American Nuclear Society

Standards Committee Report of Activities

2018

Standards Committee Report of Activities 2018

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STANDARDS COMMITTEE

Report of Activities

2018

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Table of Contents

Figures

Tables

Appendices

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 2018. The Report provides information on ANS standards projects.

Nearly 800 volunteer members participate in the development of ANS-sponsored nuclear standards, of which there are over 120 in various phases of maintenance and development. As of the end of 2018, there were 82 current standards approved by the American National Standards Institute as American National Standards.

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/sites/whitehouse.gov/files/omb/circular/A119/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.

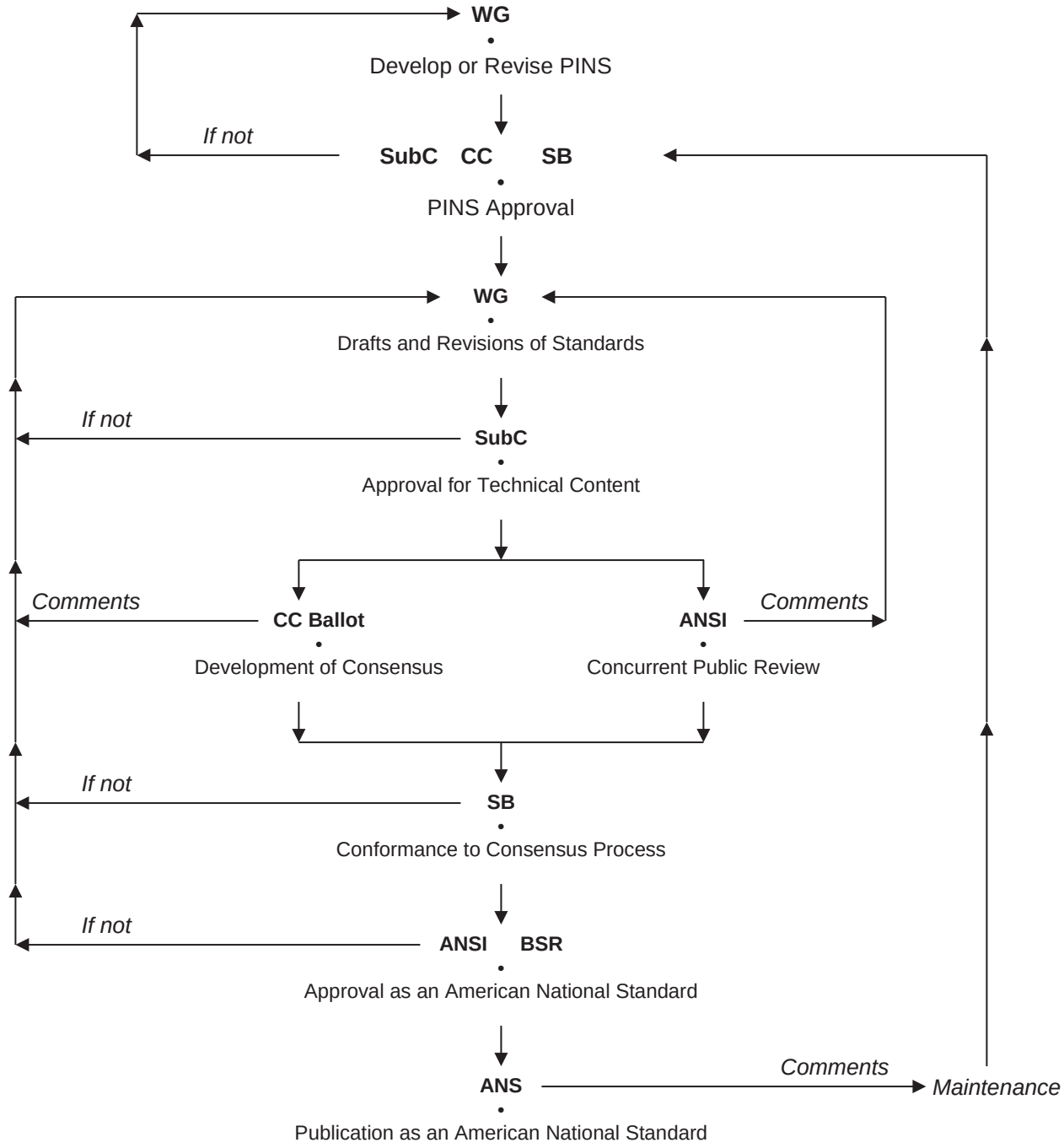
Simultaneous to the CC ballot, public review (PR) is conducted through the auspices of ANSI. ANSI announces a 45- or 60-day public review period for the proposed standard in its publication, *Standards Action*. As with CC comments, all comments from PR must be considered and resolved promptly.

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 recertification 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.



WG - Working Group
SubC - Subcommittee
CC - Consensus Committee
SB - Standards Board
ANSI - American National Standards Institute
BSR - Board of Standards Review
ANS - American Nuclear Society

Figure 1 - Steps in the Development of a Standard

Standards Board Report
Steven A. Arndt, Chair

ANS Partners Standards Store with Techstreet

ANS has partnered with Techstreet to host the new ANS Standards Store as of August 2018. This partnership provides enhanced options to customers, including redlines, standards bundles, multi-user PDFs, combination print-plus-PDF options, and customer notifications of changes to standards through the "Track It" feature. ANS members will continue to receive a 10% discount on standards purchased through the partnered store. An added bonus is the Techstreet-embedded software to protect ANS electronic standards.

Techstreet launched the first-ever website for searching and ordering industry codes and standards in 1996. Then in 1998, Techstreet became the first standards provider to offer documents in downloadable PDF format. Techstreet was bought by the Thomson Corporation in 2003 and is currently part of Clarivate Analytics, formerly the Intellectual Property & Science Business of Thomson Reuters—a company with a history dating back to 1850. Clarivate Analytics specializes in providing content and tools to help customers drive innovation, protect their intellectual assets, and maximize the value of their intellectual property.

ANS Standards Workspace Merger with ANS Collaborate and Potential Use as Volunteer Database

The ANS Standards Workspace has been in use for a little over four years. The Standards Board, consensus committees, and subcommittees use this web-based platform for all ballots and communication. Working group use of the site continues to grow. The site now includes 175 active workspaces for all committee levels and active accounts for 784 users (ANS Standards Committee members), 4465 documents have been posted, 4607 email messages generated, and 682 ballots have been issued since Workspace was launched.

Workspace, developed by Kavi, was acquired by Higher Logic roughly a year ago. Higher Logic also owns the community collaborative platform used by ANS committees and divisions called ANS Collaborate. The ANS Standards Workspace will be merged with ANS Collaborate under Higher Logic's community platform in early 2019. While all workspaces, documents, and ballots will be transferred, there will be some operational and format changes. Higher Logic will provide training to ANS staff administrators and Standards Committee members once the two platforms have been merged. The merger is believed to have the potential of connecting the two platforms with searching capabilities useable as a standards volunteer database to help identify potential candidates to staff standards committees. ANS staff will explore this opportunity.

Advanced Reactor Standards Need Workshop

ANS and the U.S. Nuclear Regulatory Commission (NRC) sponsored a workshop on May 2, 2018, near Washington, D.C., for industry partners to develop a strategic vision and path forward for advanced reactors standards. The workshop provided an opportunity for designers, vendors, owners, regulators, and representatives of standards development organizations (SDOs) to discuss standards needs to support advanced reactors. More than 70 participants attended with an additional 40 joining remotely. During the workshop, Technology Working Group (TWG) representatives from organizations involved with fast reactors, high temperature reactors, and molten salt reactors presented information related to standards needs in their technical areas. Breakout sessions for the TWGs were held identifying new and revised standards that would be of benefit to advanced reactors.

ANS Presentation at NRC Standards Forum

ANS Standards Board Chair Steven Arndt made a presentation at the September 11, 2018, NRC Standards Forum. Attendees included industry organizations, regulators, national laboratory representatives, and several standards development organizations. An overview and feedback from the ANS/NRC Advanced Reactor Standards Workshop held May 2, 2018, was provided. A request was made for more involvement from advanced reactor vendors and designers as well as the U.S. Department of Energy to provide direction in setting priorities for advanced reactor standards.

Standards Committee Strategic Plan/Future Plans

Revision 2 of the Standards Committee Strategic Plan was approved by the Standards Board in December of 2017. The long-term, strategic plan focuses on a number of key goals to 1) align standards development priorities with industry needs, 2) develop and maintain high-quality standards, 3) improve efficiency of standards development, 4)

expand external outreach, and 5) increase participation in ANS standards committees. An accompanying SMART Matrix was prepared to complement the Strategic Plan with specific actions tracking progress of each goal. The SMART Matrix is reviewed at each Standards Board meeting and updating accordingly. Major actionable initiatives to fulfill the goals include the following:

- Utilizing industry surveys, meetings, and outreach to prioritize standards needs
- Increase the use of risk-informed and performance-based methods in ANS standards
- Enhance relationships with ANS professional divisions through a liaison program
- Create a fee-based standards e-learning program for members and nonmembers
- Implement a standard training program for all Standards Committee members
- Maximize the use of the ANS Standards Workspace for electronic communication and document approval
- Actively solicit new Standards Committee members through the use of ANS publications
- Encourage young professionals to become involved in ANS standards by sending notices to ANS Student Section members, Young Members Group, and the North American Young Generation in Nuclear

Incorporation of Risk-Informed and/or Performance-Based Methods

The Risk-informed, Performance-based Principles and Policy Committee (RP3C) reviewed all ANS standards and projects to evaluate which ones would likely benefit from the use of risk-informed and/or performance-based methods. A list of standards that would provide the most benefit from risk-informed and/or performance-based methods was prepared. Consensus committees were tasked with evaluating RP3C's recommendations and reporting back to the Standards Board. The evaluation process remains in progress.

Professional Division Liaison Program

The Standards Board initiated a liaison program with the support of the ANS Professional Divisions (PD) Committee in 2016. PD liaisons were reconfirmed after the June 2018 meeting with several new liaisons appointed. The program aids in review of associated delinquent standards and enhance consensus committee relationships to assist in recommending new standards and populating working groups with expert individuals. PD liaisons are informed and invited to relevant consensus committee meetings. Time is included on all consensus committee meeting agendas for PD liaison reports.

Standards Committee Engagement of Young Professionals

The Associate Member Program was created in 2007 by the Standards Board at the suggestion of the ANS Young Member Group to allow young professionals the opportunity to participate in standards development without any experience. The Associate Member Program includes university students and those that have only a few years of professional, industry experience. Associate Members earn voting privileges through active participation and increased technical and standards development knowledge. The goal is for the Associate Member to become a full voting member within two years, but the actual length of time to become a full member can vary greatly depending on the experience of the individual and their active participation.

Each year, the ANS Standards Committee engages in outreach to encourage young and emerging professionals to become active in the ANS standards program. The Standards Board Chair made a presentation on the Associate Member Program to members of the North American Young Generation in Nuclear by webinar in March of this year. A broadcast inviting ANS Student Members to participate in ANS standards was issued this September. Since the program was initiated, over 50 young professionals and university students have been placed on a working group as an Associate Member. The program is of mutual benefit and vital to the continued success of the ANS standards program. While standards development requires support of industry experts with years of experience, emerging professionals bring a fresh perspective and revitalization to ensure industry standards needs continue to be met. The Associate Member Program helps to sustain the standards program while providing young professionals and their organizations valuable experience.

Approval of Change to Policy on Standards Committee Member Composition

The Standards Board approved a revision to the policy on the composition of working groups, subcommittees, and consensus committees. The revised policy adds a definition for an "organization" for the purpose of the policy and provides additional criteria allowing the Standards Board to approve multiple ballots from one organization for joint consensus committees (e.g., the ANS/ASME Joint Committee on Nuclear Risk Management and potential joint committees with other standards development organizations).

Maintenance of Standards

A success carried over the past three years has been the effort to reduce the number of delinquent standards. A reaffirmation form with criteria has been developed to provide reviewers guidance in determining if a standard is appropriate for reaffirmation. The new form resulted in a significant increase of reaffirmations (re-approvals) in 2016. With the success in 2016 and 2017, the effort will be indefinitely continued. A chart showing the improvement over the last five years is provided below:

Year	# of Current Standards at Close of Year	# of Standards Reaffirmed	# of Delinquent Standards	% of Delinquent Standards
2014	**78**	**2**	**33**	**42.3%**
2015	**80**	**6**	**25**	**31.3%**
2016	**81**	**20**	**19**	**23.4%**
2017	**80**	**14**	**10**	**12.5%**
2018	**82**	**10**	**8**	**9.8%**

It should be noted that 5 of the 8 standards reported as delinquent (those >5 years old) in 2018 have active revisions in development or approval. These projects have submitted the required documentation to the American National Standards Institute (ANSI) and comply with ANSI's requirement for maintenance. The 9.8% delinquency for 2018 is considered exceptionally low. Our goal moving forward is to maintain a delinquency level of no more than 15%.

Certification of Consensus Committee Balance of Interests

Balance of interests reports were prepared confirming that each consensus committee meets the requirement of no more than one-third of its membership from anyone interest category. As dictated by policy, the Standards Board reviewed each report at their June 2018 meeting and certified that all consensus committees are in compliance.

2018 Standards Action Activities

Project Initiation Notification System (PINS) forms were approved and submitted to ANSI for the following projects:

- ANS-2.22-201x, "Environmental Radiological Monitoring at Nuclear Facilities" (new standard)
- ANS-3.5.1-201x, "Nuclear Power Plant Simulators for Use in Simulation-Assisted Engineering and Non-Operator Training" (new standard)
- ANS-6.1.1, 201x, "Neutron and Photon Fluence-to-Dose Conversion Coefficients" (supersedes ANSI/ANS-N6.1.1-1991; W2001)
- ANS-8.1-201x, Nuclear Criticality Safety in Operations with Fissionable Material Outside Reactors (revision of ANSI/ANS-8.1-2014)
- ANS-10.4-201x, "Verification and Validation of Non-Safety Related Scientific and Engineering Computer Programs for the Nuclear Industry" (revision of ANSI/ANS-10.4-2008; R2016)
- ANS-16.1-201x, "Measurement of the Leachability of Solidified Low-Level Radioactive Wastes by a Short-Term Test Procedure" (revision of ANSI/ANS-16.1-2003; R2017)
- ANS-30.3-201x, "Advanced Light-Water Reactor Risk-Informed Performance-Based Design Criteria and Methods" (new standard)
- ANS-57.8-201x, Fuel Assembly Identification" (revision of ANSI/ANS-57.8-1995; R2017)

The following standards and/or draft standards were issued for ballot and public review:

- ANS-3.4-2013 (R201x), Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants (reaffirmation of ANSI/ANS-3.4-2013)
- ANS-6.1.2-2013 (R201x), Neutron and Gamma-Ray Cross Sections for Nuclear Radiation Protection Calculations for Nuclear Power Plants (reaffirmation of ANSI/ANS-6.1.2-2013)
- ANS-8.1-2014 (R201x), Nuclear Criticality Safety in Operations with Fissionable Material Outside Reactors (reaffirmation of ANSI/ANS-8.14-2014)
- ANS-8.23-201x, “Nuclear Criticality Accident Emergency Planning and Response” (revision of ANSI/ANS-8.23-2007; R2012)
- ANS-3.4-2013; R201x, “Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants” (reaffirmation of ANSI/ANS-3.4-2013)
- ANS-10.7-2013; R201x, “Non-Real Time, High Integrity Software for the Nuclear Industry--Developer Requirements” (reaffirmation of ANSI/ANS-10.7-2013)
- ANS-15.1-2007; R201x, “Non-Real Time, High Integrity Software for the Nuclear Industry—Developer Requirements” (reaffirmation of ANSI/ANS-15.1-2007; R2013)
- ANS-15.8-1995; R201x, “Quality Assurance Program Requirements for Research Reactors” (reaffirmation of ANSI/ANS-15.8-1995; R2013)
- ANS-15.21-2012; R201x, “Format and Content for Safety Analysis Reports for Research Reactors” (reaffirmation of ANSI/ANS-15.21-2012)
- ANS-16.1-201x, “Measurement of the Leachability of Solidified Low-Level Radioactive Wastes by a Short-Term Test Procedure” (revision of ANSI/ANS-16.1-2003; R2017)
- ANS-41.5-2012; R201x, “Verification and Validation of Radiological Data for Use in Waste Management and Environmental Remediation” (reaffirmation of ANSI/ANS-41.5-2012)
- ANS-51.10-1991; R201x, “Auxiliary Feedwater System for Pressurized Water Reactors” (reaffirmation of ANSI/ANS-51.10-1991; R2008)
  ANS-54.1-201x, “General Safety Design Criteria for a Liquid Sodium Reactor Nuclear Power Plants” (supersedes ANSI/ANS-54.1-1989; W1999)

The following standards were approved:

- ANSI/ANS-2.6-2018, “Guidelines for Estimating Present & Forecasting Future Population Distributions Surrounding Nuclear Facility Sites” (new standard)
- ANSI/ANS-3.4-2013 (R2018), “Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants” (reaffirmation of ANSI/ANS-3.4-2013)
- ANSI/ANS-6.1.2-2013 (R2018), Group-Averaged Neutron and Gamma-Ray Cross Sections for Radiation Protection and Shielding Calculations for Nuclear Power Plants” (reaffirmation of ANSI/ANS-6.1.2-2013)
- ANSI/ANS-8.1-2014 (R2018) “Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors” (reaffirmation of ANSI/ANS-8.1-2014)
- ANSI/ANS-10.7-2013 (R2018), “Non-Real Time, High-Integrity Software for the Nuclear Industry—Developer Requirements” (reaffirmation of ANSI/ANS-10.7-2013)
- ANSI/ANS-15.1-2007 (R2018),The Development of Technical Specifications for Research Reactors (reaffirmation of ANSI/ANS-15.1-2007; R2013)
- ANSI/ANS-15.8-1995 (R2018), “Quality Assurance Program Requirements for Research Reactors” (reaffirmation of ANSI/ANS-15.8-1995; R2013)
- ANSI/ANS-15.21-2012 (R2018), “Format and Content for Safety Analysis Reports for Research Reactors” (reaffirmation of ANSI/ANS-15.21-2012)
- ANSI/ANS-41.5-2012 (R2018), “Verification and Validation of Radiological Data for Use in Waste Management and Environmental Remediation” (reaffirmation of ANSI/ANS-41.5-2012)
- ANS-51.10-2002 (R2018), “Auxiliary Feedwater System for Pressurized Water Reactors” (reaffirmation of ANSI/ANS-51.10-2002; R2008)
- ANSI/ANS-57.3-2018, “Physical Protection for Nuclear Safety-Related Systems and Components” (supersedes withdrawn standard ANS-57.3-1983)

- ANS-58.3-1992 (R2018), “Physical Protection for Nuclear Safety-Related Systems and Components” (reaffirmation of ANSI/ANS-58.3-1992; R2008)

The following standards were published:

- ANSI/ANS-2.6-2018, “Guidelines for Estimating Present & Forecasting Future Population Distributions Surrounding Nuclear Facility Sites” (new standard)
- ANSI/ANS-57.3-2018, “Physical Protection for Nuclear Safety-Related Systems and Components” (supersedes withdrawn standard ANS-57.3-1983)

Responses to inquiries were issued on the following standards:

- ANSI/ANS-3.1-1993, “Selection and Training of Nuclear Power Plant Personnel”
- ANSI/ANS-5.1-2005 to 2014, “Decay Heat Power in Light Water Reactors”
- ANSI/ANS-19.6.1-2011, “Reload Startup Physics Tests for Pressurized Water Reactors”
- ANSI/ANS-58.2-1988, “Design Basis for Protection of Light Water Nuclear Power Plants Against the Effects of Postulated Pipe Rupture”

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

Steven A. Arndt, Chair, U.S. Nuclear Regulatory Commission
Donald R. Eggett, Vice Chair, Individual
Amir Afzali, Member at Large, Southern Company
Robert A. Bari, Member at Large, Brookhaven National Laboratory
Robert J. Budnitz, Ex Officio Member (JCNRM), Lawrence Berkeley National Laboratory
C.E. (Gene) Carpenter, Ex Officio Member (LLWRCC), U.S. Department of Energy
George F. Flanagan, **Chair,** Ex Officio Member (RARCC), Oak Ridge National Laboratory
David Hillyer, Ex Officio Member (FWDCC), Energy Solutions
Mark A. Linn, Member at Large, Oak Ridge National Laboratory
Carl A. Mazzola, Ex Officio Member (ESCC), Project Enhancement Corporation
John A. Nakoski, Member at Large, U.S. Nuclear Regulatory Commission
James O'Brien, Ex Officio Member (NRNFCC), U.S. Department of Energy
Andrew O. Smetana, Ex Officio Member (SRACC), Savannah River National Laboratory
Andrew G. Sowder, Member at Large, Electric Power Research Institute
Steven L. Stamm, Member at Large, Individual
William M. Turkowski, Member at Large, Westinghouse Electric Company, LLC
Edward G. Wallace, Member at Large, Individual
Larry L. Wetzel, Ex Officio Member (NCSCC), BWXT, Inc.

Dennis Henneke, Observer, General Electric
Calvin M. Hopper, Observer, Individual
N. Prasad Kadambi, ANSI Liaison, Individual
Stanley H. Levinson, JCNRM/SCoRA Liaison, Individual
Shivani Mehta, Observer, U.S. Nuclear Regulatory Commission
William B. Reuland, Observer, Individual
Ruth Reyes-Maldonado, Observer, U.S. Nuclear Regulatory Commission
Donald Spellman, IEEE-NPEC Liaison, Observer

Ex Officio Member = *Consensus Committee Chair*

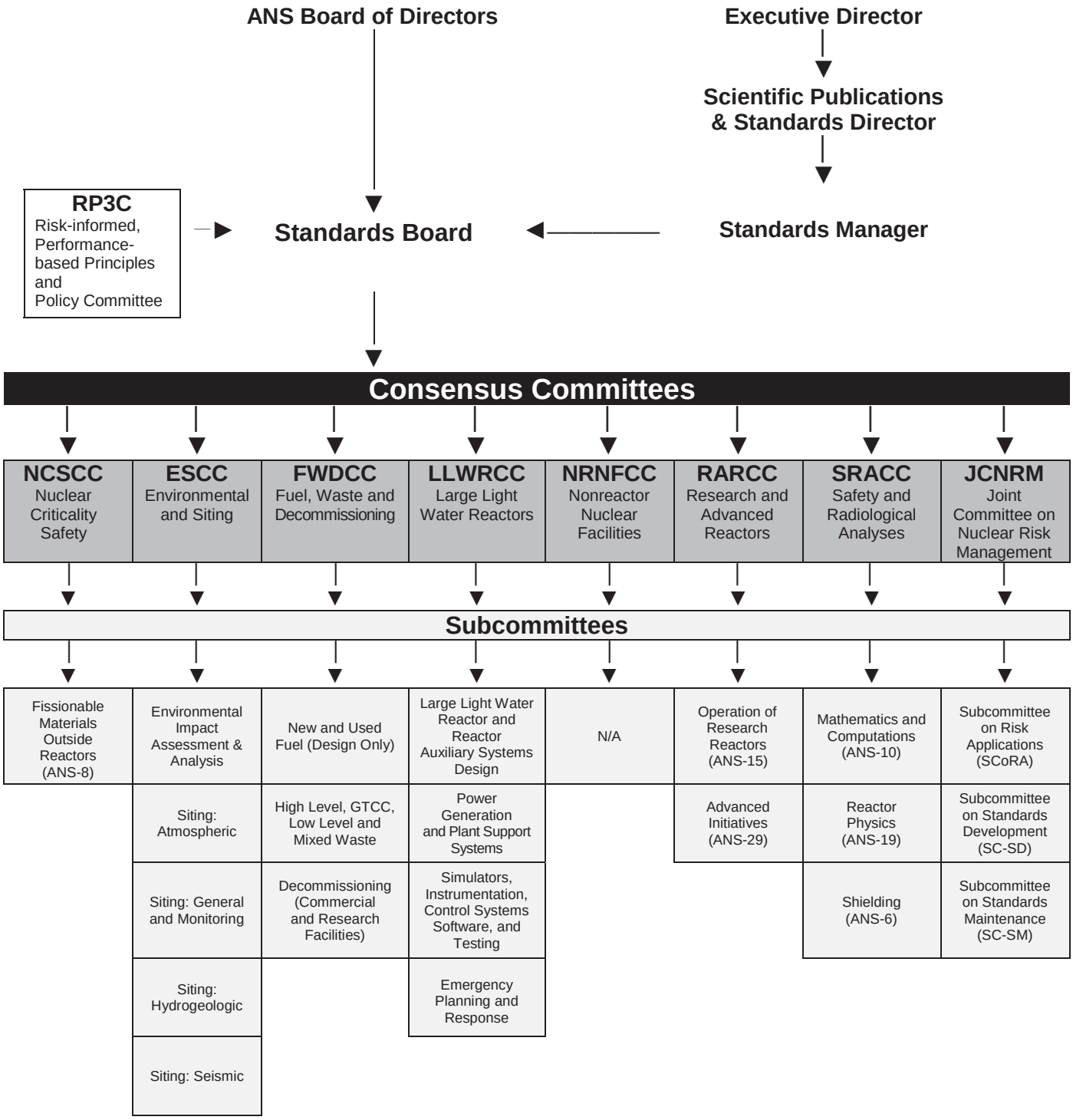


Figure 2 – ANS Standards Committee: Organizational Chart

SUBCOMMITTEE CHAIRS

Advanced Initiatives/ANS-29 (RARCC)	Bruce Bevard
Decommissioning (Commercial and Research Facilities) (FWDCC)	OPEN
Emergency Planning and Response (LLWRCC)	Ronald Markovich
Environmental and Impact Assessment	Kevin Bryson
Fissionable Material Outside Reactors/ANS-8 (NCSCC)	Douglas Bowen
High Level, GTCC, Low Level, and Mixed Waste (FWDCC)	OPEN
Light Water Reactor and Reactor Auxiliary Systems Design (LLWRCC)	Michelle French
Mathematics and Computations/ANS-10 (SRACC)	Paul Hulse
New and Used Fuel (Design Only) (FWDCC)	Mitchell Sanders
Operation of Research Reactors/ANS-15 (RARCC)	Thomas Newton
Power Generation and Plant Support Systems (LLWRCC)	Robert Burg (pro tem)
Reactor Physics/ANS-19 (SRACC)	Dimitrios Cokinos
Shielding/ANS-6 (SRACC)	Charlotta Sanders
Simulators, Instrumentation, Control Systems, Software and Testing (LLWRCC)	Pranab Guha
Siting: Atmospheric	Jennifer Call
Siting: General and Monitoring (ESCC)	Leah Parks
Siting: Hydrogeologic (ESCC)	Yan Gao
Siting: Seismic (ESCC)	Jim Xu
Subcommittee on Risk Applications (JCNRM)	Gerry Kindred
Subcommittee on Standards Development (JCNRM)	Barry Sloane
Subcommittee on Standards Maintenance (JCNRM)	Paul Amico

APPROVED AMERICAN NATIONAL STANDARDS

Developed by the ANS Standards Committee

(through December 2018)

ANS-1-2000; R2007; R2012	Conduct of Critical Experiments (reaffirmed 10/5/2012)
ANS-2.2-2016	Earthquake Instrumentation Criteria for Nuclear Power Plants (approved 7/14/2016)
ANS-2.3-2011; R2016	Estimating Tornado, Hurricane, and Extreme Straight Line Wind Characteristics at Nuclear Facility Sites (reaffirmed 6/29/2016)
ANS-2.6-2018	Guidelines for Estimating Present & Forecasting Future Population Distributions Surrounding Nuclear Facility Sites (approved 3/16/2018)
ANS-2.10-2017	Criteria for Retrieval, Processing, Handling, and Storage of Records from Nuclear Facility Seismic Instrumentation (approved 12/19/2017)
ANS-2.15-2013; R2017	Criteria for Modeling and Calculating Atmospheric Dispersion of Routine Radiological Releases from Nuclear Facilities (reaffirmed 12/2/2017)
ANS-2.17-2010; R2016	Evaluation of Subsurface Radionuclide Transport at Commercial Nuclear Power Plants (reaffirmed 3/10/2016)
ANS-2.21-2012; R2016	Criteria for Assessing Atmospheric Effects on the Ultimate Heat Sink (reaffirmed 4/18/2016)
ANS-2.23-2016	Nuclear Plant Response to an Earthquake (approved 4/7/2016)
ANS-2.26-2004; R2010; R2017	Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design (reaffirmed 9/12/2017)
ANS-2.27-2008; R2016	Criteria for Investigations of Nuclear Facility Sites for Seismic Hazard Assessments (reaffirmed 6/15/2016)
ANS-2.29-2008; R2016	Probabilistic Seismic Hazard Analysis (reaffirmed 10/11/2016)
ANS-2.30-2015	Criteria for Assessing Tectonic Surface Fault Rupture and Deformation at Nuclear Facilities (approved 5/28/2015)
ANS-3.1-2014	Selection, Qualification and Training of Personnel for Nuclear Power Plants (approved 11/20/2014)
ANS-3.2-2012; R2017	Managerial, Administrative, and Quality Assurance Controls for the Operational Phase of Nuclear Power Plants (reaffirmed 4/4/2017)
ANS-3.4-2013; R2018	Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants (reaffirmed 7/2/2018)
ANS-3.5-2009	Nuclear Power Plant Simulators for Use in Operator Training and Examination (approved 9/4/2009)
ANS-3.11-2015	Determining Meteorological Information at Nuclear Facilities (approved 8/20/2015)

ANS-5.1-2014	Decay Heat Power in Light Water Reactors (approved 11/7/2014)
ANS-5.4-2011	Method for Calculating the Fractional Release of Volatile Fission Products from Oxide Fuel (approved 5/19/2011)
ANS-5.10-1998; R2006; R2013	Airborne Release Fractions at Non-Reactor Nuclear Facilities (reaffirmed 1/15/2013)
ANS-6.1.2-2013; R2018	Group-Averaged Neutron and Gamma-Ray Cross Sections for Radiation Protection and Shielding Calculations for Nuclear Power Plants (reaffirmed 10/19/2018)
ANS-6.3.1-1987; R1998; R2007; R2015	Program for Testing Radiation Shields in Light Water Reactors (LWR) (reaffirmed 12/11/2015)
ANS-6.4-2006; R2016	Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants (reaffirmed 8/4/2016)
ANS-6.4.2-2006; R2016	Specification for Radiation Shielding Materials (reaffirmed 9/27/2016)
ANS-6.6.1-2015	Calculation and Measurement of Direct and Scattered Gamma Radiation from LWR Nuclear Power Plants (approved 8/21/2015)
ANS-8.1-2014; R2018	Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors (reaffirmed 11/27/2018)
ANS-8.3-1997; R2003 R2012; R2017	Criticality Accident Alarm System (reaffirmed 10/25/2017)
ANS-8.5-1996; R2002; R2007; R2012; R2017	Use of Borosilicate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material (reaffirmed 11/14/2017)
ANS-8.6-1983; R1988; R1995; R2001; R2010; R2017	Safety in Conducting Subcritical Neutron-Multiplication Measurements In Situ (reaffirmed 8/24/2017)
ANS-8.7-1998; R2007 R2012; R2017	Nuclear Criticality Safety in the Storage of Fissile Materials (reaffirmed 12/14/2017)
ANS-8.10-2015	Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement (reaffirmed 2/12/2015)
ANS-8.12-1987; R1993 R2002; R2011; R2016	Nuclear Criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors (reaffirmed 5/6/2016)
ANS-8.14-2004; R2011; R2016	Use of Soluble Neutron Absorbers in Nuclear Facilities Outside Reactors (reaffirmed 6/29/2016)
ANS-8.15-2014	Nuclear Criticality Control of Special Actinide Elements (approved 10/10/2014)
ANS-8.17-2004; R2009; R2014	Criticality Safety Criteria for the Handling, Storage, and Transportation of LWR Fuel Outside Reactors (reaffirmed 7/28/2014)
ANS-8.19-2014	Administrative Practices for Nuclear Criticality Safety (approved 7/28/2014)
ANS-8.20-1991; R1999; R2005; R2015	Nuclear Criticality Safety Training (reaffirmed 8/3/2015)

ANS-8.21-1995; R2001 R2011	Use of Fixed Neutron Absorbers in Nuclear Facilities Outside Reactors (reaffirmed 5/19/2011)
ANS-8.22-1997; R2006 R2011; R2016	Nuclear Criticality Safety Based on Limiting and Controlling Moderators (reaffirmed 10/17/2016)
ANS-8.23-2007; R2012	Nuclear Criticality Accident Emergency Planning and Response (reaffirmed 5/31/2012)
ANS-8.24-2017	Validation of Neutron Transport Methods for Nuclear Criticality Safety Calculations (approved 12/12/2017)
ANS-8.26-2007; R2012; R2016	Criticality Safety Engineer Training and Qualification Program (reaffirmed 12/15/2016)
ANS-8.27-2015	Burnup Credit for LWR Fuel (approved 11/10/2015)
ANS-10.2-2000; R2009	Portability of Scientific and Engineering Software (reaffirmed 8/14/2009)
ANS-10.4-2008; R2016	Verification and Validation of Non-Safety Related Scientific and Engineering Computer Programs for the Nuclear Industry (reaffirmed 9/26/2016)
ANS-10.5-2006; R2011; R2016	Accommodating User Needs in Scientific and Engineering Computer Software Development (reaffirmed 12/8/2016)
ANS-10.7-2013; R2018	Non-Real Time, High-Integrity Software for the Nuclear Industry—Developer Requirements (reaffirmed 8/13/2018)
ANS-10.8-2015	Non-Real Time, High-Integrity Software for the Nuclear Industry—User Requirements (approved 11/19/2015)
ANS-14.1-2004; R2009; R2014	Operation of Fast Pulse Reactors (reaffirmed 12/12/2014)
ANS-15.1-2007; R2007; R2013; R2018	The Development of Technical Specifications for Research Reactors (reaffirmed 4/10/2018)
ANS-15.2-1999; R2009; R2016	Quality Control for Plate-Type Uranium-Aluminum Fuel Elements (reaffirmed 8/18/2016)
ANS-15.4-2016	Selection and Training of Personnel for Research Reactors (approved 4/19/2016)
ANS-15.8-1995; R2005; R2013; R2018	Quality Assurance Program Requirements for Research Reactors (reaffirmed 7/18/2018)
ANS-15.11-2016	Radiation Protection at Research Reactor Facilities (approved 5/13/2016)
ANS-15.16-2015	Emergency Planning for Research Reactors (approved 2/11/2015)
ANS-15.21-2012; R2018	Format and Content for Safety Analysis Reports for Research Reactors (reaffirmed 2/27/2018)
ANS-16.1-2003; R2008; R2017	Measurement of the Leachability of Solidified Low-Level Radioactive Wastes Short-Term Test Procedure (reaffirmed 1/12/2017)

