approved by ANSI on 6/16/2023. No activity in 2024.

ANSI/ANS-6.3.1-1987 (R2020), *Program for Testing Radiation Shields in Light Water Reactors (LWR)* (revision of ANSI/ANS-6.3.1-1980)

Scope: *This standard describes a test program to be used in evaluating biological radiation shielding in nuclear reactor facilities under normal operating conditions including anticipated operational occurrences. The program encompasses examining and testing to be performed before startup, during startup, and testing subsequent to the startup phase. Post startup tests are required for the shielded components which do not contain sufficient radioactivity during the startup phase to allow valid testing. Shielding of these components is to be tested when radiation sources develop or are introduced into sufficient strength to allow meaningful measurements. Post startup shield tests are also required whenever radioactive or potentially radioactive equipment which could affect the adequacy of the installed shielding is introduced into the plant or relocated within the plant, or when previously tested shielding has been modified. One special category of post start-up testing is the testing of shielding during refueling operations.*

Membership:
OPEN, Chair, Jonathan Rivera, U.S. Nuclear Regulatory Commission; Sean Roy, ETA International, Inc.

Status: Reaffirmation received ANSI approval on 7/28/2020. A working group chair and members are being sought. No activity in 2024.

ANSI/ANS-6.4-2006 (R2021), *Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants* (revision of ANSI/ANS-6.4-1997; R2004)

Scope: *This standard contains methods and data needed to calculate the concrete thickness required for radiation shielding in nuclear power plants. Where possible, specific recommendations are made regarding radiation attenuation calculations, shielding design, and standards of documentation. The standard provides guidance to architect engineers, utilities, and reactor vendors who are responsible for the shielding design of stationary nuclear plants. This standard does not consider sources of radiation other than those associated with nuclear power plants. It also excludes considerations of economic aspects of shielding design.*

Concrete is a mixture of materials, the exact proportions of which will differ from application to application. This standard includes a discussion of the nature of concrete, emphasizing those variable aspects of the material which are important to the shield designer. The document discusses methods of analysis and the shielding input data appropriate to each method. Applications of the analytical methods are given, including bulk transport, radiation heating, streaming, and reflection problems.

Membership:
Ken Jha, Chair, Bechtel Corporation; Moataz Harb, Oak Ridge National Laboratory; Julie Jarvis, Defense Nuclear Facilities Safety Board

Status: Reaffirmation of the standard was approved by ANSI on 8/5/2021. The process of reaffirming the standard was initiated and is expected to be completed in 2025.

ANSI/ANS-6.4.2-2006 (R2021), *Specification for Radiation Shielding Materials* (revision of ANSI/ANS-6.4.2-1985; R1997; R2004)

Scope: *This standard sets forth physical and nuclear properties that shall be reported by the supplier as appropriate for a particular application in order to form the basis for the selection of radiation shielding materials.*

Membership:
Peter Caracappa, Chair, Columbia University; Amir Bahadori, Kansas State University; Thomas Drury, TerraPower; Brian Hinderliter, University of Minnesota-Duluth; Ahmad Ibrahim, Oak Ridge National Laboratory; Timothy Lloyd, Westinghouse Electric Company, LLC; Steven Nathan, Savannah River Nuclear Solutions; Kathryn Robertson-DeMers, Spectrum Technical Services, Inc.; Manish Sharma, Pacific Northwest National Laboratory

Status: The standard was reaffirmed on 12/7/2021. A PINS was submitted to ANSI in 2012 and resubmitted after the 2021 reaffirmation. No activity reported in 2024.

ANS-6.4.3, *Gamma-Ray Attenuation Coefficients and Buildup Factors for Engineering Materials* (proposed new standard, historical revision of ANSI/ANS-6.4-3-1991)

Scope: *This standard provides evaluated gamma-ray elemental attenuation coefficients and single material buildup factors for selected engineering materials for use in shielding calculations.*

Membership:

Eric Giavedoni, Co-Chair, Grove Engineering, Inc.; Charlotta Sanders, Co-Chair, University of Nevada Las Vegas; ; F. Arzu Alpan, Oak Ridge National Laboratory; Justin Byard, Dominion Energy; Adam Davis, Department of Energy; Elijah Dickson, U.S. Nuclear Regulatory Commission; Alex Gil, NextEra Energy; Jack Higginbotham, Oregon State University; Brian Hinderliter, University of Minnesota–Duluth; Dominic Napolitano, Individual; Mark Rutherford, RadSoft LLC; Jeffrey Ryman, Individual; Sylvia Wang, Westinghouse Electric Company, LLC

Status: The PINS for a historical revision of ANSI/ANS-6.4.3-1991 was approved and submitted to ANSI on 3/15/2012. A copy of the Japanese buildup factor standard was acquired and provided to ANS-6 Subcommittee Chair Charlotta Sanders for review. There has been no change in the status of the update to this withdrawn standard. It had earlier been proposed to see if the working group could adopt the Japanese standard on this topic, with the permission of the cognizant Japanese group. ANS standards received a copy of the Japanese standard on this subject some time ago, which was written in Japanese. Although the Japanese working group had originally expected to publish an English language version of their standard, this version has not been forthcoming to the best of our knowledge. Sanders will attempt to contact the Japanese working group to see if there is a path forward to completing the English translation of the Japanese standard.

ANSI/ANS-6.6.1-2015 (R2020), *Calculation and Measurement of Direct and Scattered Gamma Radiation from LWR Nuclear Power Plants* (revision of ANSI/ANS-6.6.1-1987)

Scope: *This standard defines calculational requirements and discusses measurement techniques for estimates of dose rates near light water reactor (LWR) nuclear power plants due to direct and scattered gamma-rays from contained sources onsite. Onsite locations outside plant buildings and locations in the offsite unrestricted area are considered. All sources that contribute significantly to dose rates are identified and methods for calculating the source strength of each are discussed. Particular emphasis is placed on 16N sources as they are significant sources of direct and scattered radiation for boiling water reactors (BWR). The standard specifically excludes radiation from gaseous and liquid effluents. The standard describes the considerations necessary to compute dose rates, including component self-shielding, shielding afforded by walls and structures, and scattered radiation. The requirements for measurements and data interpretation of measurements are given. The standard includes normal operation and shutdown conditions but does not address accident or normal operational transient conditions.*

Membership:
Dick Amato, Chair, Individual; Joseph John Bevelacqua, Bevelacqua Resources; Peter Caracappa, Columbia University; Jianwei Chen, Westinghouse Electric Company, LLC; Brian Hinderliter, University of Minnesota–Duluth; Sylvia Wang, Westinghouse Electric Company, LLC

Status: ANSI approved a reaffirmation of the standard on 5/23/2020. No activity in 2024. Maintenance is due in 2025.

Safety and Radiological Analyses Consensus Committee (SRACC) Organizational Chart