ANS-18.1-2016	Radioactive Source Term for Normal Operation of Light Water Reactors (approved 11/1/2016)
ANS-19.1-2002; R2011	Nuclear Data Sets for Reactor Design Calculations (reaffirmed 6/17/2011)
ANS-19.3-2011; R2017	Steady-State Neutronics Methods for Power Reactor Analysis (reaffirmed 1/24/2017)
ANS-19.3.4-2002; R2008; R2017	The Determination of Thermal Energy Deposition Rates in Nuclear Reactors (reaffirmed5/18/2017)
ANS-19.6.1-2011; R2016	Reload Startup Physics Tests for Pressurized Water Reactors (reaffirmed 8/5/2016)
ANS-19.10-2009; R2016	Methods for Determining Neutron Fluence in BWR and PWR Pressure Vessel and Reactor Internals (reaffirmed 10/11/2016)
ANS-19.11-2017	Calculations and Measurement of the Moderator Temperature Coefficient of Reactivity for Pressurized Power Reactors (approved 4/11/2017)
ANS-40.37-2009; R2016	Mobile Low Level Radioactive Waste Processing Systems (reaffirmed 6/30/2016)
ANS-41.5-2012; R2018	Verification and Validation of Radiological Data for Use in Waste Management and Environmental Remediation (reaffirmed 10/19/2018)
ANS-51.10-2002; R2008 R2018	Auxiliary Feedwater System for Pressurized Water Reactors (reaffirmed 8/13/2018)
ANS-53.1-2011; R2016	Nuclear Safety Design Process for Modular-Helium Cooled Reactor Plants (reaffirmed 10/31/2016)
ANS-55.1-1992; R2000; R2009; R2017	Solid Radioactive Waste Processing Systems for Light Water Cooled Reactor Plants (reaffirmed 8/24/2017)
ANS-56.8-2002; R2011; R2016	Containment System Leakage Testing Requirements (reaffirmed 6/26/2016)
ANS-57.1-1992; R1998; R2005; R2015	Design Requirements for Light Water Reactor Fuel Handling System (reaffirmed 6/16/2015)
ANS-57.3-2018	Physical Protection for Nuclear Safety-Related Systems and Components (approved 2/27/2018)
ANS-57.8-1995; R2005; R2011; R2017	Fuel Assembly Identification (reaffirmed 2/23/2017)
ANS-57.10-1996; R2006; R2016	Design Criteria for Consolidation of LWR Spent Fuel (reaffirmed 7/7/2016)
ANS-58.3-1992; R1998; R2008; R2018	Physical Protection for Nuclear Safety-Related Systems and Components (reaffirmed 1/11/2018)
ANS-58.8-1994; R2001; R2008; R2017	Time Response Design Criteria for Safety-Related Operator Actions (reaffirmed 8/24/2017)

ANS-58.9-2002; R2009; R2015	Single Failure Criteria for Light Water Reactor Safety-Related Fluid Systems (reaffirmed 2/12/2015)
ANS-58.14-2011; R2017	Safety and Pressure Integrity Classification Criteria for Light Water Reactors (reaffirmed 1/12/2017)
ANS-58.16-2014	Safety Categorization and Design Criteria for Nonreactor Nuclear Facilities (approved 9/4/2014)
ANS-59.51-1997; R2007; R2015	Fuel Oil Systems for Safety-Related Emergency Diesel Generators (reaffirmed 6/19/2015)
ANS-59.52-1998; R2007 R2015	Lubricating Oil Systems for Safety-Related Emergency Diesel Generators (reaffirmed 6/19/2015)

Approved ASME/ANS Joint American National Standard

ASME/ANS RA-S-2008	Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications (approved 4/9/2008; Addenda A approved 2/2/2009; Addenda B approved 7/1/2013)

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)
ASME/ANS RA-S-1.2-2014	Severe Accident Progression and Radiological Release (Level 2) PRA Standard for Nuclear Power Plant Applications for Light Water Reactors (LWRs) (approved for trial use by the JCNRM; not approved by ANSI)
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)
ASME/ANS RA-S-1.4-2013	Probabilistic Risk Assessment Standard for Advanced Non-LWR Nuclear Power Plants (approved for trial use by the JCNRM; not approved by ANSI)

Environmental and Siting Consensus Committee (ESCC)

Carl A. Mazzola, Chair
Project Enhancement Corporation

Scope: *The ESCC is responsible for the preparation and maintenance of voluntary consensus standards for all aspects of nuclear power plant and nonreactor 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, Project Enhancement Corporation
Jennifer Call, Vice Chair, Oasys, Inc.
Thomas Bellinger, Consolidated Nuclear Security, LLC
David Bruggeman, Los Alamos National Laboratory
Kevin Bryson, Individual
Yan Gao, Individual
Brent Gutierrez, U.S. Department of Energy
R. Joseph Hunt, Consolidated Nuclear Security, LLC
Yong Li, Defense Nuclear Facility Safety Board
Kit Ng, Bechtel Power Corporation
James O'Brien, U.S. Department of Energy
Leah Parks, U.S. Nuclear Regulatory Commission
Samuel Rosenbloom, U.S. Department of Energy
Jean Savy, Individual
Ali Simpkins, Dade Moeller, an NV5 Company
Paul B. Snead, Duke Energy
Jim Xu, U.S. Nuclear Regulatory Commission

ESCC Observer:
Brad Harvey, U.S. Nuclear Regulatory Commission

Report of the ESCC:
Two teleconferences were held in 2018 (March and July), and a physical meeting was held during the ANS Winter Meeting in Orlando, FL, on Wednesday, November 14. Brent Gutierrez and Samuel Rosenbloom were confirmed as members of the ESCC. Quazi Hossain and Steven Vigeant retired from the ESCC and all standards activities. Jim Xu stepped up from the vice chair role to replace Quazi Hossain as the Siting: Seismic Subcommittee Chair.

Brent Gutierrez took over the Siting Seismic Subcommittee Vice Chair position. At the close of 2018, William Ebert's appointment as an ESCC member was pending the close of the membership confirmation ballot.

Approved in 2018:

ANSI/ANS-2.6-2018. "Guidelines for Estimating Present & Forecasting Future Population Distributions Surrounding Nuclear Facility Sites" (new standard)

ANSI/ANS-ANS-41.5-2012 (R2018), "Verification and Validation of Radiological Data for Use in Waste Management and Environmental Remediation" (reaffirmation of ANSI/ANS-41.5-2012)

Active standards/projects (Approved PINS):

ANS-2.8, "Probabilistic Evaluation of External Flood Hazards for Nuclear Facilities" (historical revision of ANSI/ANS-2.8-1992 – proposed new standard)

ANS-2.16, "Criteria for Modeling Design-Basis Accidental Releases from Nuclear Facilities" (proposed new standard)

ANS-2.18, "Standards for Evaluating Radionuclide Transport in Surface Water for Nuclear Power Sites" (proposed new standard)

ANS-2.22, "Environmental Radiological Monitoring at Nuclear Facilities" (proposed new standard)

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

ANS-2.29, "Probabilistic Seismic Hazard Analysis" (revision of ANSI/ANS-2.29 (R2016))

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

ANS-3.8.10, "Criteria for Modeling Real-Time Accidental Release Consequences at Nuclear Facilities" (proposed new standard)

ANS-3.16, "Meteorology and Wildland Fires" (proposed new standard)

ANS-16.1, "Measurement of the Leachability of Solidified Low-Level Radioactive Wastes by a Short-Term Test Procedure" (revision of ANSI/ANS-16.1-2003; R2008; R2017)

Environmental and Impact Assessment and Analysis Subcommittee

Membership:
Kevin Bryson, Chair, Individual
Peyton Doub, U.S. Nuclear Regulatory Commission
Daniel Mussatti, U.S. Nuclear Regulatory Commission

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

ANS-2.25, "Surveys of Ecology Needed to License Nuclear Facilities" (historical revision of ANSI/ANS-18.5-1982; R1989; redesignated ANS-2.25 – proposed new standard)

Scope: *There is a need for guidance on suitable survey techniques to evaluate potential effects of a nuclear facility on surrounding ecology. This standard discusses the need developers of nuclear facilities have for information on the terrestrial and aquatic environment. Facilities include uranium enrichment facilities, fuel fabrication facilities, reactors, interim storage facilities, reprocessing facilities, low/high level waste disposal facilities, DOE GNEP facilities and other DOE owned/ operated facilities. The previous standard was withdrawn for administrative reasons and will be reinvigorated to include present conditions and to coincide with current regulations.*

Membership:
Peyton Doub, Chair, U.S. Nuclear Regulatory Commission, Christopher Courtenay (Associate Member), Duke Energy; Harriet Nash, National Oceanic and Atmospheric Administration

Status: PINS submitted to ANSI in 2009. No activity in 2018. ESCC considering need for standard and possible termination of project.

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ANS-2.33, **"Aquatic Ecological Surveys Required for Siting, Design, and Operation of Nuclear Power Plants" (proposed new standard)**

Membership:
OPEN, Chair; Briana Grange, U.S. Nuclear Regulatory Commission; Rebekah Krieg, Pacific Northwest National Laboratory; Harriet Nash, National Oceanic and Atmospheric Administration

Status: Project was moved from Siting: Aquatic Ecology Subcommittee that was dissolved. Working group formed and PINS developed in 2016. The project chair resigned before completing comment resolutions from the Standards Board. No activity in 2018. ESCC considering need for standard and possible termination of project.

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

Proposed 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:
Daniel Mussatti, Chair, U.S. Nuclear Regulatory Commission; David Anderson, Pacific Northwest National Laboratory; Linda Andrews, Framatome; Bandana Kar, Oak Ridge National Laboratory; Archie (Archana) Manoharan, Tennessee Valley Authority; Leah Parks, U.S. Nuclear Regulatory Commission; Amy Rose, Oak Ridge National Laboratory; Rachel Turney-Work, Enercon Services, Inc.; Kevin Weinisch, KLD Engineering, P.C.

Status: We are in the formative stages of ANS-2.35. A PINS form is proposed to be ready for ballot in early 2019.

Siting: Aquatic Ecology Subcommittee

Membership:
OPEN

The ESCC voted to disband the Siting Aquatic Ecology Subcommittee. ANS-2.33 has been moved to the Environmental Impact Assessment & Analysis Subcommittee.

Siting: Atmospheric Subcommittee

Membership:
Jennifer Call, Chair, Oasys, Inc.
OPEN, Vice Chair
Jeffrey Baum, ABSG Consulting
Thomas Bellinger, Consolidated Nuclear Security, LLC
David Bruggeman, Los Alamos National Laboratory
John Ciolek, AlphaTRAC, Incorporated
Marsha Kinley, Duke Energy
Rodman Linn, Los Alamos National Laboratory
Carl Mazzola, Project Enhancement Corporation

Management of ANSI/ANS-3.11-2015, “Determining Meteorological Information at Nuclear Facility Sites,” was reassigned to the Siting: Atmospheric Subcommittee from the Siting: General & Monitoring Subcommittee at the ESCC’s 11/14/18 meeting. The Siting: Atmospheric Subcommittee oversees the following projects:

ANSI/ANS-2.3-2011 (R2016), “Estimating Tornado, Hurricane, and Extreme Straight Line Wind Characteristics at Nuclear Facility Sites” (historical revision of ANSI/ANS-2.3-1983 – new standard)

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:
Jeffrey Baum, Chair, ABSG Consulting; ; Adeola Adedrian, Bechtel Corporation; Mark Carroll, Individual; Antonio Godoy, International Atomic Energy Agency;Brent Gutierrez, U.S. Department of Energy; Shannon Jasim-Hanif, U.S. Department of Energy; Alex Markivich, Westinghouse Electric Company, LLC; Carl Mazzola, Project Enhancement Corporation; Emil Simiu, National Institute of Standards Technology; Larry Twisdale, Applied Research Associates, Inc.; Stephen Weinbeck, Savannah River National Laboratory

Status:
This standard was reaffirmed 6/29/16. The previous chair, Brad Harvey, resigned from the chair position during 2018 upon his retirement from NRC. Jennifer Call presented an update on this standard to the NUMUG community at the Las Vegas meeting in October 2018 and recruited Jeffrey Baum as the new chair. Baum accepted the chair position and hopes to re-vitalize this working group in 2019. 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. Additional working group members have been solicited and added throughout 2018.

ANSI/ANS-2.15-2013 (R2017), “Criteria for Modeling and Calculating Atmospheric Dispersion of Routine Radiological Releases from Nuclear Facilities” (new standard)

Scope: *This standard establishes criteria for using meteorological data collected at nuclear facilities to evaluate the atmospheric effects on routine radioactive releases, including dilution, dispersion, plume rise, plume meander, aerodynamic effects of buildings, dry, deposition, and wet deposition (e.g., precipitation scavenging).*

Membership:
John Ciolek, Chair, AlphaTRAC, Inc.; Mark Abrams, ABS Consulting, Inc.; Thomas Bellinger, Consolidated Nuclear Security, LLC; David Brown, National Institute of Standards & Technology; Mark Carroll, Individual; Toree Cook, Tennessee Valley Authority; Cliff Glantz, Pacific Northwest National Laboratory; Chuck Hunter, Savannah River National Laboratory; Marsha Kinley, Duke Energy; Mike Mazaika, U.S. Nuclear Regulatory Commission; Carl Mazzola,Project Enhancement Corporation; Edward McCarthy, E.F. McCarthy & Associates; John Nasstrom, Lawrence Livermore National Laboratory; Matthew Parker, Savannah River National Laboratory; Doyle E Pittman, Individual; Jeremy Rishel, Pacific Northwest National Laboratory; Ali Simpkins, Dade Moeller; Ping Wan, Individual; Ken Wastrack, Tennessee Valley Authority

Status: This standard was reaffirmed on 12/21/17. No activity in 2018.

ANS-2.16, “Criteria for Modeling Design-Basis Accidental Releases from Nuclear Facilities” (proposed new standard)

Scope: *This standard establishes criteria for using meteorological data collected at nuclear facilities to evaluate the atmospheric effects on accidental radioactive and chemical releases, including dilution, dispersion, plume rise, plume meander, aerodynamic effects of buildings, dry deposition, and wet deposition (e.g., precipitation scavenging). These criteria may also be useful in Department of Homeland Security (DHS) consequence assessments.*

Membership
Kevin Quinlan, Chair (pending management approval), U.S. Nuclear Regulatory Commission; Jeremy Rishel, Vice Chair, Pacific Northwest National Laboratory; Mark Abrams, ABS Consulting, Inc.; Thomas Bellinger, Consolidated

Nuclear Security, LLC; Nate Bixler, Sandia National Laboratories; Mark Carroll, Individual; John Ciolek, AlphaTRAC, Inc.; Toree Cook, Tennessee Valley Authority; Michael Dunlevy, Defense Nuclear Facilities Safety Board; Cliff Glantz, Pacific Northwest National Laboratory; Chuck Hunter, Savannah River National Laboratory; Marsha Kinley, Duke Energy; Carl Mazzola,Project Enhancement Corporation; Edward McCarthy, E.F. McCarthy & Associates; John Nasstrom, Lawrence Livermore National Laboratory; James O'Brien, U.S. Department of Energy; Matt Parker, Savannah River National Laboratory; Doyle E. Pittman, Individual; Ali Simpkins, Dade Moeller; Harold Thistle, Individual; Ping Wan, Individual; Ken Wastrack, Tennessee Valley Authority

Status: The PINS was approved and submitted to ANSI in 2005. The previous chair, Dr. Harold Thistle, resigned from the chair position during 2018. Jennifer Call presented an update on this standard to the NUMUG community at the Las Vegas meeting in October 2018 and recruited Kevin Quinlan as the new chair. Quinlan is currently working with his management at NRC to formally accept the chair position and hopes to re-vitalize this working group in 2019.

ANSI/ANS-2.21-2012 (R2016), "Criteria for Assessing Atmospheric Effects on the Ultimate Heat Sink" (new standard)

Scope: *This standard establishes criteria for use of meteorological data collected at nuclear facilities to evaluate the atmospheric effects from meteorological parameters (e.g., dry-bulb temperature/wet-bulb temperature differential, precipitation, wind speed, short wave radiation, incoming solar (short wave) radiation, surface water temperature, and atmospheric pressure) on ultimate heat sinks.*

Membership:
Marsha Kinley, Chair, Duke Energy; Jeffrey Baum, ABSG Consulting; Edward Buchak, Environmental Resources Management; Jennifer Call, Oasys, Inc.; Mark Carroll, Individual; Andrew Dewhurst, Individual; Ludwig Haber, Alden Research Laboratory; Frank Hickey, Talen Energy/Susquehanna Nuclear, LLC; Michael Mazaika, U.S. Nuclear Regulatory Commission; Carl Mazzola, Project Enhancement Corporation; Kevin Quinlan, U.S. Nuclear Regulatory Commission; Larry Wheeler, U.S. Nuclear Regulatory Commission

Status: This standard was reaffirmed on 4/18/2016. Marsha Kinley was appointed chair in 2018 to replace Stephen Vigeant upon his retirement. A kickoff meeting and conference call was held on 10/17/2018 at NUMUG-2018 in Las Vegas, Nevada. Marsha Kinley gave a presentation on ANS-2.21 vs. NRC guidance, and solicited NUMUG for Working Group members and UHS SME contacts. Jennifer Call also presented the results of the UHS questionnaire at NUMUG on 10/18/2018.