Chair: Andrew O. Smetana Vice Chair: Julie Jarvis

Shielding (ANS-6) Chair: Charlotta Sanders	Mathematics and Computations (ANS-10) Chair: Paul Hulse	Reactor Physics (ANS-19) Chair: Dimitrios Cokinos
Ⓟ = PINS submitted to ANSI		
ANS-6.4.2-2006 (R2021) Ⓟ (A1) Specification for Radiation Shielding Materials RF 12/2/2021 (WGC: P. Caracappa)	ANS-10.4-2008 (R2021) Ⓟ (A1) Verification and Validation of Non-Safety-Related Scientific and Engineering Computer Programs for the Nuclear Industry RF 6/15/2021 (WGC: N. Fathi)	ANS-19.10-2009 Ⓟ (R2021) (A1) Methods for Determining Neutron Fluence in BWR and PWR Pressure Vessel and Reactor Internals RF 10/7/2021 (WGC: A. Haghighat)
ANS-5.4-2011 (R2020) (A2) Method for Calculating the Fractional Release of Volatile Fission Products from Oxide Fuel RF 4/9/2020 (WGC: OPEN)	ANS-10.5-2006 (R2021) (A2) Accommodating User Needs in Scientific and Engineering Computer Software Development RF 8/23/2021 (WGC: A. Smetana)	ANS-5.1-2014 (R2023) (A2) Decay Heat Power in Light Water Reactors RF 12/4/2023 (WGC: J. Klingensmith)
ANS-5.10-1998 (R2024) (A2) Airborne Release Fractions at Non-Reactor Nuclear Facilities RF 7/18/2024 (WGC: M. Gupta)	ANS-10.7-2013 (R2023) (A2) Non-Real-Time, High-Integrity Software for the Nuclear Industry--Developer Requirements RF 4/19/2023 (WGC: B. Kirk)	ANS-19.1-2019 (R2024) (A2) Nuclear Data Sets for Reactor Design Calculations RF 1/5/2024 (WGC: R. Little & F. Bostelmann)
ANS-6.1.1-2020 (A2) Photon and Neutron Fluence-to-Dose Conversion Coefficients App'd 9/10/2020 (WGC: OPEN)	ANS-10.8-2015 (R2020) (A2) Non-Real Time, High Integrity Software for the Nuclear Industry--User requirements App'd 10/29/2020 (WGC: Open)	ANS-19.3-2022 (A2) Steady-State Neutronics Methods for Power Reactor Analysis RV 10/6/2022 (WGC: E. Nichita)
ANS-6.1.2-2013 (R2023) (A2) Group-Averaged Neutron and Gamma-Ray Cross Sections for Radiation Protection and Shielding Calculations for NPPs RF 6/16/2023 (WGC: A. Alpan)	ANS-10.2 (W2019) (C2) **Revision to be considered** Portability of Scientific and Engineering Software (WGC: R. Singleterry)	ANS-19.3.4-2022 (A2) The Determination of Thermal Energy Deposition Rates in Nuclear Reactors RV 7/12/2022 (WGC: G. Radulescu)
ANS-6.3.1-1987 (R2020) (A2) Program for Testing Radiation Shields in Light Water Reactors (LWR) RF 7/28/2020 (WGC: Open)		ANS-19.4-2017 (R2022) (A2) A Guide for Acquisition and Documentation of Reference Power Reactor Physics Measurements for Nuclear Analysis Verification RF 8/24/2022 (WGC: E. Knuckles)
ANS-6.4-2006 (R2021) (A2) Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants RF 8/5/2021 (WGC: K. Jha)		ANS-19.6.1-2019 (R2024) (A2) Reload Startup Physics Tests for PWRs App'd 1/5/2024 (WGC: C. Rombough)
ANS-6.6.1-2015 (R2020) (A2) Calculation and Measurements of Direct and Scattered Gamma Radiation from LWR NPPs RF 5/23/2020 (WGC: R. Amato)		ANS-19.11-2017 (R2022) (A2) Calculation and Measurement of the Moderator Temperature Coefficient of Reactivity for PWRs RF 6/2/2022 (WGC: M. Mahgerefteh)
ANS-6.4.3 (W2001) Ⓟ (C1) Gamma-Ray Attenuation Coefficients & Buildup Factors for Engineering Materials (WGC: E. Giavdoni & C. Sanders)		ANS-19.13-2024 (NEW) (A2) Initial Fuel Loading and Startup Tests for FOAK Advanced Reactors App'd 10/7/2024 (WGCs: S. Bays / A. Weitzberg / N. Martin)
		ANS-19.8 (NEW) (B2) (Project considered) Fission Product Yields for 235U, 238U, and 239P (WGC: R. Little)
		ANS-19.9 (NEW) Ⓟ (B2) Delayed Neutron Parameters for Light Water Reactor (WGC: Open)
		ANS-19.12 (NEW) Ⓟ (B2) Nuclear Data for the Production of Radioisotope (WGC: Open)
		ANS-19.5 (W2005) Ⓟ (C1) Requirements for Reference Reactor Physics Measurements (WGC: M. DeHart)
(A1) Current Being Worked On Standards		
(A2) Current Not Being Worked On Standards		
(B1) Proposed Being Worked On Standards		
(B2) Proposed Not Being Worked On Standards		
(C1) Withdrawn Being Worked On Standards		
(C2) Withdrawn Not Being Worked On Standards		

Table 7 – SRACC Organizational Chart

JCNRM
American Nuclear Society (ANS) / American Society of Mechanical Engineers (ASME) Joint Committee on Nuclear Risk Management (JCNRM)

Dennis Henneke, ANS Co-chair
Individual
K. Raymond Fine, ASME Co-chair
Vistra Corp.

Scope: *The Joint Committee on Nuclear Risk Management (JCNRM) is responsible for the preparation and maintenance of voluntary consensus standards, standards-related guidance documents, guidance standards, and technical reports that support the application of risk-informed approaches. These efforts address currently operating and future nuclear power plants and other types of reactors, as well as the transport, storage, handling, and processing of new and used nuclear fuel and radioactive waste. The JCNRM may also support other consensus committees of the American Nuclear Society (ANS) and the American Society of Mechanical Engineers (ASME), and other standards-developing organizations (SDOs), by reviewing and commenting on risk-related aspects of standards, guidance documents, and other documents prepared by those organizations, at their request.*

Activities of the consensus committee shall be guided by the Procedures for ASME Codes and Standards Development Committees but shall also meet the intent of ANS Standards Committee Procedures Manual for Consensus Committees unless specifically authorized by the ANS Standards Board.

JCNRM Membership:
JCNRM Membership (as of December 2024):
Dennis Henneke, ANS Co-chair, Individual
K. Raymond Fine, ASME Co-chair, Vistra Corp.
Andrea Maioli, ANS Co-vice-chair, Westinghouse Electric Company
Gerry W. Kindred, Tennessee Valley Authority
(Alternate: Bradley Dolan, Tennessee Valley Authority)
Paul J. Amico, 360 Consulting, LLC
Vincent Andersen, Jensen Hughes, Inc.
Victoria K. Anderson, Nuclear Energy Institute
George Apostolakis, Nuclear Risk Research Center
Michelle Bensi, University of Maryland
Sarah Bristol, NuScale Power, LLC
Robert Budnitz, Consultant
Gary DeMoss, Public Service Enterprise Group
Matthew R. Denman, Kairos Power
Karl N. Fleming, KNF Consulting Services
David Grabaskas, Argonne National Laboratory
Rick Grantom, C. R. Grantom P.E. Associates, LLC
H. Alan Hackerott, Consultant
Jordan Hagaman, Kairos Power
Douglas C. Hance, Electric Power Research Institute
F. Greg Hudson, Metcalfe, PLLC
Matthew Humberstone, U.S. Nuclear Regulatory Commission
(Alternate: Jeffery Wood, U.S. Nuclear Regulatory Commission)
Jodine Jansen Vehec, BWX Advanced Technologies
Annie M. Kammerer, U.S. Department of the Army
N. Reed LaBarge, Westinghouse Electric Company
Stanley H. Levinson, Individual
Stuart R. Lewis, Individual
Zhegang Ma, Idaho National Laboratory
Pamela F. Nelson, National Autonomous University of Mexico

Douglas C. Raap, Individual
Robert L. Rishel, Duke Energy
Martin Sattison, Individual
Raymond E. Schneider, Westinghouse Electric Company
Jeffrey L. Stone, Constellation
(Alternate: Suzanne Loyd, Constellation)
Robert W. Youngblood III, Idaho National Laboratory
Sai Zhang, Idaho National Laboratory

Report of JCNRM:

In 2024, the JCNRM held two 4-day in-person meetings, which included options for virtual participation. The meeting February 26 –29 was hosted by the Electric Power Research Institute at their offices in Charlotte, North Carolina, with a significant in-person attendance, with the main committee meeting on February 29. The meeting held September 16 – 19 was held in Pittsburgh, Pennsylvania, with the main committee meeting held on September 19. Participation included multiple attendees from the Japan International Working Group (JIWG) and a representative from the International Atomic Energy Agency (IAEA). The JCNRM's Executive Committee has been meeting via Zoom bi-weekly to discuss current activities and to plan the future activities. The next JCNRM meeting is expected to be held physically February 24–27, 2025, at the University of Maryland in College Park, Maryland.

The JCNRM Subcommittee on Standards and Guidance (NURI-SC) has been working on the issuance of two light water reactor (LWR) standards, previously issued for trial-use and pilot application (TUPA) including the Level 2 (Severe Accident Progression and Radiological Release) PRA Standard designated RA-S-1.2 and the Level 3 (Radiological Accident Offsite Consequence Analysis) PRA Standard designated RA-S-1.3. The Level 2 standard was issued in late 2024. The Level 3 draft was balloted in mid-2023 with a final ballot in mid-2024 to be published in 2025. Additional efforts under NURI-SC include the finalization of the Low Power Shutdown (LPSD) PRA Standard, currently issued for TUPA, the Multi-Unit PRA Standard, and the Advanced Light Water Reactor (ALWR) Standard. The LPSD Standard is scheduled for ballot in 2026. Finally, NURI-SC completed an update to ASME/ANS RA-S-1.1-2022, our main (flagship) PRA standard for operating LWRs, which corrected minor inconsistencies in the issued standard, which was issued as ASME/ANS RA-S-1.1-2024.

The Subcommittee on Technical Requirements (TR-SC) includes the working groups for specific technical specialties, such as Fire PRA, Internal Flooding PRA, Seismic PRA, High Winds PRA, External Flooding PRA, and other external hazards PRA. The subcommittee has supported the issuance of the standards discussed, including ensuring the issued standards consistently develop high level and supporting requirements related to specific hazard groups. Members from each of the working groups have been assigned to support each NURI-SC working groups to ensure consistency between the standards.

The Standards Infrastructure Subcommittee (SI-SC) is responsible for the development and revision of standards content between each PRA standard, including the development of Part 1 of each standard. The working groups underneath SI-SC include the Universal Content Working Group (WG), Data Management WG and Interpretations WG.

The Subcommittee on Risk Applications (SCoRA) continued to fulfill its charter to be the JCNRM interface with ANS and ASME (and other standards development organizations in the future), and to provide assistance to other standards-development projects whenever a new standard (or modification to an existing standard) utilizes risk-informed or performance-based (RIBP) requirements. This JCNRM subcommittee is the JCNRM interface with the ANS Standards Board's Risk-informed and Performance-based Principles Policy Committee (RP3C) and has supported the development of the RP3C Guidance Document for RIPB standards development. Finally, in 2024, SCoRA has continued to support development of guidance for application of risk-informed techniques to nuclear power plant physical security and guidance on risk-informed emergency planning, with the later working group under the ANS Large Light Water Reactor Consensus Committee.

For several years, a series of grants to the ANS from the NRC have provided financial support for the work of the JCNRM Standards Committee, mainly to cover travel costs of participants who have no other travel financial support, as well as certain administrative costs and a few other selected expenses. The latest in this series of grants will run until 2026.

Approved in 2024

ANSI/ASME/ANS RA-S-1.1-2024, *Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications* (revision of ASME/ANS RA-S-2022)

ANSI/ASME/ANS RA-S-1.2-2024, *Standard for Severe Accident Progression and Radiological Release (Level 2) PRA Methodology to Support Nuclear Installation Applications* (revision of TUPA standard ASME/ANS RA-S-1.2-2014)

Active Standards/Projects (Approved PINS)

ASME/ANS RA-S-1.3, *Standard for Radiological Accident Offsite Consequence Analysis (Level 3 PRA) to Support Nuclear Installation Applications* (revision of TUPA standard ASME/ANS RA-S-1.3-2017)

ASME/ANS RA-S-1.5, *Advanced Light Water Reactor PRA Standard* (proposed new TUPA standard or appendix of RA-S-1.1)

ASME/ANS RA-S-1.6 (formerly ANS/ASME-58.22*), Standard for Low Power and Shutdown Methodology for PRA Applications.* (revision of trial use standard ANS/ASME-58.22-2014; to be redesignated)

ASME/ANS RA-S-1.7, *Multi-Unit PRA Standard* (proposed new TUPA standard)

The above standards are discussed in more detail in the subcommittee discussions below:

Subcommittee on Nuclear Risk Standards and Guidance (NURI-SC)

Charter: *To assist in the development of standards and guides on probabilistic risk assessment (PRA) methods supporting risk-informed and performance-based applications for nuclear facilities.*

Membership:
N. Reed LaBarge, Chair, Westinghouse Electric Company, LLC
Zhegang Ma, Vice Chair, Idaho National Laboratory
Victoria K. Anderson, Nuclear Energy Institute
Sarah Bristol, Nuscale Power
Heather L. Detar, Westinghouse Electric Company, LLC
Karl N. Fleming, KNF Consulting Services, LLC
David Grabaskas, Argonne National Laboratory
Dennis W. Henneke, GE Hitachi Nuclear Energy
Matthew Humberstone, U.S. Nuclear Regulatory Commission
Andrea Maioli, Westinghouse Electric Company, LLC
Martin Sattison, Individual
Raymond E. Schneider, Westinghouse Electric Company, LLC
Ricky Summitt, Enercon
Taeyong Sung, Southern Nuclear
Grant A. Teagarden, Jensen Hughes
Jeffery J. Wood, U.S. Nuclear Regulatory Commission

Report: NURI-SC is responsible for developing and maintaining seven authorized PRA standards in various stages of development, trial use, and maintenance. In addition to development of the new standards by separate writing groups (project teams) that report to NURI-SC, the subcommittee has developed a trial-use procedure adopted by JCNRM for use in consistently interacting with users of trial-use standards during the trial-use periods. The status of the seven standards is provided in the following paragraphs.

ANSI/ASME/ANS RA-S-1.1-2024, *Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications* (revision of ASME/ANS RA-S-1.1-2022)

Scope: *PRA of internal and external hazards for all plant operating modes (low power and shutdown modes will be included at a future date). In addition, this Standard establishes requirements for a limited Level 2 PRA sufficient to evaluate large early release frequency (LERF). The only hazards explicitly excluded from the scope are accidents resulting from purposeful human-induced security threats (e.g., sabotage). This Standard applies to PRAs used to support applications of risk-informed decision-making related to design, licensing, procurement, construction, operation, and maintenance. These requirements are written for operating power plants. They may be used for plants under design or construction, for advanced LWRs, or for other reactor designs, but revised or additional requirements may be needed. This version of the PRA Standard provides specific requirements for the following hazard groups:*

a) Internal Events (Part 2)
b) Internal Floods (Part 3)
c) Internal Fires (Part 4)
d) Seismic Events (Part 5)
e) High Winds (Part 7)
f) External Floods (Part 8)
g) Other Hazards (Part 9)

Membership:
Andrea Maioli, Chair, Westinghouse Electric Company; Jodine Jansen Vehec, Vice Chair, Holtec; Paul J. Amico, Jensen Hughes, Vincent Andersen, Jensen Hughes; Michelle Bensi, University of Maryland; John M. Biersdorf, Terrapower; Scott A. Brinkman, Duke Energy; Robert J. Budnitz, Consultant; Stephen Eder, Facility Risk Consultants, Inc.; Jonathan E. Evans, U.S. Nuclear Regulatory Commission; Alan Hackerott, Consultant; Jason Hall, Entergy Operations, Inc.; Francisco J. Joglar, Jensen Hughes; Douglas C. Hance, Electric Power Research Institute; Dennis W. Henneke, GE Hitachi Nuclear Energy; Annie M. Kammerer, Annie Kammerer Consulting, LLC; James C. Lin, ABSG Consulting Inc.; Nicholas Lovelace, Jensen Hughes; David N. Miskiewicz, Engineering Planning and Management, Inc.; Alexander A. Rubbicco, Duke Energy; Raymond E. Schneider, Westinghouse Electric Co. LLC; Michael Szoke, Individual; Matthew Degonish, Alternate, Ameren; Michelle Gonzalez, Alternate, U.S. Nuclear Regulatory Commission

Status: ANSI/ASME/ANS RA-S-2008 was originally published in 2008. Addendum A was released in 2009 and endorsed by the NRC in RG 1.200 Revision 2. Addendum B (of RA-S) was approved and published in 2013. ANSI/ASME/ ANS RA-S-1.1-2022 was released as a full replacement of Addendum B and represented a significant update of the standard and contains many substantive changes based on feedback from recent users of the standard, along with extensive re-formatting, including elimination of Capability Category III. Extensive efforts have been made to improve consistency in requirements, terminology, and clarity. The seismic PRA Code Case already reflected many of the features in the newly released version RA-S-1.1-2022. In addition, Parts 7 (High Winds), 8 (External Flood), and 9 (Other Hazards), having not been changed since their original publication in the ANS RISC external hazards standard in 1999, were completely replaced to reflect the almost 20 years of experience since then. Finally, Part 10 (Seismic Margins) has been deemed inappropriate for a PRA standard and is being deleted. RA-S-1.1-2022 was approved by ANSI on May 11, 2022, and was published May 31, 2022.

In 2023, the working group completed a further revision of the standard that corrected minimal inconsistencies from the 2022 edition of the standard. The updated edition was released in 2024 as ANSI/ASME/ANS RA-S-1.1-2024, which reviewed and dispositioned applicable comments from the NRC to RG 1.247 (on the NLWR PRA Standard) that may have had an impact on the Level 1 Standard. RA-S-1.1-2024 was approved by ANSI on February 29, 2024, and was published on March 15, 2024. The 2024 version is the current version. All other versions are considered historical.

The Level 1 Working Group is also processing a proposed code case for redefinition of risk significance on an overall plant level as opposed to an individual hazard basis. In 2023, the Level 1 Working Group identified a future activity to revisit the current applicability of the PRA Standard for modelling digital I&C in PRA, which has been a focus of significant research and development in the industry in the last few years.