ANS-3.8.10, "Criteria for Modeling Real-time Accidental Release Consequences at Nuclear Facilities" (proposed new standard)

Scope: *This standard establishes criteria for use of meteorological data collected at nuclear facilities or nearby stations to evaluate in real time the atmospheric effects of all anticipated accidental radioactive and hazardous chemical releases during emergencies, including atmospheric transport and dispersion. These criteria may also be useful in Department of Homeland Security (DHS) emergency response consequence assessments.*

Membership:
OPEN, Chair; Rishel, Vice Chair, Pacific Northwest National Laboratory; Mark Abrams, ABS Consulting, Inc.; George Athey, Athey Consulting; Tom Bellinger, Consolidated Nuclear Security, LLC; Jay Boris, Naval Research Laboratory; Jennifer Call, Oasys, Inc.; Mark Carroll, Individual; Joseph Chang, Department of Homeland Security; John Ciolek, AlphaTRAC, Inc.; Toree Cook, Tennessee Valley Authority; Mark Drucker, Anatech Corporation; Michael Dunleavy, Defense Nuclear Facilities Safety Board; Bruce Egan, Egan Environmental; Cliff Glantz, Pacific Northwest National Laboratory; Chuck Hunter, Savannah River National Laboratory; Marsha Kinley, Duke Energy; Michael Mazaika, U.S. Nuclear Regulatory Commission; Edward McCarthy, EF McCarthy & Associates; John Nasstrom, Lawrence Livermore National Laboratory; E. F. McCarthy & Associates; Matt Parker, Savannah River National Laboratory; Doyle E Pittman, Individual; Kevin Quinlan, U.S. Nuclear Regulatory Commission; Ali Simpkins, Dade Moeller; Ping Wan, Individual; Ken Wastrack, Tennessee Valley Authority

Status: The chair position for this standard is once again open after Harold Thistle resigned from the position in 2018. We have had five chairmen come and go without being able to see this standard through to publication. Call has recruited colleagues directly, as well as tried an all-call approach to the CCM community with no luck. Consideration was given to combining this standard with either ANS-2.15 or ANS-2.16, as the content and the working groups overlap greatly, in order to reduce overall effort, and possibly increase the functionality and value of ANSI/ANS-2.15-2013. However, ANS-3.8.10 is an operational standard associated with emergency response dispersion modeling, while ANS-2.16 is a licensing standard associated with accidental release dispersion modeling, hence the different number sequence. Also, it was recognized that this action would possibly delay ANS-2.15 while material was being incorporated, and that standard has an action date of 2022. As the main community of users, NUMUG's feedback is valued greatly in this area, and the path forward was discussed at the NUMUG meeting in October 2018. It was determined that the most desirable path forward was to retain separate standards and a chair was successfully recruited for ANS-2.16. A chair is obviously still needed: however, for ANS-3.8.10.

ANSI/ANS-3.11-2015 "Determining Meteorological Information at Nuclear Facilities" (revision of ANSI/ANS-3.11-2005; R2010)

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:
Thomas Bellinger, Co-Chair, Consolidated Nuclear Solutions, LLC; David Bruggeman, Co-Chair, Los Alamos National Laboratory; Mark Abrams, ABS Consulting; Kevin Birdwell, Oak Ridge National Laboratory; Patrick T. Brennan, Meteorological Evaluation Services; Jennifer Call, Oasys, Inc.; Mark Carroll, Individual; John Ciolek, AlphaTrac; Kirk Clawson, NOAA Air Resources Laboratory; Thomas Coulter, Coulter Air Quality Services; Paul Fransioli, Clark County Nevada; Thomas Galletta, U.S. Nuclear Regulatory Commission; Cliff Glantz, Pacific Northwest National Laboratory; R. Brad Harvey, U.S. Nuclear Regulatory Commission; Frank Hickey, Susquehanna Nuclear, LLC; James Holian, Holian Environmental, LLC; Charles Hunter, Savannah River National Laboratory; Rachael Ishaya, BRYZA Wind Laboratory; David Katz, Climatronics Corporation; Stanton Lanham, Duke Energy; Stanley Marsh, Southern California Edison; Michael Mazaika, U.S. Nuclear Regulatory Commission; Carl Mazzola, Project Enhancement Corporation; Edward McCarthy, E.F. McCarthy & Associates; Doyle Pittman, Individual (Retired Meteorologist); Kevin Quinlan, U.S. Nuclear Regulatory Commission; Walter Schalk, NOAA ARL/SORD; Adam Smith, Tennessee Valley Authority; Stephen Vigeant, APTIM Corporation, Ping Wan, Individual; Ken Wastrack, Tennessee Valley Authority

Status: The standard was approved by ANSI on 8/20/2015. The working group held a kick-off meeting at the NUMUG meeting in October 2018 to discuss the upcoming action on this standard and preliminary discussion on whether to reaffirm or revise. This standard was also moved from the subcommittee Siting: General & Monitoring to the subcommittee Siting: Atmospheric in 2018.

ANS-3.16, "Meteorology and Wildland Fires" (proposed new standard)

Scope: *The broad scope of this standard is to provide guidance to the user and point the user to the applicable references where more detailed information can be found related to the meteorological / atmospheric impacts and forecasting considerations on wildland fires. (This will be further refined as the PINS is developed.)*

Membership:
Rodman Linn, Chair, Los Alamos National Laboratory; Jeff Baum, ABSG Consulting; Christopher Fiebrich, University of Oklahoma; Todd Lindley, National Oceanic and Atmospheric Administration; Scott McDonald, Washington State Department of Health; Rhett Milne, Individual; Bill Shields, Individual; John Snow, Individual; Ron Stouffer, Individual; Brian Viner, Savannah River National Laboratory

Status: The working group is the process of drafting the PINS for this proposed standard. A talented working group of professionals from many organizations has been established over the past two years. However, before work could start in earnest, there was a need to confirm whether there was an end use for this standard within the nuclear community. Private and public sector survey analysis assist in this determination, and the ESCC elected to move forward with this standard development. Rodman Linn recently assumed the chair position of this working group and hopefully will revitalize the working group efforts in 2019.

Siting: General and Monitoring Subcommittee

Membership:
Leah Parks, Chair, U.S. Nuclear Regulatory Commission
Thomas Bellinger, Consolidated Nuclear Security, LLC
Andrew Garrabrants, Vanderbilt University
Timothy Jannik, Savannah River National Laboratory
David Kosson, Vanderbilt University
Daniel Mussatti, U.S. Nuclear Regulatory Commission

Management of ANSI/ANS-3.11-2015, "Determining Meteorological Information at Nuclear Facility Sites," was reassigned to the Siting: Atmospheric Subcommittee from the Siting: General & Monitoring Subcommittee at the ESCC's 11/14/18 meeting.

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

ANSI/ANS-2.6-2018, "Guidelines for Estimating Present and Projecting Future Population Distributions Surrounding Nuclear Facility Sites"

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:
Daniel Mussatti, Chair, U.S. Nuclear Regulatory Commission; Leah Parks, Vice Chair, U.S. Nuclear Regulatory Commission; David Anderson, Pacific Northwest National Laboratory; Linda Andrews, Framatome; 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, Oak Ridge National Laboratory; Harold Stiles, Duke Energy; Seshagiri Tammara, U.S. Nuclear Regulatory Commission; Rachel Turney-Work, Enercon Services, Inc.; Kevin Weinisch, KLD Engineering, P.C.

Status: The standard was approved on 3/16/2018.

ANS-2.22, "Environmental Radiological Monitoring at Nuclear Facilities" (proposed new standard)

Scope: *This standard establishes criteria for use in developing and implementing an integrated radiological environmental monitoring program focusing on ambient air, surface water, and biota. It also provides criteria on the use of resultant environmental data collected near nuclear facilities to evaluate the impact of facility operations on the surrounding population and environment.*

Membership:
Timothy Jannik, Chair, Savannah River National Laboratory; Janet Aremu-Cole, Duke Energy; James Bland, Chesapeake Nuclear Services, Inc.; Teresa Eddy, Savannah River Nuclear Solutions; Derek Favret, U.S. Department of Energy; Zachary Harvey, Lawrence Berkeley National Laboratory; Jerry Hiatt, Nuclear Energy Institute; Frank Hickey, Talen Energy/Susquehanna Nuclear, LLC; Gary Huff, Excel Energy; James Key, Key Solutions, Inc.; Robert Litman, Radiochemestry Laboratory Basics; Erik Merchant, American Electric Power; Tanya Oxenberg, TPO Technical Services, LLC; Zach Ryals, Southern Company; Kevin Witt, U.S. Department of Energy

Status: Timothy Jannik accepted the working group chair position. The working group has been formed and a kick off meeting was held December 14, 2017. The PINS was submitted to ANSI on 4/24/2018.

ANSI/ANS-16.1-2003 (R2017), "Measurement of the Leachability of Solidified Low-Level Radioactive Wastes by a Short-Term Test Procedure" (revision of ANSI/ANS-16.1-1986)

Scope: *This standard provides a uniform procedure to measure and index the release of radionuclides from waste forms as a result of leaching in demineralized water for 5 days. The results of this procedure do not apply to any specific environmental situation except through correlative studies of actual disposal site conditions. The test presented in this standard has much in common with the original International Atomic Energy Agency proposal and has by now become familiar to those working in the radioactive waste-form development field. It contains the provisions published in the original version of this standard in 1986.*

Membership:
David Kosson, Co-chair, Vanderbilt University; Andrew Garrabrants, Co-chair, Vanderbilt University; Leah Parks, Vice Chair, U.S. Nuclear Regulatory Commission; George Alexander, U.S. Nuclear Regulatory Commission; Kevin Brown, Vanderbilt University; William Ebert, Argonne National Laboratory; Mark Fuhrmann, U.S. Nuclear Regulatory Commission; Andrew Garrabrants, Vanderbilt University; Albert Kruger, U.S. Department of Energy; Hans van der Sloot, Individual (formerly with the Energy Research Centre of the Netherlands)

Status: Reaffirmation was approved by ANSI on 1/12/2017. A PINS was submitted on 6/25/2018. The working group has completed a draft proposed revision and is working through the proposed changes during biweekly teleconferences. The draft issued to the ESCC for ballot did not pass due to too many abstain votes. A new member with leachability expertise has been appointed to the ESCC, and a new ballot will be issued.

ANSI/ANS-41.5-2012 (R2018), "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:
Leah Parks, Chair; James E. Chambers, Fluor; Pamela Greenlaw, U.S. Department of Energy; John Griggs, Environmental Protection Agency; Chung King Liu, Department of Energy; David E. McCurdy, Individual; Dennis Poyer, U.S. Army CHPPM; Ann Rosecrance, Core Laboratories

Status: This standard was reaffirmed by ANSI on 10/19/2018. This standard was formerly under the SRACC, Math & Computations Subcommittee.

Siting: Hydrogeologic Subcommittee

Membership:
Yan Gao, Chair, Individual
Kit Ng, Bechtel Power Corporation
Todd Rasmussen, University of Georgia
Lisa Schleicher, Defense Nuclear Facilities Safety Board
Michael Truex, Pacific Northwest National Laboratory

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

ANS-2.8, "Probabilistic Evaluation of External Flood Hazards for Nuclear Facilities" (historical revision of ANSI/ANS-2.8-1992 – proposed new standard)

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

Membership:
Yan Gao, Chair, Individual; Victoria Anderson, Nuclear Energy Institute; James August, Southern Company; Kevin Bryson, Consultant; Lawrence Cieslik, HDR Company; Christopher Cook, U.S. Nuclear Regulatory Commission; Jemie Dababneh, RIZZO International, Inc.; David Finnicum, Consultant; Quazi Hossain, Lawrence Livermore National Laboratory; R. Joe Hunt, Consolidated Nuclear Security, LLC; Kevin Hyde, Individual; Sharon Jasim-Hanif, Department of Energy; Joseph Kanney, U.S. Nuclear Regulatory Commission; Greg Lowe, Consultant; Carl

Mazzola, Project Enhancement Corporation; Marty McCann, Jack Benjamin & Associates, Inc.; Kit Ng, Bechtel Power Corporation; Robert Rishel, Duke Energy; Raymond Schneider, Westinghouse Electric Company, LLC; Jery Stedinger, Cornell University

Status: A decision was made to incorporate proposed new standard ANS-2.31, "Standard for Estimating Extreme Precipitation at Nuclear Facility Sites," into ANS-2.8. A draft was provided to ESCC, NUMUG (Nuclear Utilities Meteorological Data Users Group), and various industry members for preliminary review. Working group members are in the process of reviewing and discussing responses and making necessary changes to the draft. A revised draft is expected to be submitted for formal ESCC review in 2019 with a proposed new title of "Probabilistic Evaluation of External Flood Hazards for Nuclear Facilities."

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

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; Larry Armstrong, S&ME, Inc.; Matt Barvenik, GZA GeoEnvironmental, Inc.; Kevin Bryson, Individual; Dib Goswami, Washington State Department of Ecology; Dua Guvanasen, HydroGeoLogic, Inc.; Tim Hunsucker, Duke Energy; Philip Meyer, Pacific Northwest National Laboratory; Fred Molz, III, Clemson University; Thomas J. Nicholson, U.S. Nuclear Regulatory Commission; Todd Rasmussen, University of Georgia; David Scott, Radiation Safety and Control Services; Stewart Taylor, Bechtel Corporation; Mike Young, University of Texas

Status: No activity in 2018. James Bollinger stepped down as working group chair and resigned as a member. Todd Rasmussen also stepped down as working group chair, but remains a member.

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

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

Status: Revision of historical standard being considered.

ANSI/ANS-2.17-2010 (R2016), "Evaluation of Subsurface Radionuclide Transport at Commercial Nuclear Power Plants" (historical revision of ANSI/ANS-2.17-1980; R1989 – new standard)

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; Matt Barvenik, GZA GeoEnvironmental, Inc.; Rick Beauheim, Sandia National Laboratories; James S. Bollinger, Savannah River National Laboratory; Mike Godfrey, Southern Nuclear; Dib Goswami, Washington State Department of Ecology; Dua Guvanasen, HydroGeoLogic, Inc.; Cynthia Martinec, Duke Energy; Philip D. Meyer, Pacific Northwest National Laboratory; Fred J. Molz, III, Clemson University; Thomas J. Nicholson, U.S. Nuclear Regulatory Commission; David Scott, Radiation Safety and Control Services; Edwin Weeks, U.S. Geological Survey; Dan Wells, Washington Savannah River Co.; Mike Young, Desert Research Institute

Status: This standard was reaffirmed on 3/10/16. James Bollinger stepped down as working group chair but remains a member of the group.

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ANS-2.18, "Standards for Evaluating Radionuclide Transport in Surface Water for Nuclear Power Sites" (proposed new standard)

Unapproved Scope: *This standard presents guidelines for the determination of the transport of radionuclides in surface water resulting from both postulate accidental and routine releases from nuclear power plants and other nuclear facilities.*

Membership:
Kit Ng, Chair, Bechtel Power Corporation; Charles Cohen (Associate Member), Individual; Angelos Findikakis, Bechtel National, Inc.;

Status: Kit Ng took over as working group chair 2/1/2016 and has begun the process of reforming the working group. A PINS will be prepared.

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

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: Resurrection of historical standard is being considered. No activity in 2018.

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

Scope: *Draft scope from unapproved PINS: This guidance would address how to determine whether or not to remediate subsurface residual radioactivity sources within defined hydrogeologic systems at nuclear facilities both for operational and decommissioning stages. This standard would build on ANS-2.17 and provide decision criteria for evaluating when, where and how to remediate subsurface contamination at nuclear facilities in accordance with risk and performance-based considerations. Specific guidance would be provided for identifying, selecting, implementing, and monitoring the efficacy of remediation methods.*

Membership:
Michael Truex, Chair, Pacific Northwest National Laboratory; Joseph Carlson, U.S. Department of Energy; Yan Gao, Individual; Jerry Hiatt, Nuclear Energy Institute; Jack McCarthy, Exelon Corporation; Thomas Nicholson, U.S. Nuclear Regulatory Commission

Status: Comments on a PINS issued to the Nuclear Facilities Standards Committee (predecessor consensus committee) remain unresolved. Michael Truex was appointed as working group chair. Additional members were added to the working group to reinvigorate the project.

Siting: Seismic Subcommittee

Membership:
Jim Xu, Chair, U.S. Nuclear Regulatory Commission
Brent Gutierrez, Vice Chair, U.S. Department of Energy
Douglas Clark, Consolidated Nuclear Security, LLC
Emily Gibson, Schnabel Engineering
Kathryn Hanson, KLHanson Consulting LLC
Robert Kassawara, Electric Power Research Institute
Stephen McDuffie, U.S. Department of Energy
Farhang Ostadan, Bechtel Corporation
Ivan Wong, Lettis Consultants International

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

ANSI/ANS-2.2-2016, "Earthquake Instrumentation Criteria for Nuclear Power Plants" (historical 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:
Farhang Ostadan, Chair, Bechtel Corp.; Vladimir Graizer, U.S. Nuclear Regulatory Commission; Roy Joe Hunt, Consolidated Nuclear Security, LLC; Roger Kenneally, Individual; Richard Lee, Los Alamos National Laboratory; Robert Nigbor, University of California-Los Angeles; Subir Sen, U.S. Department of Energy

Status: The standard was approved by ANSI on 7/14/2016.

ANSI/ANS-2.10-2017, "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:
Jim Xu, Chair, Chair, U.S. Nuclear Regulatory Commission; Robert Darragh, Pacific Northwest National Laboratory; Tarek Elkhoraibi, Bechtel National Inc.; Vladimir Grazier, U.S. Nuclear Regulatory Commission; Brent Gutierrez, U.S. Department of Energy; Alidad Hashemi, Bechtel National Inc.; Robert Kassawara, Electric Power Research Institute; Roger Kenneally, Individual; Robert Nigbor, University of California-Los Angeles; Lisa Schleicher, Defense Nuclear Facilities Safety Board

Status: Standard was approved by ANSI on 12/19/2017.

ANSI/ANS-2.23-2016, "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:
Robert Kassawara, Chair, Electric Power Research Institute; Divakar Bhargava, Dominion Energy; Greg Hardy, Simpson, Gumpertz and Heger, Inc.; Eric Hendrixson, Dominion Energy; James Johnson, James J. Johnson and Associates; Robert Kenneally, Individual; Robert Kennedy, RPK Structural Mechanics Consulting; William Schmidt, W. Schmidt Consulting

Status: The revised standard was approved by ANSI on 4/7/2016.