ASME/ANS RA-S-1.2-2014, *Severe Accident Progression and Radiological Release (Level 2) PRA Methodology to Support Nuclear Installation Applications* (previously ANS/ASME-58.24) (previously ANS/ASME-58.24) (proposed new standard)

Scope: *Criteria and acceptable methods are defined for the evaluation of containment performance and radiological releases to the environment from accidents in a nuclear power plant that result in damage to fuel within the reactor vessel for use in risk-informed applications requiring Level 2 probabilistic risk assessment (PRA). The standard will address sequences initiated by internal or external events during all modes of reactor operation. The initial scope will focus on full power operations.*

Membership:
Raymond E. Schneider, Chair, Westinghouse Electric Company, LLC; Nathan LaBarge, Vice Chair, Westinghouse Electric Company, LLC; Aram Hakobyan, Dominion Resources Inc.; John R. Lehner, Individual; Wison Luangdilok, Fauske & Associates, LLC; Ricky Summitt, Enercon; Carroll Trull, Engineering Planning and Management, Inc. Jeffery J. Wood, U.S. Nuclear Regulatory Commission; Michelle L. Hart, Alternate, U.S. Nuclear Regulatory Commission

Status: Over the past several years, the Level 2 Working Group has met weekly to resolve ballot comments and to prepare the draft standard for ballot. The Level 2 Standard was approved by JCNRM in April of 2023 (JCNRM ballot 19-3448RC101). Editorial comments were received and responded to, and JCNRM agreed that all the changes were indeed editorial. The Level 2 PRA Standard received ANSI approval on May 31, 2024, and was published on June 17, 2024.

ASME/ANS RA-S-1.3-2017, *Standard for Radiological Accident Offsite Consequence Analysis (Level 3 PRA) to Support Nuclear Installation Applications* (previously ANS/ASME-58.25) (trial-use standard to be revised and seek ANSI approval)

Scope: *This standard provides requirements for application of risk-informed decisions related to the consequences of accidents involving atmospheric release of radioactive materials to the environment. The standard is envisioned to apply to current and future light water reactor designs, other reactor designs, and nonreactor applications such as radiological dispersion device (RDD) incidents. The consequences to be addressed include health effects (early and late) and longer term environmental and economic impacts. The required capabilities allow determination of the efficacy of mitigation strategies on reducing consequences.*

Membership:
Grant A. Teagarden, Chair, Individual; Nathan E. Bixler; Individual; Keith Compton, U.S. Nuclear Regulatory Commission; Kyle Hope, Westinghouse; Gerry W. Kindred, Tennessee Valley Authority; Stanley Levinson, Individual; Carl Mazzola, Los Alamos National Laboratory; Vinod Mubayi, Individual; Kevin O'Kula, Individual; Keith Woodward, Individual

Status: The Level 3 PRA Standard was balloted in August 2023, and ballot comment resolution activities by the Level 3 Working Group (WG) commenced in September 2023 and continued into 2024. The Level 3 WG addressed 161 comments, completing the comment resolution process in May 2024. A JCNRM recirculation ballot associated with the 2023 comment resolutions was conducted in July 2024, and the L3 PRA Standard passed the recirculation ballot thereby completing the review process associated with the technical requirements. In the fall of 2024, other reviews of the Level 3 PRA Standard were conducted such as the Board Procedural Review, the JCNRM Editorial Review, and an opportunity for public comment. Concurrent with these other reviews, the Level 3 PRA Standard was prepared for publishing. ANSI approval and publication of the Level 3 PRA Standard is expected to occur in early 2025, a culmination of 20 years of development activities.

ASME/ANS RA-S-1.4-2021, *Probabilistic Risk Assessment Standard for Advanced Non-LWR Nuclear Power Plants* (revision of trial-use standard ASME/ANS RA-S-2013)

Scope: *This standard establishes requirements for a PRA for advanced non-LWR nuclear power plants. The requirements in this standard were developed for a broad range of PRA scopes that may include:*

a) Different sources of radioactive material both within and outside the reactor core but within the boundaries of the plant whose risks are to be determined in the PRA scope selected by the user. The technical requirements in this trial use version of the Standard are limited to sources of radioactive material within the reactor coolant system pressure boundary. Technical requirements for other sources of radioactive material such as the spent fuel system are deferred to future editions of this Standard.

b) Different plant operating states including various levels of power operation and shutdown modes.

c) Initiating events caused by internal hazards, such as internal events, internal fires and internal floods, and external hazards such as seismic events, high winds, and external flooding

d) Different event sequence end states including core or plant damage states, and release categories that are sufficient to characterize mechanistic source terms, including releases from event sequences involving two or more reactor units or modules for PRAs on multi-reactor or multi-unit plants.

e) Evaluation of different risk metrics including the frequencies of modeled core and plant damage states, release categories, risks of offsite radiological exposures and health effects, and the integrated risk of the multi-unit plant if that is within the selected PRA scope. The risk metrics supported by this Standard are established metrics used in existing LWR Level 3 PRAs such as frequency of radiological consequences (e.g., dose, health effects) which are inherently technology neutral. Surrogate risk metrics used in LWR PRAs such as core damage frequency and large early release frequency are not used as they may not be applicable to non-LWR PRAs.

f) Quantification of the event sequence frequencies, mechanistic source terms, offsite radiological consequences, risk metrics, and associated uncertainties, and using this information in a manner consistent with the scope and applications PRA.

Membership:
David Grabaskas, Chair, Argonne National Laboratory; Karl. N. Fleming, Co-Vice Chair, KNF Consulting Services, LLC; John Biersdorf, Co-Vice Chair, TerraPower; Robert J. Budnitz, Consultant; Matthew Denman, Kairos Power LLC; Jordan Hagaman, Kairos Power; Dennis Henneke, General Electric Co.; Alexander Huning, Oak Ridge National Laboratory; Brian Johnson, TerraPower; Ken Muramatsu, Tokyo City University; Hanh Phan, U.S. Nuclear Regulatory Commission; Martin B. Sattison, Individual; Jiejuan Tong, Tsinghua University; Matthew Warner, Kairos Power; Peiwen Whysall, Kairos Power; Ben Chen, Argonne National Laboratory; Jon Facemire, X-Energy; Harry Liao, X-Energy; Fred Grant, Simpson Gumpertz & Heger; Antonio Godoy, James J Johnson and Associates; Drew Nigh, X-Energy; Annie Kammerer, Annie Kammerer Consulting, LLC; Ben Kosbab, Simpson Gumpertz & Heger; Emma Redfoot, Oklo; Hiroyuki Sato, Japan Atomic Energy Agency; Andrew Whittaker, University of Buffalo; Emre Tatli, Westinghouse Electric Company; Askin Guler Yigitoglu, Oak Ridge National Laboratory; Sai Zhang, Idaho National Laboratory; Heather Detar, Westinghouse Electric Company; Michelle Gonzalez, U.S. Nuclear Regulatory Commission

Status: This standard received ANSI approval on 1/28/21 and was published on 2/8/21. The standard was formally endorsed by the U.S. Nuclear Regulatory Commission in Trial Use Regulatory Guide 1.247, released in Spring 2022. The working group is currently focused on collecting user feedback regarding the standard as advanced reactor vendors initiate the licensing process. The next edition of this standard will not occur until revisions of the LPSD, L2, and L3 standards are issued as ANSI standards, currently estimated to be in 2025.

ASME/ANS RA-S-1.5, *Advanced Light Water Reactor PRA Standard* (proposed new standard)

Scope: *This standard sets forth the requirements for PRAs used to support risk-informed decisions for commercial, advanced light water reactor (ALWR) nuclear power plants in the preoperational phase. It is ultimately expected to be a mandatory appendix to the existing PRA standard RA-S, for advanced light water reactors in the design to operational phases.*

Membership:
Sarah Bristol, Chair, NuScale Power, Chair; Heather L. Detar, Westinghouse Electric Company, Vice Chair; Michelle Gonzalez, U.S. Nuclear Regulatory Commission; Dennis W. Henneke, General Electric Co.; Jodine Jansen Vehec, Holtec; Alissa Neuhausen, U.S. Nuclear Regulatory Commission Alternate; Benny J. Ratnagaran, Southern Nuclear; Ram Srinivasan, Consultant

Status: This draft standard was planned to be balloted starting in September 2013 but has been delayed several times to accommodate changes in scope [i.e., to engage light water small modular reactor (SMR) vendors to ensure that the standard would address their needs, and also to accommodate significant changes requested by the U.S. Nuclear Regulatory Commission to accommodate their intended application of that standard to the new plant licensing process]. There was substantial progress made in 2024, having drafted all parts with the exception of the part on fire which remains in progress. In 2025, the main focus of the Advanced Light Water Reactor Working Group will be to finalize all parts and complete outside reviews by liaisons. Alignment of this standard with the next edition will be reviewed. The draft is expected to be issued to the JCNRM for ballot in 2025.

RA-S-1.6, *Requirements for Low Power and Shutdown Probabilistic Risk Assessment* (revision of trial use standard ANS/ASME-58.22-2014; to be redesignated)

Scope: *This standard sets forth criteria and specific methods for plant-specific probabilistic risk assessments (PRAs) to be used to develop risk-informed decisions regarding low power and shutdown (LPSD) operations at light water nuclear power plants. It addresses those attributes of a PRA that will ensure that the scope and level of quality of the assessment are appropriate to the decision being considered. The standard addresses the use of risk information for making plant improvements, the risk, ranking of components, and the development of decisions that can benefit from risk information. The scope of this standard is limited to internal and external events (excluding internal fires) while operating at low power and shutdown conditions. Both requirements for quantitative and qualitative methods are included.*

Membership:
Taeyong Sung, Chair, Southern Nuclear; Jeffrey Julius, Vice Chair, Jensen Hughes; Leo Shanley, Vice Chair, Jensen Hughes; Douglas Hance, Electric Power Research Institute; Dennis Henneke, General Electric; Kristin Kaspar, South Texas Project; Kenneth Kiper, Westinghouse; Greg Kvamme, Excel Energy; Jonathan Li, General Electric; Zhegang Ma, Idaho National Laboratory; Mario Martinez, Westinghouse; Jeff Mitman, Individual; Marie Pohida, U.S. Nuclear Regulatory Commission; Keith Tetter, U.S. Nuclear Regulatory Commission; Vaibhav Yadav, Idaho National Laboratory; Jeff Wood, Alternate, U.S. Nuclear Regulatory Commission

Status: This standard was issued for a 3-year, trial-use period in March 2015. Seven different outside groups used the standard in a trial-use mode and provided feedback. The Low Power Shutdown (LPSD) Working Group resolved trial-use comments in a couple of technical areas (at-initiator HRA and QLRA). The team has proposed a three-phased approach to address all comments and get ready for the next ballot: phase 1 mainly for the comment resolutions and gathering all inputs, phase 2 for resolving all comments and merge technical pieces and collapse capability categories as well as finalize decision on inclusion of hazards, phase 3 for revising LPSD PRA sections to be consistent with RA-S-1.1 and to comply with all guidance documents. For 2024, LPSD Working Group developed and refine draft Parts 1, 2 (POS), 3 (internal event), 4 (internal Flood) and 10 (QLRA). Technical Requirements working groups keep developing and reviewing Parts 5-9. LPSD PRA Standard Parts 6 and 9 were drafted by the Other Hazards Technical Requirements Working Group. The LPSD PRA Standard Working Group is meeting on bi-weekly basis.

ASME/ANS RA-S-1.7, *Multi-Unit PRA Standard* (proposed new standard)

Scope*: Develop a multi-unit PRA standard including all necessary high-level and supporting requirements addressing the development of a multi-unit Level 1 PRA and large early release frequency (LERF). The standard uses the existing single unit LWR standard as the starting point for the MUPRA standard.*

Membership:
Ricky Summitt, Enercon Services, Inc. (Chair); Mark Wishart, EPRI (Vice Chair); Paul Amico, 360Consulting-LLC; Dennis Henneke, Individual; Susan Cooper U.S. Nuclear Regulatory Commission; Grady, Anne-Marie U.S. Nuclear Regulatory Commission; Cindy Williams, Nuscale Power; Taeyong Sung, Southern Company; Sarah Bristol, Nuscale Power; Dr. Joon-Eon Yang; Hanyang University; Hiromichi Miura, CRIEPI; Shota Soga, CRIEPI; Andrea Maioli, Westinghouse

Status: The MUPRA standard is designed to be a standalone document that identifies the high-level and supporting requirements that are necessary to expand one or more single unit PRA model conforming to the single unit LWR standard into a multi-unit PRA model. The MUPRA standard addresses the same scope and content as the LWR standard and concentrates on the tasks necessary to complete the expansion to a multi-unit model. The MUPRA standard follows the same format as the LWR standard. The draft of Part 1 was completed in 2023. For 2024, most

of the work involved review and refinement of Parts 2-4, 6, and 9. These sections are drafted. Work on Part 5 was initiated in 2024 and is ongoing with one area drafted and two still under development. Parts 7 and 8 are delayed in order that resources can address higher priority standards. The MUPRA Working Group is meeting on an infrequent basis while the remaining Parts are drafted by the associated supporting SMEs.

Standards Infrastructure Subcommittee (SI-SC)

Charter: *To develop standard-inclusive hazard-group or risk application-specific related content, using approved SI-SC framework and guidance, supporting JCNRM Standards Product development. SI-SC is responsible for addressing other identified subcommittee needs, facilitating the development and approval of JCNRM Standards products supporting risk-informed and performance-based applications for nuclear facilities.*

Membership:
Sai Zhang, Chair, Idaho National Laboratory; Carroll Trull, Vice Chair, Engineering Planning and Management, Inc.; Matthew Denman, Kairos Power; Alan Hackerott, Consultant; Raymond Schneider, Westinghouse Electric Company; Jeffrey Stone, Constellation; Jeffery Wood, U.S. Nuclear Regulatory Commission; Latonia Enos-Sylla (alternate), U.S. Nuclear Regulatory Commission

Status: SI-SC is focused exclusively on providing tools and processes to streamline the standards development effort. Formulated in 2022, SC-SI has been focusing on setting up its own processes, procedures, and membership to effectively interface with JCNRM's standards development efforts. In 2024, SI-SC focused on developing a one-stop, automation tool for consistency checks of JCNRM standards products, keeping the documents owned by the Universal Supporting Content Working Group up to date on C&S Connect, and being standby to support potential standards interpretation requests. In 2024, SI-SC also conducted new business in ingesting the Low Power Shutdown draft standard and Advanced LWR draft mandatory appendix and providing feedback, as well as performing consistency checks for a draft white paper developed by the Risk-Informed Security working group.

Database Development Working Group

Charter: *To ensure consistency in the form, structure, and content of JCNRM Standards products. The DDM WG develops, maintains, and deploys a database of JCRNM Standards products content. This database is the approved content source for all JCNRM Standards products. NURISC and TR-SC WGs interface with the DDM WG to ensure that evolving technical content is adequately communicated and reflected in the database. The USC WG interfaces with the DDM WG to ensure that consistency guidance is appropriately implemented and validated for across JCRNM Standards products. The DDM WG is responsible for producing the ballot-ready and ballot-supporting documents for NURI-SC.*

Membership:
Matthew Denman, Kairos Power (Chair); Robert Drsek, Vistra Corp. (Vice Chair); Dave Grabaskas, Argonne National Laboratory; Sia Zhang, Idaho National Laboratory; Jeff Wood, Nuclear Regulatory Commission

Status: The Database Management Working Group is focused on developing Continuous Integration and Continuous Deployment (CICD) workflows to ensure that JCNRM requirements are written and processed according to the many rigorous consistency requirements associated with JCNRM standards. In 2025, focus will shift to integrating up-to-date standards content into the database and the expanding consistency tests. Additionally, the Database Management Working Group expects to expand the types and formats of output documents which can be generated from the database to better support the various working groups within JCNRM.

Interpretation Working Group

Charter: *To assist with Interpretation as they relate to all active JCNRM Standards.*

Membership:
H. Alan Hackerott, Chair, Consultant; Paul J. Amico, Jensen Hughes; Adrienne F. Brown, U.S. Nuclear Regulatory Commission; David N. Miskiewicz, Engineering Planning and Management, Inc.; Matthew Humberstone, Alternate, U.S. Nuclear Regulatory Commission

Status: The Interpretation Working Group addresses formal technical inquiries per codes and standards operating guidance for the ASME/ANS JCNRM. No inquiries were received in 2024.

Universal Supporting Content (USC) Working Group

Charter: *To maintain common and consistent content for all the JCNRM Standards products being developed or maintained by JCNRM to the extent appropriate and practical. This includes common definitions, action verbs, screening criteria, level of detail, peer review requirements, as well as requirements for configuration control and newly developed methods.*

To assist with the maintenance of the RA-S Standard Part 1.