ANSI/ANS-2.26-2004 (R2017), "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, Chair, Consolidated Nuclear Security, LLC.; Chris Chaves, U.S. Department of Energy; Brent Gutierrez, U.S. Department of Energy; Asadour Hadjian, Defense Nuclear Facilities Safety Board; Roy Joe Hunt, Consolidated Nuclear Security, LLC; Jackson Rahsean, Defense Nuclear Facilities Safety Board; Lisa Schleicher, Defense Nuclear Facilities Safety Board

Status: The standard was reaffirmed on 9/12/2017. Revision of this standard is underway. A PINS is in development.

ANSI/ANS-2.27-2008 (R2016), "Criteria for Investigations of Nuclear Facility Sites for Seismic Hazard Assessments" (new standard)

Scope: *This standard provides requirements and recommended practices for conducting investigations and acquiring data sets needed to evaluate seismic source characterization for probabilistic seismic hazard analysis (PSHA), site response and soil structure interaction (SSI) effects, and liquefaction. These data also are used to evaluate fault rupture and associated secondary deformation, and other seismically-induced ground failure hazards (i.e., ground settlement, slope failure, and subsidence and collapse).*

Membership:
Kathryn Hanson, Chair, Individual; William Savage, Vice Chair, Individual; Jon Ake, U.S. Nuclear Regulatory Commission; M. Logan Cline, RIZZO International, Inc.; Carl J. Costantino, Carl J. Constantino & Associates; C.B. Crouse, AECOM Professional Solutions; Emily Gibson, Schnabel Engineering; Brent Gutierrez, U.S. Department of Energy; Richard Lee, Los Alamos National Laboratory; Yong Li, Defense Nuclear Facilities Safety Board; Clifford Munson, U.S. Nuclear Regulatory Commission; Robert Nigbor, Individual; Susan Olig, Olig Seismic Geology, Inc.; Ellen Rathje, University of Texas-Austin; ;Adrian Rodriguez-Marek, Virginia Tech; William (Woody) Savage, U.S. Geological Survey; Lisa Schleicher, Defense Nuclear Facilities Safety Board; Kenneth Stokoe, University of Texas; Stephen Thompson, Lettis Consultants International; Jim Xu, U.S. Nuclear Regulatory Commission

Status: A reaffirmation was approved by ANSI on 6/7/2016. Revision activities started in 2017. A PINS was submitted to ANSI on 9/28/2017. A Project Implementation Plan was submitted on 9/28/2017. An initial draft of the entire standard was submitted to the ANS-2.27 Working Group on December 10, 2018, for comments. The revision is being coordinated with the revision of ANSI/ANS-2.29-2008 (R2016) and input from members of the ANS-2.30 Working Group.

ANSI/ANS-2.29-2008 (R2016), "Probabilistic Seismic Hazard Analysis" (new standard)

Scope: *This standard provides criteria and guidance for performing a probabilistic seismic hazard analysis (PSHA) for the design and construction of nuclear facilities. 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 material laboratories; and nuclear reactors. Criteria provided in this standard address various aspects of conducting PSHAs, including 1) selection of the process, the methodology and the level of seismic hazard analysis appropriate for a given seismic design category (SDC) structure, system, or component (SSC) or facility and the geotechnical and seismological characteristics of the site; 2) seismic source characterization; 3) ground motion estimation; 4) site response assessment; 5) assessment of aleatory and epistemic uncertainties in a PSHA; and 6) PSHA documentation requirements.*

Membership:
Emily Gibson, Chair, Schnabel Engineering, LLC; Lisa Schleicher, Vice Chair, Defense Nuclear Facilities Safety Board; Jon Ake, U.S. Nuclear Regulatory Commission; Nilesh Chokshi, Individual; Kevin Coppersmith, Coppersmith Consulting Inc.; Carl Costantino, Individual; C.B. Crouse, AECOM- Professional Solutions; Russell Green, Virginia Tech; Nicholas Gregor, Individual; Brent Gutierrez, U.S. Department of Energy; Kathryn Hanson, Individual; Thomas Houston, Individual; Annie Kammerer, Individual; 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; Adrian Rodriguez Marek, Virginia Tech; Jean Savy, Individual; John Stamatakos, Southwest Research Institute; Gabriel Toro, Lettis Consultants International; Ivan Wong, Lettis Consultants International; Jim Xu, U.S. Nuclear Regulatory Commission

Status: A reaffirmation of this standard was approved 10/11/2016. A PINS was submitted to ANSI on 7/19/17 for a revision. The working group has made significant progress in updating ANS-2.29 in 2018. A full draft has been developed that is consistent with the update to ANS-2.27, ASCE 43, and NUREG-2213. The working group is currently addressing working group member comments. The update is expected to be completed in 2019 to start the internal committee approval process.

ANSI/ANS-2.30-2015, "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, URS Professional Solutions; Bill Bryant, California Geological Survey; Rui Chen, California Geological Survey; Keith Kelson, URS Professional Solutions; Jeffrey Kimball, Defense Nuclear Facility Safety Board; Susan Olig, URS Professional Solutions; David Schwartz, U.S. Geological Survey; Donald Wells, AMEC Environment & Infrastructure; Alice Stieve, U.S. Nuclear Regulatory Commission

Status: The standard was approved by ANSI on 5/28/2015.

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:
Stephen McDuffie, Chair, U.S. Department of Energy; Michael Cline, RIZZO International, Inc.; Charles Connor, University of South Florida; Kevin Coppersmith, Coppersmith Consulting Inc.; Mihai Diaconeasa (Associate Member), University of California-Los Angeles; William Hackett; Individual; Brittain Hill, U.S. Nuclear Regulatory

Commission; Larry Mastin, U.S. Geological Survey; Suzette Payne, Idaho National Laboratory; Lisa Schleicher, Defense Nuclear Facilities Safety Board

Status: The PINS was approved ANSI on 9/28/17. The team held an introductory conference call in mid-2018. The project implementation plan and the outline for the new standard began development in late 2018 and will be provided to the working group in early 2019.

Siting: Terrestrial Ecology Subcommittee

Membership:
Peyton Doub, Chair, U.S. Nuclear Regulatory Commission

The ESCC voted to disband the Siting: Terrestrial Ecology Subcommittee. ANS-2.25 has been moved to the Environmental Impact Assessment & Analysis Subcommittee.

Environmental and Siting Consensus Committee (ESCC) Organizational Chart

Chair: Carl A. Mazzola **Vice Chair: Jennifer Call**

Siting: Atmosphere	*Siting: Hydrogeologic*	*Siting: Seismic*	*Siting: General and Monitoring*	Environmental Impact Assessment & Analysis
Jennifer Call (Chair)	**Yan Gao (Chair)**	**Jim Xu (Chair)**	**Leah Parks (Chair)**	**Kevin Bryson (Chair)**
OPEN (Vice Chair)	**OPEN (Vice Chair)**	**Brent Gutierrez (Vice Chair)**	**OPEN (Vice Chair)**	**OPEN (Vice Chair)**
3 Current Standards	1 Current Standard	7 Current Standards	3 Current Standards	0 Current Standards
4 Proposed/Active Projects	6 Proposed/Active Projects	1 Proposed/Active Projects	1 Proposed/Active Projects	3 Proposed/Active Projects
Ⓟ = PINS submitted to ANSI				
2.3-2011 (R2016) Estimating Tornado, Hurricane, and Extreme Straight Line Wind Characteristics at Nuclear Facility Sites RF 6/29/2016 (WGC: B. Harvey)	2.8 (W2002) Ⓟ Probabilistic Evaluation of External Flood Hazards for Nuclear Facilities (will incorporate proposed standard ANS-2.31, Estimating Extreme Precipitation at Nuclear Facility Sites) (WGC: Y. Gao)	2.2-2016 Earthquake Instrumentation Criteria for Nuclear Power Plants App'd 7/14/2016 (WGC: F. Ostadan)	2.6-2018 Guidelines for Estimating Present & Projecting Future Population Distributions Surrounding Nuclear Facility Sites (WGC: D. Mussatti) (App'd 3/16/2018)	2.25 (W1999) Ⓟ Surveys of Terrestrial Ecology Needed to License Thermal Power Plants (WGC: P. Doub)
2.15-2013 (R2017) Criteria for Modeling and Calculating Atmospheric Dispersion of Routine Radiological Releases from Nuclear Facilities App'd 12/21/2017 (WGC: J. Ciolek)	2.9 (W2000) Ⓟ Evaluation of Ground Water Supply for Nuclear Facilities (WGC: Open)	2.10-2017 Criteria for the Retrieval, Processing, Handling and Storage of Records from Nuclear Facility Seismic Instrumentation App'd 12/19/2017 (WGC: J. Xu)	2.22 (NEW) Ⓟ Environmental Radiological Monitoring at Nuclear Facilities (project being considered) (WGC: T. Jannik)	2.33 (NEW) (previously designated 18.4) Aquatic Ecological Surveys Required for Siting, Design, and Operation of Nuclear Power Plants (WGC: Open)
2.16-(NEW) Ⓟ Criteria for Modeling Design-Basis Accidental Releases From Nuclear Facilities (WGC: K. Quinlan)	2.13 (W1998) Evaluation of Surface-Water Supplies for Nuclear Power Sites (project being considered) (WGC: Open)	2.23-2016 Nuclear Plant Response to an Earthquake App'd 4/7/2016 (WGC: R. Kassawara)	16.1-2003 (R2017) Measurement of the Leachability of Solidified Low-Level Radioactive Wastes by a Short-Term Test Procedure RF 1/12/2017 (WGC: D. Kosson / A. Garrabrants)	2.35 (NEW) Estimating the Socioeconomic Impacts of Construction, Operation, and Decommissioning at a Nuclear Facility (WGC: D. Mussatti)
2.21-2012 (R2016) Criteria for Assessing Atmospheric Effects on the Ultimate Heat Sink RF 4/18/2016 (WGC: S. Vigent)	2.17-2010 (R2016) Evaluation of Subsurface Radionuclide Transport at Commercial Nuclear Power Plants RF 3/10/2016 (WGC: T. Rasmussen)	2.26-2004 (R2017) Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design RF 9/12/2017 (WGC: D. Clark)	41.5-2012 (R2018) V&V of Radiological Data for Use in Waste Management and Environment RF 10/19/2018 (WGC: L. Parks)	
3.8.10 (NEW) Ⓟ Criteria for Modeling Real-Time Accidental Release Consequences at Nuclear Facilities (WGC: Open)	2.18 (NEW) Standards for Evaluating Radionuclide Transport in Surface Water for Nuclear Power Sites (project being considered) (WGC: K. Ng)	2.27-2008 (R2016) Ⓟ Criteria for Investigations of Nuclear Facility Sites for Seismic Hazard Assessments RF 6/15/2016 (WGC: K. Hanson)		
3.11-2015 Determining Meteorological Information at Nuclear Facility Sites App'd 8/20/2015 (WGC: T. Bellinger / D. Bruggeman)	2.19 (W2001) Guidelines for Establishing Site-related Parameters for Site Selection and Design of ISFSIs (Water Pool Type) (project being considered) (WGC: Open)	2.29-2008 (R2016) Ⓟ Probabilistic Seismic Hazard Analysis RF 10/11/2016 (WGC: E. Gibson)		
3.16 (NEW) Meteorological Aspects of Wildland Fire Response (WGC: R. Linn)	2.32 (NEW) Guidance on the Selection and Evaluation of Remediation Methods for Subsurface Contamination (WGC: M. Truex)	2.30-2015 Criteria for Assessing Tectonic Surface Fault Rupture and Deformation at Nuclear Facilities App'd 5/26/2015 (WGC: I. Wong)		
		2.34 (NEW) Ⓟ Characterization and Probabilistic Analysis of Volcanic Hazards (WGC: S. McDuffie)		

Table 1 – ESCC Organizational Chart

Fuel, Waste, and Decommissioning Consensus Committee (FWDCC)

David Hillyer, Chair
Energy Solution

Scope: *The FWDCC is responsible for the preparation and maintenance of voluntary consensus standards for the design, operation, maintenance, operator selection and training, quality requirements of new and used fuel transport, storage and related handling facilities; including high level/TRU, 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:
David Hillyer, Chair, Energy Solutions
Jean Francois Lucchini, Vice Chair, Los Alamo National Laboratory
Sven O. Bader, Orano Federal Services, LLC
Jeffery R. Brault, Individual
Harry D. Felsher, U.S. Nuclear Regulatory Commission
Jodine Jansen Vehec, Individual
Wayne Lewis, WECTEC
Coleman C. Miller, Pacific Gas & Electric Company
Mitchell Sanders, Westinghouse Electric Company, LLC
Steven W. Schithelm, BWXT, Inc.
Maryanne Stasko, Duke Energy

Obserber:
Anoop Kota, Individual

Report of FWDCC:
The FWDCC held physical meetings at the 2018 ANS Annual Meeting in Philadelphia, PA, and at the ANS Winter Meeting in Orlando, FL.

Approved in 2018:

ANSI/ANS-57.3-2018, "Design Requirements for New Fuel Storage Facilities at Light Water Reactor Plants"

Active Standards/Projects (Approved PINS):

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

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

New and Used Fuel (Design Only) Subcommittee

Membership:
Mitchell Sanders, Chair, Westinghouse Electric Company, LLC
Richard Browder, Duke Energy
Rosemary Montgomery, Oak Ridge National Laboratory
John Scaglione, Oak Ridge National Laboratory

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

ANSI/ANS-57.1-1992 (R2015), "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:
Mitchell Sanders, Chair, Westinghouse Electric Company, LLC; Douglas Eisterhold, Westinghouse Electric Company, LLC; Wayne Lewis, WECTEC, Thomas Smedra, Westinghouse Electric Company, LLC;Steven Stamm, Individual

Status: Reaffirmation was approved by ANSI on 6/16/2015. Working group formation in progress.

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

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:
Richard Browder, Chair, Duke Energy; Wayne Lewis, Vice Chair, WECTEC; Michael Akins, Worley Parsons (semi-retired); Gordon Bjorkman, Nuclear Regulatory Commission; Matthew Eyre, NETCO; Brian Gutherman, Gutherman Technical Services; Nathan Hottle, Framatome; Christian Lobscheid, NuScale Power; Mark Peres, Fluor Nuclear Power; Mitchell Sanders, Westinghouse Electric Company, LLC; Justin Schulte, Energy Solutions; Manit Shah (Associate Member), Texas A&M University; Maryanne Stasko, Duke Energy; Gregory Suehr, University of Pittsburgh; Robert Tucker, Bechtel

Status: Because of their closely related scope, both the ANS-57.2 and ANS-57.3 standards are being developed jointly. ANS-57.3 was approved in 2018. Revision of ANS-57.2 is in progress.

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

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:
Richard Browder, Chair, Duke Energy; Brian Gutherman, Vice Chair, Gutherman Technical Services; Timothy Ake, FramatomeMichael Akins, Worley Parsons (semi-retired); Wayne Lewis, WECTEC; Christian Lobscheid,Advent Engineering Services, Inc.; John Massey, California Maritime Academy (retired); Mark Peres Fluor Enterprises, Inc.; Mitchell Sanders, Westinghouse Electric Company, LLC; Maryanne Stasko, Duke Energy; Robert Tucker, Bechtel

Status: This standard was approved by ANSI on 2/27/2018.

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

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

Status: This standard was administratively withdrawn by ANSI on 2/27/16 for lack of maintenance. The working group was reestablished in August 2017. Recruitment of working group members is ongoing.

ANS-57.7, "Design Criteria for an Independent Spent Fuel Storage Installation (Water Pool Type) (historical revision of ANSI/ANS-57.7-1998 (W2007) in consideration)

Membership:
OPEN

Status: No activity in 2018. Revision of historical standard being considered.

ANSI/ANS-57.8-1995 (R2017), "Fuel Assembly Identification" (revision of ANSI/ANS-57.8-1978; R1987)

Scope: *This standard describes requirements for the unique identification of fuel assemblies utilized in nuclear power plants. It defines the characters and proposed sequence to be used in assigning identification to fuel assemblies. This standard was developed primarily for commercial light-water reactor fuel, but may be used for any reactor fuel contained in discrete fuel assemblies that can be identified with a serial number as specified by this standard. Additionally, this standard describes requirements for a matrix system for identification in mapping the location of fuel rods within a fuel assembly. The matrix system establishes unique x-y coordinates for each possible rod location.*

Membership:
John Scaglione, Chair, Oak Ridge National Laboratory; Caroline Duncan, Westinghouse Electric Company, LLC; Josh Jarrell, Idaho National Laboratory; Steven Maheras, Pacific Northwest National Laboratory; Robert Sachs, Individual; Umer Shahid (Associate Member), University of Ontario Institute of Technology

Status: Reaffirmed by ANSI on 2/23/17. The working group was formed, and a PINS was prepared. PINS expected to be submitted to ANSI in early 2019.

ANS-57.9, "Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)" (proposed new standard, supersedes ANSI/ANS-57.9-1992 (W2010))

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:
Mitchel Sanders, Chair, Westinghouse Electric Company, LLC; Kaushik Banerjee, Oak Ridge National Laboratory; Justin Clarity, Oak Ridge National Laboratory; William Murphy, Duke Energy

Status: Working group formation in process.

ANSI/ANS-57.10-1996 (R2016), "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:
OPEN

Status: Reaffirmed by ANSI on 7/7/2016.

High Level, GTCC, Low Level and Mixed Waste Subcommittee

Membership:
OPEN, Chair
D. Mark Gerboth, AEM Consulting, LLC
Coleman Miller, Pacific Gas & Electric Company
Scott Poole, Atkins, Division of SNC Lavalin

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 being 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: No activity in 2018. Historical standard to be considered for reinvigoration.