Membership:
Raymond E. Schneider, Chair, Westinghouse Electric Company; Ricky Summitt, Vice Chair, Enercon; Paul J. Amico, Jensen Hughes; Mihaela Biro, U.S. Nuclear Regulatory Commission; Nathan LaBarge, Westinghouse; Andrea Maioli, Westinghouse; Lawrence A. Mangan, FirstEnergy Nuclear Operating Co.; Harold A. Stiles, Enercon; Ian B. Wall, Consultant; Mark B. Wishart, Electric Power Research Institute

Status: The USC also assists with the maintenance of the Part 1 of JCNRM RA-S PRA standards. This includes USC support for the maintenance and application of documents previously developed by the USC Working Grop. These documents support the development and review of in progress JCNRM PRA standards. These documents are:
1. JCNRM Glossary of Action Verbs accepted for use in the JCNRM PRA Standards
2. JCNRM Glossary of Definitions
3. JCNRM List of Acronyms
4. JCNRM Writer's Guide Checklist (Structure and Organization Criteria for PRA Standard)
5. JCNRM PRA Standard Readiness Review Process and Checklist

The above documents have been subject to a working group internal ballot and posted on C&S Connect for member use.

It is also the intent of the USC to support the new standard readiness review process. Once a new JCNRM standard is ready for ballot, the specific standards writing group will perform a readiness review self-assessment. Once the self-assessment is received by the USC, the USC will put together a readiness review team to review the self-assessment and provide feedback to the PRA standard writing team. One JCNRM self-assessment was scheduled for 2024 but was delayed until 2025. The current JCNRM schedule is anticipated to have 3 readiness reviews for new standards to be initiated in 2025.

Technical Requirements Subcommittee (TR-SC)

Charter: *To develop JCNRM Standards products inclusive content associated with specific technical requirements, using approved the SI-SC framework and guidance, supporting the needs of the NURI-SC's Standards products. TR-SC is responsible for developing technical requirements, facilitating the development and approval of JCNRM Standards products supporting risk-informed and performance-based applications for nuclear facilities.*

TR-SC is responsible for identifying which technical elements are common to multiple standard products and assessing their associated level of consistency. TR-SC is then responsible to recommend changes, as appropriate, to ensure technical requirement consistency across JCNRM Standards products, as applicable. Technical requirements that are only applicable to one Standard product are identified by TR-SC and managed directly by the Product WG responsible for that Product.

One dedicated WG is established for each Technical Element.

To develop or to maintain the technical requirements (i.e., high level requirements and supporting requirements) associated with a specific PRA Technical Element.

Each Technical Requirement WG assigns a liaison for every Product WG, as applicable. The Technical Requirements WG reviews proposed changes to the technical requirements with respect to each individual Standards product(s) and evaluates the Product with the WG to modify the Technical Requirements, as needed. Standards products readiness reviews are not permitted until the Technical Requirements WG has agreed on the acceptability of the technical requirements.

Membership:
Michelle Bensi, Chair, University of Maryland
Matthew Degonish, Vice Chair, Ameren
Vicent Andersen, Jensen Hughes
Latonia Enos-Sylla, U.S. Nuclear Regulatory Commission
K. Raymond Fine, Energy Harbor
Frederic Grant, Simpson Gumpertz & Heger, Inc.
H. Alan Hackerott, Consultant
Kyle Hope, Westinghouse
Matthew Humberstone, U.S. Nuclear Regulatory Commission
Francisco J. Joglar, Jensen Hughes
James C. Lin, ABSG Consulting, Inc.
Nicholas Lovelace, Jensen Hughes
Ram Srinivasan, Consultant
John E. Weglian, Electric Research Power Institute

Status: The TR-SC supported the following standards activities in 2024: 1) Tracking various liaisons for various working groups, 2) Addressing cross-cutting issues between various working groups to ensure technical consistency across all products being developed. The TR-SC has set up recurring monthly meetings and has actively participated in the in-person annual JCNRM meetings.

External Flood Technical Requirements Working Group

Charter: *To assist with the maintenance of the RA-S Standard Part 8.*

Membership:
Michelle Bensi, Chair, University of Maryland; Jemie Dababneh, U.S. Army Corps of Engineers; Joseph Kanney, U.S. Nuclear Regulatory Commission; Svetlana Lawrence, Idaho National Laboratory; Suzanne M. Loyd, Constellation; Zhegang Ma, Idaho National Laboratory; Pierre Macheret, Jensen Hughes; Sean McCloskey, Holtec; Artur Mironenko, Duke Energy; Raymond E. Schneider, Westinghouse Electric Co., LLC; Joy Shuan Shen; John E. Weglian, Electric Power Research Institute; De (Wes) Wu, Alternate, U.S. Nuclear Regulatory Commission

Status: During 2024, the External Flooding Working Group met on an approximately weekly basis to discuss and draft technical content related to multiple standards. The working group supported the development of technical requirements and non-mandatory appendices for draft standards related to lower power and shutdown PRA and multi-unit PRA. In addition, the working group identified editorial and other clarity revisions in the standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications, which are being tracked for inclusion in the next addition.

High Winds Technical Requirements Working Group

Charter: *To assist with the maintenance of the RA-S Standard Part 7.*

Membership:
Nicholas Lovelace, Chair, Jensen Hughes; Art Mironenko, Vice Chair, Duke Energy; Steve Hess, Jensen Hughes; Ray Schneider, Westinghouse; John Lane, U.S. Nuclear Regulatory Commission; Keith Tetter, U.S. Nuclear Regulatory Commission; Chris Rochon, EPRI; Kyle Hope, Westinghouse

Status: The High Winds Working Group supported the following standards activities in 2024: 1) liaison review of MUPRA Standard Part 7; 2) liaison review and creation of LPSD PRA Standard Part 7. The High Winds Technical Requirement Working Group members also participated virtually and in-person to the two annual JCNRM meetings in 2024.

Internal Events Technical Requirements Working Group

Charter: *To assist with the maintenance of the RA-S Standard Part 2.*

Membership:
H. Alan Hackerott, Chair, Consultant; Jodine Jansen Vehec, Vice Chair, Holtec; John M. Biersdorf, Terrapower; Adrienne F. Brown, U.S. Nuclear Regulatory Commission; Matthew Denman, Kairos Power; Douglas C. Hance, Electric Power Research Institute; Todd Hilsmeier, U.S. Nuclear Regulatory Commission; Gerry W. Kindred, Tennessee Valley Authority; Stanley Levinson, Individual; Sean McCloskey, Holtec; Pamela F. Nelson, UNAM; Hideyuki Sunada, Central Research Institute of Electric Power Industry; Kent Sutton, INGRID Consulting Services, LLC.; Susan E. Cooper, Alternate, U.S. Nuclear Regulatory Commission

Status: In addition to the maintenance of the RA-S Standard Part 2, this working group engages the NURI-SC working groups directly by assigning liaisons to each working group from each of the TR-SC working groups to ensure technical consistency across all standards being developed. The liaisons will bring back to the associated TR-SC working group any assigned tasks to complete and return feedback to the NURI-SC working group. This Liaison support includes providing feedback for consistency with RA-S Part 2 internal events requirements. Current roster levels are sufficient for the assigned tasks and there are currently no challenges.

Internal Fire Technical Requirements Working Group

Charter: *To assist with the maintenance of the RA-S Standard Part 4.*

Membership:
Francisco J. Joglar, Chair, Jensen Hughes; Michele L. Reed, Vice Chair, Westinghouse; John M. Biersdorf, Terrapower; Scott A. Brinkman, Duke Energy; Dennis W. Henneke, Individual; William Jameson, Constellation; Gregory A. Kvamme, Xcel Energy; Ashley M. Lindeman, Electric Power Research Institute; Nicholas B. Melly, U.S. Nuclear Regulatory Commission; Jeffrey D. Miller, Holtec; David N. Miskiewicz, Engineering Planning and Management, Inc.; Richard Stremple, Energy Harbor; Kiang Zee, Individual; Reinaldo Rodriguez, Alternate U.S. Nuclear Regulatory Commission

Status: We have successfully transitioned to the new organizational structure and working groups have consolidated their rosters. We have engaged the NURI-SC working groups directly by assigning liaisons to each working group from each of the TR-SC working groups to ensure technical consistency across all standards being developed. The liaisons will bring back to the associated TR-SC working group any assigned tasks to complete with consensus of the group and return that feedback to the NURI-SC working group. Current roster levels are sufficient for the assigned tasks and there are currently no challenges.

Internal Flood Technical Requirements Working Group

Charter: *To assist with the maintenance of the RA-S Standard Part 3.*

James C. Lin, Chair, Individual; Alexander Rubbicco, Vice Chair, Duke Energy; Matthew Degonish, Ameren; Jason Hall, Entergy; Joseph Kanney, U.S. Nuclear Regulatory Commission; Douglas C. Rapp, Energy Harbor; Adrienne F. Brown, Alternate, U.S. Nuclear Regulatory Commission

Status: The liaisons from Internal Flood Working Group have been attending the ALWR, LPSD, MUPRA, NLWR, and Level 1 Working Group meetings to ensure technical consistency across all standards being developed. The liaisons bring back to the Internal Flood Working Group any assigned tasks to complete with consensus of the group and return that feedback to the NURI-SC standard development working group.
The liaisons from Internal Flood Working Group attended the ALWR, LPSD, MUPRA, NLWR, and Level 1 working group meetings during the semi-annual JCNRM meeting week in February 2024 and September 2024.
Provided comments related to Internal Flood to the following standard working groups: ALWR, LPSD, and MUPRA. Comments on LPSD have all been closed. Current roster levels are sufficient for the assigned tasks and there are currently no challenges.

Other Hazards Technical Requirements Working Group

***Charter*:** *To assist with the maintenance of the RA-S Standard Parts 6 & 9.*

Kyle Hope, Chair, Westinghouse; Pierre Macheret, Vice Chair, Jensen Hughes; Vincent Andersen, Jensen Hughes; Robert J. Budnitz, Lawrence Berkeley National Laboratory-Retired; Matthew Denman, Kairos Power; Suzanne M. Loyd, Constellation; Keith Tetter, U.S. Nuclear Regulatory Commission; John Lane, Alternate, U.S. Nuclear Regulatory Commission

Status: The Other Hazards Technical Requirements Working Group supported the following standards activities in 2024: 1) liaison review of MUPRA Standard Parts 6 and 9; 2) liaison review of LPSD PRA Standard Parts 6 and 9. Other Hazards Technical Requirements Working Group members also participated virtually and in-person to the two annual JCNRM meetings in 2024.

Seismic Technical Requirements Working Group

Charter: *To assist with the maintenance of the RA-S Standard Part 5.*

Membership:
Fred F. Grant, Chair, Simpson Gumpertz & Heger; Ram Srinivasan, Vice Chair, Independent Technical Consultant; Abhinav Anup, Simpson Gumpertz & Heger; Paul Amico, Jensen Hughes; Vince Andersen, Jensen Hughes; Robert J. Budnitz, Lawrence Berkeley National Laboratory-retired; Carlos Cantarero, Westinghouse; Partha Chandran, Aalo; Nilesh Chokshi, Independent Technical Consultant; Robert Drsek, Vistra Corp.; Steve Eder, Facility Risk Consultants; Calin Eftemie, Consultant; Ray Fine, Vistra; Antonio Godoy, James J. Johnson and Associates; Eddie Guerra, Rizzo International; Justin Hiller, Ameren Missouri; Annie Kammerer, U.S. Department of Defense; Benjamin Kosbab, Simpson Gumpertz & Heger; Wei Li, Rizzo International; Andrea Maioli, Westinghouse; Ching Ng, U.S. Nuclear Regulatory Commission; John Richards, Electric Power Research Institute; Wen Tong, Simpson Gumpertz & Heger; Boback Torkian, Holtec; Gabriel Toro, Lettis Consultants International; Andrew Whittaker, SUNY Buffalo; Sunwoo Park, Alternate, U.S. Nuclear Regulatory Commission Commission

Status: The Seismic Hazards Technical Requirements Working Group supported the following standards activities in 2024:

1) ALWR Mandatory Appendix Development:
    a. Numerous significant interactions with the ALWR WG dealing with representative vs. site-specific seismic hazards
    b. Reviewed the Part 5 (Seismic) requirements in the draft mandatory appendix
2) Multi-Unit PRA (MUPRA) Standard Development: Seismic WG teams (SHA, SFR, SPR) are working on draft sections of the proposed MUPRA Standard and a non-mandatory appendix.
3) Low-Power Shutdown (LPSD) PRA Standard development: Seismic WG teams (SHA, SFR, SPR) are working on draft sections of the proposed LPSD Standard and a non-mandatory appendix.
4) Non-LWR (NLWR) PRA Standard: No activity pending changes to the ALWR standard.
5) Seismic Technical Requirements Working Group members participated virtually and in-person in the two semi-annual JCNRM meetings in 2024, plus multiple ad-hoc meetings organized by subgroups to support the activities described above.

Subcommittee on Risk Applications (SCoRA)

Charter: *To support the application of risk methods using JCRNM Standards products, as appropriate or requested and the need for new JCNRM Standards products. SCoRA will evaluate new JCNRM Standards products proposals identified by individual JCNRM members or other industry stakeholders. SCoRA will appoint and staff an investigation Project Team to determine product scope, purpose, and need to provide recommendations to JCNRM for further product development. If SCoRA concludes that a new product requires development, then the JCNRM approves further development. SCoRA then performs the necessary process to generate a Project Initiation Notification System (PINS) form. When the PINS form is approved by JCNRM, then a new Product WG, under NURI-SC is formed and tasked with the development of the Product.*

SCoRA periodically revisits the need for additional JCNRM Standards products and other supporting JCNRM products in development to ensure that they satisfy the original objectives justifying the product's development. If the Product need

changes or is determined to no longer be appropriate, then the Product in development is recommended to be cancelled or paused to the JCNRM.

JCNRM with SCoRA support will interface with the ANS Standards Board, the ASME Board on Nuclear Codes and Standards, and their subordinate groups, and other standards developing organizations (SDOs) regarding nuclear-related standards that include or plan to include risk assessment methods, risk management approaches, or risk-informed, performance-based applications. The work of SCoRA is focused on supporting these SDOs in the development and updating of risk-informed standards, as requested by the cognizant SDO. The objective is to strive for value added to the nuclear industry, technical acceptability, and consistency in other nuclear-related standards using risk management principles both within JCNRM and outside of JCNRM.

When SCoRA organizes a technical interface with a specific nuclear-related standard (regardless of the originating SDO), it will draw upon the membership of the JCNRM, but need not be limited to JCNRM membership. The interface activity can be informal without a written product, but if a written review product is produced, the report itself is intended to be a product of the SCoRA, as approved by JCNRM, even if developed mainly by an ad hoc subsidiary group. Part of the interface activity includes an education function, for which SCoRA will avail itself of resources that exist among the broader JCNRM membership.

SCoRA will also consider mechanisms to disseminate "lessons learned" from reviewing and commenting on nuclear-related standards to other SDOs and writing groups who have similar needs.

Membership:

Stuart R. Lewis, Chair, Individual
Gary M. Demoss, Vice Chair, PSEG-Salem & Hope Creek
F. Gregory Hudson, Vice Chair, Metcalfe PLLC
George Apostolakis, NRRC
Robert J. Budnitz, Consultant
Bradley Dolan, Tennessee Valley Authority
Jonathen Facemire, Nuclear Energy Institute
Anne-Marie Grady (Alternate), U.S. Nuclear Regulatory Commission
Rick Grantom, C.R. Grantom P.E. & Assoc. LLC
Jordan E. Hagaman, Kairos Power
Ching Hang Ng (Alternate), U.S. Nuclear Regulatory Commission
Jodine Jansen Vehec, Holtec
Gerry W. Kindred, Tennessee Valley Authority
Nathan LaBarge, Westinghouse Electric Company, LLC
Stanley H. Levinson, Individual
Roy Linthicum, Constellation
Andrea Maioli, Westinghouse Electric Company, LLC
Pamela F. Nelson, UNAM
James O'Brien, U.S. Department of Energy
Stephen J. Reed, Oak Ridge National Laboratory
Robert I. Rishel, Duke Energy
Timothy D. Sande, Enercon
Jeffrey L. Stone, Exelon
Ricky Summitt, Enercon
Dr. Carroll Trull, Engineering Planning and Management, Inc.
Victoria Warren, Jensen Hughes
Yasunori Yamanaka, Unclear Damage Compensation and Decommissioning Facilitation
Robert W. Youngblood, Idaho National Laboratory

Report: SCoRA continues to engage actively with ANS, ASME, and other standards developing organizations as a resource for helping them to incorporate risk-informed elements in appropriate and consistent ways into their standards and other documents. Among these, in 2024, SCoRA continued to participate in the Reliability-Integrity Management effort under ASME Section XI; provided comments on ANS-3.11, ANS-19.13, and ANS-56.2 and continued engagement with the Institute of Electrical and Electronic Engineers and the Instrument Society of America. SCoRA also continues to support the activities of the Risk Informed Emergency Planning (RIEP) Working Group, which is a joint effort of the JCNRM and the ANS Large Light Water Reactor Consensus Committee (LLWRCC). The RIEP Working Group continues to work toward developing guidance related to risk-informing the size of emergency planning zones (primarily aimed at new reactors) and to risk-informing emergency response organizations (primarily focused on operating large light water reactors). These activities are consistent with a PINS approved in 2022. SCoRA is also responsible for the JCNRM Risk-Informed Security Working Group. This working group has two task groups, one focused on introducing further risk-informed elements into physical security for

nuclear power plants, and the other devoted to risk-informed approaches to improve cyber security. In 2024, this working group produced a detailed framework paper to communicate its efforts to other organizations and to outline the guidance it intends to develop in both of these areas. SCoRA members also support the ASME Plant System Design Standard. In 2024, efforts to coordinate with the ANS Standards Board's Risk-Informed, Performance-Based Principles and Policy Committee (RP3C) increased. These activities will continue in 2025 as will efforts to engage with additional standards developing organizations.