ANS-40.21, "Siting, Construction, and Operation of Commercial Low Level Radioactive Waste Burial Grounds" (inactive project being considered for resurrection)

Scope unapproved draft PINS: *This standard provides a matrix of minimum criteria to be met in determining the siting, construction and operation of a commercial low level radioactive waste burial ground. The standard will balance siting*

(i.e., natural criteria), construction (i.e., engineered safeguards) and operation (i.e., acceptance criteria) to provide a safety matrix that provides for the containment of the facility.

Membership:
OPEN

Status: No activity in 2018. Inactive project to be considered for reinvigoration.

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

***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:
D. Mark Gerboth, Chair, AEM Consulting, LLC; Mike Akins, Parsons E&C

Status: No activity reported in 2018.

ANSI/ANS-40.37-2009 (R2016) "Mobile Low-Level Radioactive Waste Processing Systems" (historical revision of ANSI/ANS-40.37-1993–new standard)

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.; David Vaught, Duke Energy

Status: This standard was reaffirmed by ANSI on 6/30/2016.

ANSI/ANS-55.1-1992 (R2009) (R2017), "Solid Radioactive Waste Processing System for Light Water Cooled Reactor Plants" (revision of ANSI/ANS-55.1-1979)

***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:
Scott Poole, Chair, Atkins, Division of SNC Lavalin; Craig Schmiesing, Framatome

Status: Reaffirmation was approved by ANSI on 8/24/2017. Scott Poole was appointed chair of ANS-55.1, ANS-55.4, and ANS-55.6 just before the end of the year.

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

***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:
Scott Poole, Chair, Atkins, Division of SNC Lavalin; Craig Schmiesing, Framatome

Status: This standard was administratively withdrawn on 5/14/2017 for lack of maintenance. Scott Poole was appointed chair of ANS-55.1, ANS-55.4, and ANS-55.6 just before the end of the year.

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

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:
Scott Poole, Chair, Atkins, Division of SNC Lavalin; Craig Schmiesing, Framatome

Status: This standard was administratively withdrawn on 5/13/2017 for lack of maintenance. Scott Poole was appointed chair of ANS-55.1, ANS-55.4, and ANS-55.6 just before the end of the year.

Decommissioning (Commercial and Research Facilities) Subcommittee

Membership:
OPEN, Chair

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

ANS-15.10, "Decommissioning of Research Reactors" (proposed reinvigoration 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.*

Status: No activity in 2018. Reinvigoration of historical standard being considered.

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

Chair: David Hillyer Vice Chair: Jean Francois Lucchini

New and Used Fuel (Design Only)	*High Level, GTCC, Low Level, and Mixed Waste*	*Decommissioning (Commercial and Research Facilities)*
Mitchell Sanders, Chair **Vice-Chair (TBD)**	**Chair (TBD)** **Vice-Chair (TBD)**	**Chair (TBD)** **Vice-Chair (TBD)**
4 Current Standards	**2 Current Standards**	**0 Current Standards**
4 Proposed/Active Projects	**5 Proposed/Active Projects**	**1 Proposed/Active Project**
Ⓟ = PINS submitted to ANSI		
ANS-57.1-1992 (R2015) Design Requirements for Light Water Reactor Fuel Handling Systems RF 6/16/2015 (WGC: Open)	ANS-15.19 (W2001) Shipment and Receipt of Special Nuclear Material (SNM) by Research Reactor (reinvigoration being considered) (WGC: Open)	ANS-15.10 (W2004) Decommissioning of Research Reactors (reinvigoration being considered) (WGC: Open)
ANS-57.2 (W1993) Ⓟ Design Requirements for Light Water Reactor Spent Fuel Facilities at Nuclear Power Plants (WGC: R. Browder)	ANS-40.21 Siting, Construction, and Operation of Commercial Low Level Radioactive Waste Burial Grounds (inactive project in consideration for resurrection) (WGC: Open)	
ANS-57.3-2018 Design Requirements for New Fuel Storage Facilities at LWR Plants App'd 2/27/2018 (WGC: R. Browder)	ANS-40.35 (W2001) Volume Reduction of Low-Level Radioactive Waste or Mixed Waste (WGC: M. Gerboth)	
ANS-57.5 (W2016) Light Water Reactors Fuel Assembly Mechanical Design and Evaluation (WGC: R. Montgomery)	ANS-40.37-2009 (R2016) Mobile Low-Level Radioactive Waste Processing Systems RF 6/30/2016 (WGC: C. Miller)	
ANS-57.7 (W2007) Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type) (WGC: Open)	ANS-55.1-1992 (R2017) Solid Radioactive Waste Processing System for Light-Water-Cooled Reactor Plants RF 8/24/2017 (WGC: S. Poole)	
ANS-57.8-1995 (R2017) Ⓟ Fuel Assembly Identification RF 2/23/2017 (WGC: J. Scaglione)	ANS-55.4 (W2017) Gaseous Radioactive Waste Processing Systems for Light Water Reactor Plants (WGC: S. Poole)	
ANS-57.9 (W2010) Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type) (WGC: M. Sanders)	ANS-55.6 (W2017) Liquid Radioactive Waste Processing System for Light Water Reactor Plants (WGC: S. Poole)	
ANS-57.10-1996 (R2016) Design Criteria for Consolidation of LWR Spent Fuel RF 7/7/2016		

Table 2 – FWDCC Organizational Chart

Large Light Water Reactor Consensus Committee (LLWRCC)

C.E. (Gene) Carpenter, Chair
U.S. Department of Energy

Scope: *The LLWRCC is responsible for the preparation and maintenance of voluntary consensus standards for 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:

- *Large Light Water Reactor and Reactor Auxiliary Systems Design*
- *Power Generation and Plant Support*
- *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:

C.E. (Gene) Carpenter, Chair, U.S. Department of Energy
William Reuland, Vice Chair, Individual
Robert Becse, Westinghouse Electric Company, LLC
Robert Burg, Engineering Planning & Management, Inc.
Lowell T. Christensen, Bechtel Corporation
Mark Colby, Global Nuclear Fuel
James B. Florence, Nebraska Public Power District
Michelle French, WECTEC
Darrell Gardner, Kairos Power
Steven W. Gebers, Quantum Nuclear Services
James P. Glover, Graftel, Inc.
Pranab K. Guha, U.S. Department of Energy
Earnestine Johnson-Turnipseed, Entergy Corporation
Mark A. Linn, Oak Ridge National Laboratory
Evan M. Lloyd, Exitech Corporation
Ronald Markovich, Contingency Management Consultant
Timothy K. Meneely, Westinghouse Electric Company, LLC
Charles H. Moseley, Jr., ASME NQA Liaison (Individual)
Steve Routh, Bechtel Power Corporation
Steven L. Stamm, Individual

Observers:
J. Mike Bonfiglio, Framatome
R. Michael Ruby, Individual
James C. Saldarini, Advanced Reactor Concepts, LLC

Report of LLWRCC:
The LLWRCC held a physical meeting during the 2018 ANS Winter Meeting in Orlando, on November 14. Additionally, the LLWRCC held three teleconferences (January, April and August) in 2018. Michelle French accepted the chair position for the Light Water Reactor & Reactor Auxiliary Systems Design Subcommittee. Robert

Becse was appointed to the LLWRCC as a full member to represent Westinghouse (existing plants). Lastly, Charles Brown retired from the LLWRCC and all standards activities.

Approved in 2018:

ANSI/ANS-3.4-2013 (R2018), "Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants" (reaffirmation of ANSI/ANS-3.4-2013)

ANSI/ANS-51.10-1991 (R2018), "Auxiliary Feedwater System for Pressurized Water Reactors" (reaffirmation of ANSI/ANS-51.10-1991 (R2008))

ANSI/ANS-58.3-1992 (R2018), "Physical Protection for Nuclear Safety-Related Systems and Components" (reaffirmation of ANSI/ANS-58.3-1992 (R2008))

Active Standards/Projects (Approved PINS):

ANS-3.5, "Nuclear Power Plant Simulators for Use in Operator Training and Examination" (revision of ANSI/ANS-3.5-2009)

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

ANS-3.15, "Cybersecurity for Nuclear Systems" – Title TBD (proposed new standard)

ANS-30.3, "Advanced Light-Water Reactor Risk-Informed Performance-Based Design Criteria and Methods" (proposed new standard)

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

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

ANS-56.8, "Containment System Leakage Testing Requirements" (revision of ANSI/ANS-56.8-2002; R2011; R2016)

ANS-58.8, "Time Response Design Criteria for Safety-Related Operator Actions" (revision of ANSI/ANS-58.8-1994; R2001; R2008; R2017)

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

Light Water Reactor and Reactor Auxiliary Systems Design Subcommittee

Membership:
OPEN, Chair
Michelle French, Chair, WECTEC
Kenneth Geelhood, Pacific Northwest National Laboratory
Earnestine Johnson-Turnipseed, Entergy Corporation
Mark Linn, Oak Ridge National Laboratory
Kent B. Welter, Nuscale Power, Inc.

The Light Water Reactor and Reactor Auxiliary Systems Design Subcommittee manages the following projects and current standards:

ANSI/ANS-18.1-2016, "Radioactive Source Term for Normal Operation of Light Water Reactors" (historical revision of ANSI/ANS-18.1-1999 – new standard)

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. Nuclear Regulatory Commission; Elijah Dickson, U.S. Nuclear Regulatory Commission; Cindy Fung Poon, GE Hitachi Nuclear Energy; Dennis Hussey, Electric Power Research Institute; Germina Ilas, Oak Ridge National Laboratory; Matthew O'Connor, Electric Power Research Institute; Mark Shaver, NuScale Power Inc.; Pavel V. Tsvetkov, Texas A&M University

Status: The standard was approved by ANSI on 11/1/2016.

ANS-30.3, "Advanced Light-Water Reactor Risk-Informed Performance-Based Design Criteria and Methods" (proposed new standard)

Scope: *This standard establishes requirements for using risk-informed, performance-based (RIPB) methods for advanced light water reactor (LWR) designs. RIPB methods are provided to ensure nuclear safety design practices are consistently applied to all new advanced LWR reactor technologies, specifically; high level safety criteria selection, nuclear safety functions and margin, licensing-basis-event selection and acceptance criteria, equipment classification and categorization, defense-in-depth adequacy, and evaluating conformance with regulatory positions. The application of this standard to existing reactors is beyond the scope of this standard.*

Membership:
Kent B. Welter (Chair), NuScale Power, LLC; David Blanchard, Applied Reliability Engineering, Inc.; Milton Capiotis, Worley Parsons Resources and Energy; Don Dube, Jensen Hughes; Ernest Elliott, N3B – Los Alamos; Dave Leaver, Individual; Paul Sicard, Entergy; Donald Spellman, Individual; Ernie Tep, Los Alamos National Laboratory; Patrick White, Massachusetts Institute of Technology; Cindy Williams, NuScale Power; Alex Young, Tennessee Valley Authority

Status: The PINS was submitted to ANSI 1/10/2018. All sections of the standard have been drafted and are under internal working group review. The draft standard is expected to be available for broader review by May 2019.

ANSI/ANS-51.10-1991 (R2018), "Auxiliary Feedwater System for Pressurized Water Reactors" (revision of ANSI/ANS-51.10-1979)

Scope: *This standard is applicable to pressurized light water reactor nuclear power plants using auxiliary feedwater for emergency applications. Small modular plants are not considered in the scope of this document.*

This standard sets forth the nuclear safety-related functional requirements, performance requirements, design criteria, design requirements for testing and maintenance, and interfaces for the nuclear safety-related portion of the auxiliary feedwater system (AFS) of pressurized water reactor (PWR) plants.

Membership:
Earnestine Johnson-Turnipseed, Chair, Entergy Corporation; Ralph Hill, Individual

Status: The standard was last reaffirmed on 8/13/2018. The draft was issued to LLWRCC for ballot in early 2016. Comment resolution is nearing completion.

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

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: No activity in 2018.

ANSI/ANS-58.9-2002; (R2015), "Single Failure Criteria for Light Water Reactor Safety-Related Fluid Systems" (re-approval of ANSI/ANS-58.9-1981; R1987 -- new standard)

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, Engineering Planning and Management, Inc.; Tim Dodson, Engineering Planning & Management, Inc.; Matthew Hertel (Associate Member), Individual; Ethan Hunt, Nuclear Energy Consultants, Inc.; Earnestine Johnson-Turnipseed, Entergy; Prasad Kadambi, Individual; Cherie Paugh, Westinghouse Electric Company, LLC; Timothy Stout (Associate Member), Exelon

Status: The standard was reaffirmed by ANSI on 2/12/15. 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 new standard receiving the designation of ANSI/ANS-58.9-2002. Robert Andre resigned as working group chair. The standard will be considered by the working group for revision with risk-informed insights once a new chair is found.

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

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

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.

ANSI/ANS-58.14-2011 (R2017), "Safety and Pressure Integrity Classification Criteria for Light Water Reactors" (historical revision of ANSI/ANS-58.14-1993 – new standard)

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, Oak Ridge National Laboratory; David Blanchard, Applied Reliability Engineering; Rick Hill, Individual; Gary Locklear, Individual; Paul Sicard, Entergy; Russell Williston, Xcel Energy

Status: The standard was reaffirmed by ANSI on 1/12/2017.

Power Generation and Plant Support Systems Subcommittee

Membership:
OPEN, Chair
Robert Burg, Vice Chair, Engineering Planning & Management, Inc.
Mark Dooley, Individual
James Glover, Graftel, Inc.
Margaret Harding, 4 Factor Consulting, LLC
Earnestine Johnson-Turnipseed, Entergy
Donald Spellman, Individual
Dong Zheng, Bechtel Power Corporation

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

ANS-56.1, "Containment Hydrogen Control" (Title TBD) (proposed new standard)

Scope: *In development.*

Membership:
James Glover, Chair, Graftel LLC; Sam Gyepi-Garbrah, Canadian Nuclear Safety Commission; Edward Rodriguez, Global Nuclear Network Analysis LLC.; Siddharth Suman (Associate Member), Indian Institute of Technology Panta; Andrew Smirnov (Associate Member), Bechtel

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)

Scope from historic standard: *This standard specifies minimum design, actuation, testing, and maintenance requirements for the containment isolation of fluid systems after a 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 isolation requirements for events other than LOCAs.*

Membership:
Earnestine Johnson-Turnipseed, Chair, Entergy; James Bradford, Southern Company; Joseph Halackna, Westinghouse Electric Company, LLC; Robert McGowan, True North Consulting, LLC; Glenda Patzch-Velasquez, DTE Energy

Status: Earnestine Johnson-Turnipseed formed working group to revise standard. A PINS has been prepared and is in the approval process.

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

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, Bechtel Power Corporation; Butch Bornt, Southern Company; Joseph Halackna, Westinghouse Electric Company, LLC; Julie Jarvis, Bechtel Corporation; Manoj Karki, Duke Energy; Wai Law, Tennessee Valley Authority; Anthony Trupiano, Westinghouse Electric Company, LLC

Status: Dong Zheng accepted the working group chair position in 2017. The working group held a teleconference on 8/3/2018. A draft response to an inquiry was submitted for ballot in December 2018.

ANSI/ANS-58.3-1992 (R2008) (R2018), "Physical Protection for Nuclear Safety-Related Systems and Components" (revision of ANSI/ANS-58.3-1977)

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:
Donald Spellman, Chair, Individual; Robert Burg, Engineering, Planning & Management, Inc.; Anthony Trupiano, Westinghouse Electric Company, LLC

Status: The standard was reaffirmed on 1/11/2018. Further LLWRCC discussions led to questioning whether the standard should be withdrawn, and a white paper was prepared to help determine the appropriate action. Based on the white paper, the consensus of the LLWRCC was to start the formal withdrawal process. The standard is expected to be withdrawn in early 2019.

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

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:
Robert Burg, Chair, Engineering Planning & Management, Inc.; Todd Anselmi, Enercon Services, Inc.; James August, Southern Company; Chad Boyer, WECTEC; Raul Hernandez, U.S. Nuclear Regulatory Commission; Matthew Hertel (Associate Member), Individual; Edward Knuckles, Individual; William Reuland, Individual

Status: The PINS was approved by the consensus committee and the Standards Board. The PINS will be submitted to ANSI in early 2019.

ANSI/ANS-59.51-1997 (R2015) "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:
Mark Dooley, Chair, Individual

Status: Reaffirmation received ANSI approval 6/19/15. New chair assigned in 2017. No activity reported in 2018.

ANSI/ANS-59.52-1998 (R2015) "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:
Mark Dooley, Chair, Individual

Status: Reaffirmation received ANSI approval 6/16/15. New chair assigned in 2017. No activity reported in 2018.

ANS-60.1, "Export Control Standard" (Title TBD) (proposed new standard)

Scope: *In development.*

Membership:
Margaret Harding, Chair, 4 Factor Consulting, LLC

Status: Margaret Harding accepted the working group chair position in 2016 and is forming the working group. A draft PINS was prepared and is under review by the working group. No activity reported in 2018.

Simulators, Instrumentation, Control Systems, Software and Testing Subcommittee

Membership:
Pranab Guha, Chair, U.S. Department of Energy
Lowell Christensen, Vice Chair, Bechtel Corporation
James August, Southern Company
Sacit M. Cetiner, Oak Ridge National Laboratory
James Florence, Nebraska Public Power District
James Glover, Graftel, Inc.
Huafei (Harry) Liao, Sandia National Laboratories
Evan Lloyd, Exitech Corporation
Julie Sickle, Exelon Corporation
Kashmir Singh, EDF Energy
Marion Smith, Nuclear Innovation North America
Barbara Stevens, Exelon Corporation

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

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

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:
Julie Sickle, Chair, Exelon Corporation; Ted Amundson, Southern Company; Scott Bauer, Nuclear Energy Institute; Hamer Carter, Progress Energy; Theodore Green, Arizona Public Service; Jerry Hiatt, Nuclear Energy Institute; Richard Hons, Southern Company; Lauren Kent, U.S. Nuclear Regulatory Commission; Timothy Kolb, U.S. Nuclear Regulatory Commission; Michael Llewelyn, Individual; Gregg Ludlam, Exelon Corporation; Elizabeth McAndrews-Benavides, Nuclear Energy Institute; Joseph Murray, Public Service Electric and Gas Company; Chuck Sizemore, Florida Power & Light; Greg Sparks, Entergy; Geoffrey Steele, South Carolina Electric and Gas; John Suptela, Duke Energy; Sam Wender, First Energy Nuclear Operating Company

Status: Standard was approved by ANSI on 11/20/2014. Awaiting NRC issuance of Regulatory Guide 1.8 revision to endorse the standard before adoption by the nuclear industry.

ANSI/ANS-3.2-2012 (R2017), "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:
Marion Smith, Chair, Nuclear Innovation North America; Clint Eldridge, Vice Chair, Diablo Canyon; Mark Harvey, Unistar/Constellation; Michael Hayse, Exelon Nuclear; Michael Janus, Progress Energy; Charles H. Moseley, Individual; Thomas Niessen, Tennessee Valley Authority; Paul Prescott, U.S. Nuclear Regulatory Commission; George Reed, PSEG Nuclear LLC; Kerry Rhoads, Dominion; Richard Rogalski, Individual; Stanley Stasek, Detroit Edison Company; Richard Sweigart, Duke Energy; Donato Visco, Arizona Public Service Co.; Thomas White, Entergy Nuclear; Dennis Winchester, Exelon

Status: The working group was reconstituted in 2016 and voted to reaffirm the standard. The standard was reaffirmed on 4/4/2017.

ANSI/ANS-3.4-2013 (R2018), "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:
Barbara Stevens, Chair, Exelon Corp.; George Rombold, Vice Chair, Scientech, a business unit of Curtiss-Wright Flow Control Company; Michael Ardaiz, U.S. Department of Energy, Sam Hansell, Excelon Corporation; Thomas Jetzer, Occupational Medicine Consultants; Laurie Kubec, NextEra Energy Corp.; Hironori Peterson, U.S. Nuclear Regulatory Commission; Julianne Peterson, Xcel Energy; William Pilkey, Exelon Corp.; Carole Revelle, U.S. Nuclear Regulatory Commission; Jennifer Veytia, Individual; Michael Zaruba, Auburn Family Health Center

Status: This standard received ANSI approval on 4/29/2013 and was reaffirmed on 7/2/2018. 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.

ANSI/ANS-3.5-2009, "Nuclear Power Plant Simulators for Use in Operator Training and Examination" (historical revision of ANSI/ANS-3.5-1998 – new standard)

Scope: *This standard establishes the functional requirements for full-scope nuclear power plant control room simulators for use in operator training and examination. The standard also establishes criteria for the scope of simulation, performance, and functional capabilities of the simulators. This standard does not address simulators for test, mobile, and research reactors, or for reactors not subject to U.S. Nuclear Regulatory Commission licensing. This standard does not establish criteria for application of simulators in training programs.*

Membership:
James Florence, Chair, Nebraska Public Power District-Cooper; Keith P. Welchel, Secretary, Duke Energy-Oconee; F. J. (Butch) Colby, Editor, L-3 Communications MAAPS; Theresa Buchanan, U.S. Nuclear Regulatory Commission; Shih-Kao Chang, Dominion Resources-Millstone; William Fraser, Westinghouse Electric Company, LLC; Robert Goldman, Entergy; David Goodman, Luminant; William Hendy, Institute of Nuclear Power Operations; James Kellum, U.S. Nuclear Regulatory Commission; Jody Lawter, South Carolina Electric & Gas; George McCullough, GSE Systems, Inc.; Mac McDade, Progress Energy – Harris Nuclear Plant; Michael Petersen, Progress Energy–Harris Nuclear Plant; Pablo Rey, Tecnatom, S.A.; James Sale, Dominion; Frank A. Tarselli, Individual; Lawrence Vick, Individual; Dong (Allen) Wang, Shandong Nuclear Power Company Ltd.

Status: ANSI/ANS-3.5-2009 was approved 09/04/09. A reconsideration ballot of ANS-3.5-201x was issued on 10/18/18. Members of the LLWRCC cast their votes with 17 "approved" votes and 2 "not approved" votes (100% participation). A recirculation ballot will be issued to inform members of unresolved public comments.

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.*

Members:
Kashmir Singh, Chair, EDF Energy; Ossama Ashy, WSC, Inc.; Lun (Alan) Cheng, Exelon Corporation; Rama Deljouravesh, Ontario Power Generation; James Florence, Nebraska Public Power District; David Goodman, Luminant; Burkhard Holl; Kraftwerks-Simulator-Gesellschaft mbH; Kenneth Leung, Bruce Power; Alistair Linsell, EDF Energy; Evan Lloyd, Exitech Corporation; Ian Lowe, EDF Energy; George McCullough, Exitech Corporation; Alan Montgomery, EDF Energy; Bernard Panfil, Corys Inc.; Ed Rau, Duke Energy; Jose Antonio Ruiz, Technatom S.A.; Dennis Spielman, Southern Company; Joseph Yarbrough, Xcel Energy

Status: The working group was formed and a PINS was prepared. The PINS was submitted to ANSI on 12/14/2018.

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 K. August, Chair, Southern Company; Odunayo Ayegbusi, U.S. Nuclear Regulatory Commission; James Halderman, Bechtel Power Corporation; N. Prasad Kadambi, Individual; Herbert Massie, Individual; Dong Thai Nguyen, Southern Company; Mark Paul, Individual; Andrei Smirnov, Bechtel Corporation; Shilp Vasavada, Individual

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 -2018 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 was too regulatory oriented to be useful to industry. We have reconstituted the approach to "RAP" and are in the process of reforming the working group. The entire process has been reviewed and evaluated for continued need and utility.

ANS-3.15, Cyber Security for Nuclear 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:
Sacit Cetiner, Chair, Oak Ridge National Laboratory; F. Mitch McCrory, Vice Chair, Sandia National Laboratories;Stephen Batson, Deloitte; Ralph Branscomb,Florida Power & Light; Jor-Shan Choi, University of California–Berkeley; Lowell Christensen, Bechtel Corporation; Ronald Cole, DP Engineering Ltd. Co.; Bristol Hartlage (Associate Member), Kinectrics; Gregory Hudson, Metcalffe PLC; Gary Johnson, Individual; Eric Lee, U.S. Nuclear Regulatory Commission; Michael Liebenow, Framatome; Christopher Niffenegger, Individual; Vincent Penkrot, Westinghouse Electric Company, LLC; Ted Quinn, Technology Resources; Steven Stamm, Individual; Nicholas Upanavage, Bechtel Corporation; Richard Vilim, Argonne National Laboratory; Barry Westreich, Westreich Group, LLC

Status: Very limited progress has been made since the committee made a presentation to the Standards Board in June 2016. The working group plans to conduct monthly conference call meetings and pick up speed to make progress. The working group is collaborating with JCNRM to produce a guidance document for nuclear power plants.

ANSI/ANS-56.8-2002 (R2016), "Containment System Leakage Testing Requirements" (revision of ANSI/ANS-56.8-1994)

Scope: *This standard specifies acceptable primary containment leakage rate test requirements to assure valid testing. The scope includes (1) Leakage test requirements; (2) Test instrumentation; (3) Test procedures; (4) Test methods; (5) Acceptance criteria; (6) Data analysis;(7) Inspection and recording of test results.*

Membership:
James Glover, Chair, Graftel Inc.; Jerome Bettle, U.S. Nuclear Regulatory Commission; Kenneth Clark, Individual; Alexis Courtois, Electricite de France; Mark Gowan, Tennessee Valley Authority; Kelvin Green, Tennessee Valley Authority; Jeremy Gustafson, BWXT, Inc.; Howard Hill, Individual; Murray Jennex, University of Arizona; Steven Leighty, Westinghouse Electric Company, LLC; Daniel Oakley, Exelon Corporation; Babul Patel, Consultant

Status: The current standard received ANSI approval of a reaffirmation on 5/26/2016. An erratum was issued in April 2018 to correct typographical errors in a formula in Appendix F of the standard. The new standard's contents are complete. The working group chair is going through the draft to check formatting and final details before sending the draft to the working group for final comments and a vote. The goal is to get this revision to the ANS for review by the end of April 2019.

ANSI/ANS-58.8-1994 (R2017), "Time Response Design Criteria for Safety-Related Operator Actions" (revision of ANSI/ANS-58.8-1984)

Scope: *This standard establishes time response design criteria for safety-related operator actions to be used in the design of light water reactor (LWR) nuclear power plants. The criteria are used to determine the minimum response time intervals for safety-related operator actions that are taken to mitigate design basis events (DBEs) which result in an automatic reactor trip. This standard specifies time requirements that are to be met to receive credit in the safety analysis for operator actions that initiate or control safety-related functions.*

Specifically, the criteria provide bases: (1) For establishing certain requirements for determining whether a particular action to initiate or control a safety-related system might be accomplished by operator action or must be accomplished by an automatic action, (2) For determining when design modifications can obviate the need for automatic actions that would otherwise be required, and (3) For general guidance for hardware, such as instrumentation, controls, indicators, and annunciators necessary to support safety-related operator actions.

Membership:
Huafei (Harry) Liao, Chair, Sandia National Laboratories: Emmanuelle ContargyrisFramatome; David Desaulniers, U.S. Nuclear Regulatory Commission; Jonathan Ford, Framatome; Robert Fuld, Westinghouse Electric Company, LLC; Lisa Hill, Southern Company; Göran Hultqvist, Individual (Sweden); Susan Sallade, Exelon Corporation; Logan Schulze, Xcel Energy; Steven Stamm, Individual; Rachel (Beth) Vail, AECOM-Professional Solutions; Michael Weiner, Duke Power

Status: The standard was reaffirmed by ANSI on 8/27/2017. The working group was reconstituted to revise the standard. A decision was made to reaffirm the standard to keep it current while the revision is completed. The revision will address the process for the selection and verification of operator response times for safety related operator actions. A revised PINS for the revision was submitted to ANSI on 6/6/2018. The draft standard has been issued for consensus committee approval.

Emergency Planning and Response Subcommittee

Membership*:*
Ronald Markovich, Chair, Contingency Management Consulting
Steven Gebers, Vice Chair, Quantum Nuclear Services
Evan Lloyd, Exitech Corporation
Manit Shah, Texas A&M University

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

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

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; Lori Thomas, U.S. Department of Energy; Steve Hook, Individual; William Renz, Entergy Operations

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 incorporated ANS-3.8.5), and ANS-3.8.7. A decision was made to initiate ANS-3.8.7 as a risk-informed, performance-based (RIPB) standard as a pilot. No industry interest. No activity in 2018.

The chair questions whether there is a need to keep open the 3.8 series standards as both the commercial nuclear and DOE haven't expressed interest in participating. Should this subject matter area (EP) be shelved for the present time until such time as interest is renewed?

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

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; William Froh, U.S. Department of Energy; Kevin Keyes, Department of Homeland Security; 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 incorporated ANS-3.8.5), and ANS-3.8.7. A decision was made to initiate ANS-3.8.7 as a risk-informed, performance-based (RIPB) standard as a pilot. No industry interest. No activity in 2018.

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

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; David Freshwater, U.S. Department of Energy; Richard J. Stuhler, U.S. Department of Energy; Kevin Keyes, Department of Homeland Security; 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 incorporated ANS-3.8.5), and ANS-3.8.7. No industry interest. No activity in 2018.

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" (historical revision and consolidation of ANSI/ANS-3.8.5-1992 and ANSI/ANS-3.8.6-1995 – proposed new standard)

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; Lori Thomas, U.S. Department of Energy; Mohammad Pourgol-Mohammad, FM Global

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 incorporated ANS-3.8.5), and ANS-3.8.7. No industry interest. No activity in 2018.

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

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; Stephen Luckett, U.S. Department of Energy; Steve Hook, Individual; William Renz, Entergy Nuclear; Kevin Keyes, Department of Homeland Security; Steven Erickson, Contingency Management Consulting Group, LLC; Martin Hug, Nuclear Energy Institute; Scott McCain, EP Tec, Inc.; Randy Sullivan, U.S. Nuclear Regulatory Commission; Donald Tailleart, U.S. Nuclear Regulatory Commission

Status: ANS-3.8.7 is the standard to be developed as a pilot for the proposed emergency preparedness standards; it is a document to be used by both the commercial nuclear industry and DOE. The concept continues to be for the ANS commercial nuclear membership to develop the standard (since the NRC new rulemaking addressed this area) and then present to the ANS Department of Energy membership for incorporation of their requirements. Unfortunately, continued push back has been received by the commercial nuclear industry, thru NEI, stating that they will not participate in development of the standard. NEI issued a letter on October 23, 2012, to ANS indicating their disapproval of development of this standard and requesting that ANS not develop one. Additionally, the industry, through INPO, are in the process of development of an industry drill and exercise manual. After internal discussions, ANS determined it would continue with the development of the emergency preparedness standards citing that ANS has multiple customers, not only the commercial nuclear industry, and issued its response in a letter dated December 17, 2012. As such, the ANS-3.8.7 membership re-engaged in the finalization of the standard. A draft has been completed which includes the NRC new rulemaking requirements and has been through internal review as well as NRC review and incorporation of its comments. Team members have been in the process of engaging DOE to provide input to the draft standard, however no success. Hence the standard is on hold pending DOE involvement. Issuance of this standard without DOE involvement would not serve a purpose as the commercial nuclear industry is not supportive of its development/issuance. No activity in 2018.

Large Light Water Reactor Consensus Committee (LLWRCC)
Organizational Chart

Chair: Gene Carpenter Vice Chair: William B. Reuland

Light Water Reactor and Reactor Auxiliary Systems Designs	Power Generation and Plant Support Systems	Simulators, Instrumentation, Control Systems, Software and Testing	Emergency Planning and Response
Chair: Michelle French **Vice Chair: OPEN**	**Chair: OPEN** **Vice Chair: Robert Burg**	**Chair: Pranab Guha** **Vice Chair: Lowell Christensen**	**Chair: Ronald Markovich** **Vice Chair: Steven Gebers**
3 = Projects	5 = Projects	3 = Projects	5 = Projects
4 = Current Standards	3 = Current Standards	6 = Current Standards	0 = Current Standards
Ⓟ = PINS submitted to ANSI			
ANS-18-1-2016 Radioactive Source Term for Normal Operation of Light Water Reactors Approved 11/1/16 (WGC: K. Geelhood)	ANS-56.1 (NEW) Containment Hydrogen Control (WGC: J. Glover)	ANS-3.1-2014 Selection, Qualification, and Training of Personnel for Nuclear Power Plants Approved 11/20/14 (WGC: J. Sickle)	ANS-3.8.1 (W2005) Ⓟ Properties of Radiological Emergency Response Functions and Organizations for Nuclear Facilities (WGC: R. Markovich)
ANS-30.3 (NEW) Ⓟ Advanced Light-Water Reactor Risk-Informed Performance-Based Design Criteria and Methods (WGC: K. Welter)	ANS-56.2 (W1999) Containment Isolation Provisions for Fluid Systems After a LOCA (WGC: E. Johnson-Turnipseed)	ANS-3.2-2012 (R2017) Managerial, Administrative, and Quality Assurance Controls for the Operational Phase of NPPs RF 4/4/17 (WGC: M. Smith)	ANS-3.8.2 (W2005) Ⓟ Properties of Functional and Physical Characteristics of Radiological Emergency Response Facilities at Nuclear Facilities (WGC: R. Markovich)
ANS-51.10-1991 (R2018) Ⓟ Auxiliary Feedwater System for Pressurized Water Reactors RF 8/13/18 (WGC: E. Johnson-Turnipseed)	ANS-58.2 (W1998) Design Basis for Protection of Light Water Nuclear Power Plants Against the Effects of Postulated Pipe Rupture (WGC: D. Zheng)	ANS-3.4-2013 (R2018) Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants RF 7/2/18 (WGC: B. Stevens)	ANS-3.8.3 (W2005) Ⓟ Properties of Radiological Emergency Response Plans and Implementing Procedures and Maintaining Emergency Response Capability for Nuclear Facilities (WGC: R. Markovich)
ANS-58.6 (W2011) Criteria for Remote Shutdown for Light Water Reactors Facilities (WGC: Open)	ANS-58.3-1992 (R2018) Physical Protection for Nuclear Safety-Related Systems and Components RF 1/10/2018 (WGC: D. Spellman)	ANS-3.5-2009 Ⓟ Nuclear Power Plant Simulators for Use in Operator Training and Examination Approved 9/4/09 (WGC: J. Florence)	ANS-3.8.6 (W2005) Ⓟ Properties of Radiological Emergency Response Plans and Implementing Procedures and Maintaining Emergency Response Capability for Nuclear Facilities (WGC: R. Markovich)
ANS-58.9-2002 (R2015) Single Failure Criteria for Light Water Reactor Safety-Related Fluid Systems RF 2/12/15 (WGC: Open)	ANS-59.3-(W2012) Ⓟ Nuclear Safety Criteria for Control Air Systems (WGC: R. Burg)	ANS-3.5.1 (NEW) Ⓟ Nuclear Power Plant Simulators for Use in Simulation Assisted Engineering and Non-Operator Training (WGC: K. Singh)	ANS-3.8.7 (W2008) Ⓟ Properties of Planning, Development, Conduct, and Evaluation of Drills and Exercises for Emergency Preparedness at Nuclear Facilities (WGC: R. Markovich)
ANS-58.11 (W2012) Design Criteria for Safe Shutdown Following Selected Design Basis Events in Light Water Reactors (WGC: Open)	ANS-59.51-1997 (R2015) Fuel Oil Systems for Safety-Related Emergency Diesel Generators RF 6/19/15 (WGC: M. Dooley)	ANS-3.13 (NEW) Ⓟ Nuclear Facility Reliability Assurance Program (RAP) Development (WGC: J. August)	
ANS-58.14-2011 (R2017) Safety and Pressure Integrity Classification Criteria for Light Water Reactors RF 1/12/17 (WGC: M. Linn)	ANS-59.52-1998 (R2015) Lubricating Oil Systems for Safety-Related Emergency Diesel Generators RF 6/19/15 (WGC: M. Dooley)	ANS-3.15 (NEW) Cybersecurity Standard (Title TBD) (WGC: S. Cetiner)	
	ANS-60.1 (NEW) Export Control Standard (Title TBD) (WGC: M. Harding)	ANS-56.8-2002 (R2016) Ⓟ Containment System Leakage Testing Requirements RF 5/26/16 (WGC: J. Glover)	
		ANS-58.8-1994 (R2017) Ⓟ Time Response Design Criteria for Safety-Related Operator Actions RF 8/24/17 (WGC: H. Liao)	

Table 3 – LLWRCC Organizational Chart

Nonreactor Nuclear Facilities Consensus Committee (NRNFCC)

James O'Brien, Chair
U.S. Department of Energy

Scope: *The NRNFCC is responsible for the preparation and maintenance of voluntary consensus standards for 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:
James O'Brien, Chair, U.S. Department of Energy
Jeffery R. Brault, Vice Chair, Individual
Todd M. Anselmi, Enercon Services, Inc.
Robert A. Bari, Brookhaven National Laboratory
Robert G. Eble, Jr., Orano
Mukesh K. Gupta, AECOM Professional Solutions
Jerry E. Hicks, Individual
Roman Kazban, Defense Nuclear Facilities Safety Board
Margie Kotzalas, U.S. Nuclear Regulatory Commission
Charles Martin, National Security Technologies, LLC
Herbert W. Massie, Jr., Individual
Carl A. Mazzola, Project Enhancement Corporation
Mohammad Modarres, University of Maryland

Report of NRNFCC:
The NRNFCC held a meeting on November 14, 2018, at the ANS Winter Meeting in Orlando, Florida.
James Miller resigned from the NRNFCC and all standards activities. Invitations have been extended to Lawrence Berg and Paul Rogerson to join the NRNFCC. Membership confirmation for both is expected in early 2019.