Guidance Document for Risk Informing Physical Security and Cyber Security Programs at Nuclear Facilities

Charter: *Develop guidance for implementing methods and processes to risk-inform nuclear facility physical and cyber security programs. This guidance may also provide (in part) the technical basis on which future standards covering these methods/processes could be based.*

Membership:
F. Gregory Hudson (Co-Chair), Metcalfe, PLLC; Stephen J Reed (Co-Chair), Oak Ridge National Laboratory; George Apostolakis, Nuclear Risk Research Center; Robert J Budnitz, Lawrence Berkeley National Lab (Retired); Yung Hsien J Chang, U.S. Nuclear Regulatory Commission; Lon A. Dawson, Sandia National Laboratory; Kevin Deyette, Jensen Hughes; Bradley Dolan, Tennessee Valley Authority; Shannon Eggers, Idaho National Laboratory; Ismael Garcia, U.S. Nuclear Regulatory Commission; Jan Geib, Dominion Energy; Rick Grantom, C.R. Grantom P.E. & Associates, LLC; Justin Hiller, Callaway Energy Center; Pamela F. Nelson, Universidad Nacional Autónoma de México; Shahen Poghosyan, International Atomic Energy Agency; James Raines, KCI Engineering Consulting; Timothy D. Sande, Enercon Services, Inc.; Michael R. Sleigh, Westinghouse Electric Company, LLC; Ricky L. Summitt, Enercon Services, Inc.; Kent Sutton, INGRID Consulting Services, LLC; Grant A. Teagarden, Consultant; Carroll Trull, Engineering Planning and Management, Inc.; Rob White, ARES Security Corp; Vaibhav Yadav, Idaho National Laboratory; Robert W. Youngblood, Idaho National Laboratory; Ching Hang Ng (Alternate), U.S. Nuclear Regulatory Commission

Status: The 2024 focus was developing a white paper entitled "Managing Nuclear Facility Security Risks: A Framework for Risk-Informing Security." This white paper describes a proposed framework within which the Security Working Group (SWG—this group) can develop guidance to risk-inform nuclear facility physical and cyber security programs. Representing an important contribution to the SWG's larger task of developing guidance on risk-informing nuclear facility physical and cyber security programs, this white paper: (1) summarizes format and content considerations for a framework to risk-inform nuclear facility security and (2) provides a proposed risk-informed security framework that addresses these considerations.

Three white paper drafts were developed and reviewed in 2024. In addition to the SWG, reviewing entities included: BWR Owner's Group, PWR Owners Group, JCNRM Subcommittee on Risk Applications (SCoRA) and JCNRM Executive Committee. The white paper was approved by formal SWG and SCoRA ballots in late 2024. The white paper is to be distributed in early 2025 to a designated set of nuclear industry stakeholders.

Coincident with white paper balloting, the SWG's attention began shifting to developing an initial set of risk-informed security work products. Three documents were identified for initial development; specifically: (1) a TECHNICAL REPORT addressing a literature review of current Risk-Informed Security Practices; (2) a GUIDANCE DOCUMENT addressing Scenario Development and (3) a GUIDANCE DOCUMENT addressing Attack Likelihood. Planning for preparation of these three documents began in late 2024.

ANS/ASME Joint Committee on Nuclear Risk Management Cochair: Dennis W. Henneke — Cochair: C. Rick Grantom Vice Cochair: Andrea Maioli — Vice Cochair: Pamela F. Nelson			
Standards Infrastructure Subcommittee (SI-SC)	**Nuclear Risk Standards and Guidance Subcommittee (NURI-SC)**	**Technical Requirements Subcommittee (TR-SC)**	**Subcommittee on Risk Applications (SCoRA)**
Sai Zhang (Chair)	N. Reed LaBarge (Chair)	Michelle Bensi (Chair)	Stuart Lewis (Chair)
Carroll Trull (Vice Chair)	Zhegang Ma (Vice Co-chair)	Matt Degonish (Vice Chair)	Gary Demoss (Vice Chair) Greg Hudson (Vice Chair)
Universal Supporting Content (WGC: R. Schneider)	**Product Working Group: Level 1 LWR** (WGC: A. Maioli)	**Internal Events** (WGC: A. Hackerott)	**Risk-Informed Security*** (WGC: G. Hudson) (WGC: S. Reed)
Database Development and Management (WGC: M. Denman)	**Product Working Group: Level 2 LWR** (WGC: R. Schneider)	**Internal Flood** (WGC: J. Lin)	
Interpretation (WGC: A. Hackerott)	**Product Working Group: Level 3 LWR** (WGC: G. Teagarden)	**Internal Fire** (WGC: F. Joglar)	
	Product Working Group: Advanced LWR PRA (WGC: S. Bristol)	**Seismic** (WGC: F. Grant)	
	Product Working Group: Non LWR (WGC: D. Grabaskas)	**High Winds** (WGC: N. Lovelace)	
	Product Working Group: Multi-Unit PRA (WGC: R. Summitt)	**External Floods** (WGC: M. Bensi)	
	Product Working Group: Low Power/Shutdown PRA (WGC: T. Sung)	**Other Hazards** (WGC: V. Andersen)	
**Working groups will be moved out of SCoRA when the topic has been deemed sufficiently mature to initiate draft development.*			

Table 8 – JCNRM Organizational Chart

Appendix
Standards Service Award

Established in 1984, the ANS Standards Service Award recognizes outstanding achievement by individuals in the generation and use of ANS standards in the field of nuclear science and engineering. The purpose of the award is to identify and honor those individuals who have made significant contributions to the development of ANS nuclear Standards accepted by recognized authorities as the most practical and appropriate solution of a recurring problem. Any member of the Society can nominate worthy candidates for the ANS Standards Service Award. The nominees shall be current or past members of the Society in good standing.

2024 Standards Service Award Recipient

Larry Wetzel

In recognition of over twenty years of participation and leadership in ANS-8 standards, service on the Nuclear Criticality Safety Consensus Committee, work stressing the importance of standards to young professionals, and efforts highlighting the importance of synergy among the ANSI/ANS standards to maintain safe operation of nuclear facilities.

Past recipients of the award include the following individuals:

1988	A. Dixon Callihan
	Ralph G. Chalker
	Miles C. Leverett
1989	Walter H. D'Ardenne
1990	James F. Mallay
1991	David K. Trubey
1992	J. Ed Smith *(posthumously)*
1993	Joseph T. Thomas
1994	George L. Wessman
1995	Hugh K. Clark
1996	Tawfik M. Raby
1997	David R. Smith
1998	Marilyn D. Weber
1999	Dimitrios Cokinos
2000	William C. Hopkins
2001	Michael J. Wright
2002	Francis M. Alcorn
2003	Wade J. Richards
2004	Charles H. Moseley
2005	James F. Mallay
2006	Robert J. Budnitz
2007	William L. Whittemore *(posthumously)*
2008	Donald J. Spellman
2009	Calvin M. Hopper
2010	Allen L. Camp
	Thomas P. McLaughlin
2011	No recipient selected
2012	Elizabeth B. Johnson *(posthumously)*
	Patricia A. Schroeder
2013	Carl A. Mazzola
2014	Steven L. Stamm
2015	Jerry E. Hicks
	Donald J. Wakefield
2016	Andrew O. Smetana
2017	Abraham Weitzberg
2018	Robert D. Busch
2019	James B. Florence
	Ian B. Wall
2020	George Flanagan
	N. Prasad Kadambi
2021	Stanley H. Levinson
2022	Douglas Bowen
2023	Jean-Francois Lucchini
2024	Larry Wetzel