Approved in 2018:

No projects were approved in 2018.

Active Standards/Projects (Approved PINS):

ANS-3.14, "Process for Aging Management and Life Extension for 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-3.14, "Process for Aging Management and Life Extension for Nonreactor Nuclear Facilities" (proposed 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, Enercon Federal Services; Craig McMullin, Co-Chair, Savannah River National Laboratory; Mark Blackburn, U.S. Department of Energy; Joseph Crociata, Consolidated Nuclear Security, LLC; Frederic Grant, Simpson Gumpertz & Heger Inc.; William Gunther, Brookhaven National Laboratory; James Heffner, U.S. Department of Energy; Philip Jensen, Pacific Northwest National Laboratory; Margie Kotzalas, U.S. Nuclear Regulatory Commission; Cailyn Ludwig (Associate Member), Purdue University; Herbert Massie, Individual; Michael Mudlock, Simpson Gumpertz & Heger, Inc.; Mark Sapia, General Electric; Brian Smith, U.S. Nuclear Regulatory Commission; James Wittkop, Nuclear Fuel Services

Status: The draft is close to completion and expected to the issued to the NRNFCC for review in 2019.

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:
Robert Eble, Chair, Orano; Sven Bader, Orano; William Doane, Framatome; Robert Faris, Westinghouse Electric Company, LLC; Chelsea Gunter (Associate Member) Shearman & Sterling LLP; Thomas Hiltz, U.S. Department of Energy; Gary Kaplan, RSL Safety; Margie Kotzalas, U.S. Nuclear Regulatory Commission; Alexander Lang, Global Nuclear Fuel; Calvin Manning, Framatome; Arielle Miller, Defense Nuclear Facilities Safety Board; Ashley Morris, Nuclear Fuel Services, Inc.; Wyatt Padgett, Urenco; Robert Pierson, Talisman; Mark Wolf, Honeywell

Status: A draft was issued to the NRNFCC for a preliminary review in November of 2015. Signification comments were received. A revised draft is expected to be issued for ballot to the NRNFCC in early 2019. The draft will also be provided to the Nuclear Criticality Safety Consensus Committee; the Risk-informed, Performance-based Principles and Policy Committee; and the Subcommittee on Risk Application for review.

ANSI/ANS-58.16-2014, "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:
Paul Rogerson, Chair, Bechtel National Inc.; Randy Bunt, Southern Company; Chris Chaves, U.S. Department of Energy; David Cook, Oak Ridge National Laboratory; Gerald Couture, Westinghouse Electric Company, LLC; Mosi Dayani, Savannah River Solutions; Richard Englehart (late), Individual; Pranab Guha, U.S. Department of Energy; Gregory Jones, U.S. Department of Energy/ORP; Pradyot Niyogi, U.S. Department of Energy; Mark Ramsay, U.S. Department of Energy/ORP; Kevin Ramsey, U.S. Nuclear Regulatory Commission; Louis Restrepo, Nuclear Safety Associates; Subir Sen, U.S. Department of Energy

Status: The standard was approved 9/4/2014. Paul Rogerson accepted the chair position in May 2018. The appropriate maintenance action is being considered.

Nonreactor Nuclear Facilities Consensus Committee (NRNFCC) List of Standards/Projects Chair: James O'Brien Vice Chair: Jeffery R. Brault		
Ⓟ = PINS submitted to ANSI		
ANS-3.14 Ⓟ	Process for Aging Management and Life Extension for Nonreactor Nuclear Facilities	Active Project (WGC: T. Anselmi / B. McMullen)
ANS-57.11 Ⓟ	Integrated Safety Assessments for Fuel Cycle Facilities	Active Project (WGC: R. Eble)
ANS-58.16-2014	Safety Classification and Design Criteria for Nonreactor Nuclear Facilities	Approved 9/4/2014 (WGC: P. Rogerson)

Table 4 – NRNFCC List of Standards/Projects

Nuclear Criticality Safety Consensus Committee (NCSCC)

Larry L. Wetzel, Chair
BWXT, Inc.

Scope: *To develop standards for determining the potential for nuclear criticality of fissile fissionable material outside reactors, for the prevention of accidental criticality, and for coping with accidents should they occur.*

NCSCC Membership:
Larry L. Wetzel, Chair, BWXT, Inc.
William R. Shackelford, Vice Chair, Nuclear Fuel Services, Inc.
Roger W. Bartholomay, C.S. Engineering, Inc.
Lawrence J. Berg, U.S. Department of Energy
Douglas Bowen, Oak Ridge National Laboratory
Robert D. Busch, University of New Mexico
William Doane, Framatome
Robert S. Eby, AIChE Representative (employed by Navarro Research & Engineering)
Ernest Elliott, N3B – Los Alamos
Calvin M. Hopper, Individual
Kevin Kimball, Individual
Ronald A. Knief, INMM Representative (employed Sandia National Laboratories)
Thomas Marenchin, U.S. Nuclear Regulatory Commission
John A. Miller, Sandia National Laboratories
Scott P. Murray, HPS Representative (employed by General Electric Co.)
Richard G. Taylor, C.S. Engineering, Inc.
Robert E. Wilson, U.S. Department of Energy

Observer:
R. Michael Westfall, Individual

Report of NCSCC:
The NCSCC had a teleconference on May 22, 2018, and held a meeting at the ANS Winter Meeting on November 12, 2018. Ernest Elliott was confirmed as a member of the NCSCC.

Approved in 2018

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

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)

ANS-8.3, "Criticality Accident Alarm System" (revision of ANSI/ANS-8.3-1997; R2003; R2012; R2017)

ANS-8.7, "Nuclear Criticality Safety in the Storage of Fissile Materials" (revision of ANSI/ANS-8.7-1998; R2007; R2012)

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)

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

ANS-8.21, "Use of Fixed Neutron Absorbers in Nuclear Facilities Outside Reactors" (revision and consolidation of ANSI/ANS-8.21-1995; R2001 and ANSI/ANS-8.5-1996; R2002; R2007; R2011)

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

ANS-8.26, "Criticality Safety Engineer Training and Qualification Program" (revision of ANSI/ANS-8.26-2007; R2012; R2016)

ANS-8.28, "Administrative Practices for the Use of Non-Destructive Assay Measurements for Nuclear Criticality Safety" (proposed new standard)

Subcommittee 8 – Fissionable Material Outside Reactors 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 consensus committee N16, Nuclear Criticality Safety.*

Membership:
Douglas Bowen, Chair, Oak Ridge National Laboratory
Kevin Reynolds, Vice Chair, Consolidated Nuclear Security, LLC
Michael Crouse, Secretary, Consolidated Nuclear Security, LLC
James Baker, Spectra Tech, LLC
Marvin Barnett, Savannah River Nuclear Solutions
Nicholas Brown, Nuclear Fuel Services, Inc.
Ernest Elliott, N3B - Los Alamos
David Erickson, Savannah River Nuclear Solutions
Christopher Haught, Consolidated Nuclear Security
Thomas McLaughlin, Individual
James Morman, Argonne National Laboratory
Lon Paulson, GE Hitachi Nuclear Energy
Catherine Percher, Lawrence Livermore National Laboratory
Andrew Prichard, Pacific Northwest National Laboratory
Christopher Tripp, Tripp Nuclear Consulting Services
Dominic Winstanley, Sellafield Ltd. (U.K.)

Observers:
Peter Angelo, Consolidated Nuclear Security, LLC
Debdas Biswas, Lawrence Livermore National Laboratory
Jeffrey Chapman, Oak Ridge National Laboratory
Jerry Hicks, Individual
Deborah Hill, National Nuclear Laboratory, U.K.
Kevin Kimball, Individual
Ronald Knief, Sandia National Laboratories
Dale Lancaster, NuclearConsultants.com
John Miller, Sandia National Laboratories
Jeremy Munson, U.S. Nuclear Regulatory Commission
William Myers, Los Alamos National Laboratory
Charles Rombough, CTR Technical Services, Inc.
Ellen Saylor, Oak Ridge National Laboratory
Larry Wetzel, BWXT, Inc.

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

The ANS-8 Subcommittee held a standards forum at each of the two annual ANS conferences, Philadelphia, PA, in June 2018, and Orlando, FL, in November 2018. Two ANS-8 subcommittee meetings were held at the same venues to discuss internal ANS-8 business and special projects such as to provide basis statements for each standards requirement and recommendation as a reference for the next generation of working group members to assist with inquiries and standards revisions. Additional modifications were made to the ANS-8 Subcommittee

membership to fill vacancies with dedicated experts and end-users of the ANS-8 standards. Also, one standard, ANS-8.23, was approved and two standards, ANS-8.1 and ANS-8.21, were reaffirmed to prepare for revisions. The request for clarification for ANS-8.14 was addressed early in 2018; however, the ANS-8 subcommittee voted negatively on the response. A second clarification response to address ANS-8 comments was drafted by the ANS-8.14 Working Group Chair and ANS-8 was still working on reviewing the draft response at the close of 2018. Lastly, a final draft of a new standard, ANS-8.28 "Administrative Practices for the Use of Nondestructive Assay Measurements for Nuclear Criticality Safety," was completed by year's end and will be submitted for ANS-8 ballot in early 2019.

Current Standards and Active Projects:

ANSI/ANS-8.1-2014 (R2018), "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, Nuclear Fuel Services; Douglas Bowen, Oak Ridge National Laboratory; Clint Gross, Paschal Solutions; Chris Haught, Consolidated Nuclear Solutions, LLC; Jerry Hicks, Individual Tom Marenchin, U.S. Nuclear Regulatory Commission; John Miller, Sandia National Laboratories; James Morman, Argonne National Laboratory; Lane Paschal, Paschal Solutions, Inc.; David Pilgrim, Canadian Nuclear Laboratories; Kevin Reynolds, Consolidated Nuclear Security, LLC; Ellen Saylor, Oak Ridge National Laboratory; Matthew Wilson, Paschal Solutions, Inc. (Associate Member), Fred Winstanley, Sellafield Ltd.; Ning Zhang (Associate Member)

Status: Reaffirmation of this standard was approved on 11/28/2018. The PINS was resubmitted to ANSI on 11/29/2018 after the reaffirmation. The working group has started work on the next revision. Work assignments and location of previous computer modeling files have been completed.

ANSI/ANS-8.3-1997 (R2017), "Criticality Accident Alarm System" (revision of ANSI/ANS-8.3-1986)

Scope: *This standard is applicable to all operations involving fissionable materials in which inadvertent criticality can occur and cause personnel to receive unacceptable exposure to radiation. This standard is not applicable to detection of criticality events where no excessive exposure to personnel is credible, nor to nuclear reactors or critical experiments. This standard does not include details of administrative actions or of emergency response actions that occur after alarm activation.*

Membership:
Jerry Hicks, Chair, Individual; Peter Angelo, Consolidated Nuclear Security, LLC; James Baker, Spectra Tech, LLC; Lawrence Berg, U.S. Department of Energy; Debdas Biswas, Lawrence Livermore National Laboratory; Douglas Bowen, Oak Ridge National Laboratory; Konner Casanova, Idaho National Laboratory; Jeffrey Chapman, Oak Ridge National Laboratory; Theresa Cutler, Los Alamos National Security, LLC; Matthieu Duluc, Institute for Radiological Protection & Nuclear Safety; Ed Kendall, Individual; John Kirkpatrick, Mirion Technologies Inc.; Austin McGee (Associate Member), Consolidated Nuclear Security, LLC; Thomas McLaughlin, Individual; Hannah Morbach (Associate Member), BWXT, Inc.; Wade Scates, Idaho National Laboratory; Timothy Sippel, U.S. Nuclear Regulatory Commission; Jingjing Wang, Canadian Nuclear Laboratories; William Zywiec (Associate Member), Lawrence Livermore National Laboratory

Status: Reaffirmation received ANSI approval 10/25/17. The reaffirmation was processed to keep the standard current while the revision is completed. A rough draft was issued to ANS-8 for a preliminary ballot in 2015. Significant comments were received needing resolution by the working group. Shean Monahan stepped down as working group chair. Jerry Hicks came onboard in 2018 to chair the working group. The major focus of the writing group is the proper characterization of the smallest excursion which needs to be detected. The writing group is editing the near-final draft to prepare for re-submission to the ANS-8 Subcommittee.

ANSI/ANS-8.5-1996 (R2017), "Use of Borosilicate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material" (revision of ANSI/ANS-8.5-1986)

Scope: *This standard provides guidance for the use of borosilicate-glass Raschig rings as a neutron absorber for criticality control in ring-packed vessels containing solutions of ^{235}U, ^{239}Pu, or ^{233}U. The chemical and physical environment, properties of the rings and packed vessels, maintenance inspection procedures, and operating guidelines are specified.*

Membership:
Jerry Hicks, Chair, Individual

Status: Reaffirmation received ANSI approval on 11/14/2017. If a revision of the standard is necessary, the working group will have to be reconstituted. No activity in 2018.

ANSI/ANS-8.6-1983 (R2017), "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:
William Myers, Chair, Los Alamos National Laboratory; Ernie Elliott,N3B – Los Alamos; Jerry Hicks, Individual; Chris Haught, Consolidated Nuclear Security, LLC; Jesson Hutchinson, Los Alamos National Laboratory; John Miller, Los Alamos National Laboratory; Norman Schwers, Sandia National Laboratories

Status: Reaffirmation received ANSI approval on 8/24/2017. No activity in 2018.

ANSI/ANS-8.7-1998 (R2012) (R2017), "Nuclear Criticality Safety in the Storage of Fissile Materials" (revision of N16.5-1975; R1982; R1987)

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

Membership:
Kevin Kimball, Chair, Consolidated Nuclear Security, LLC; Denise Anderson, U.S. Nuclear Regulatory Commission; Kermit Bunde, U.S. Department of Energy; Christy Fisher, Consolidated Nuclear Security, LLC; Ed Kendall, U.S. Department of Energy; James Kuropatwinski, Los Alamos National Laboratory; Dylan Robideaux (Associate Member), Exelon Corporation; Ellen Saylor, Oak Ridge National Laboratory; Brittany Williamson, Savannah River Nuclear Solutions; Travis Wilson (Associate Member), Consolidated Nuclear Security, LLC

Status: Reaffirmation was approved by ANSI on 12/14/2017. The standard is under revision to incorporate reaffirmation comments and ensure consistency with other ANS-8 standards. The working group met in 2018 to consider additional changes in the scope of the revision. The schedule calls for submitting the revision for balloting in 2019.

ANSI/ANS-8.10-2015, "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, Pacific Northwest National Laboratory; Linda Andrews, Framatome; Douglas Bowen, Oak Ridge National Laboratory; Jason Crye (Associate Member), Consolidated Nuclear Security, LLC; Theresa Cutler (Associate Member), Los Alamos National Security, LLC; Jerry Hicks, Individual; Darby Kimball, Lawrence Livermore National Laboratory; Lon Paulson, GE Hitachi, Nuclear Energy

Status: The revision of ANSI/ANS-8.10-1983 (R2012) was approved by ANSI on 2/12/15. Two associate members were added to the working group in 2018. A revision is underway to address evacuation in the standard.

ANSI/ANS-8.12-1987 (R2016), "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, Chair, Tripp Nuclear Consulting Services; Tracy E. Stover, Vice Chair, Savannah River Nuclear Solutions, LLC; Debdas Biswas, Lawrence Livermore National Laboratory; Kermit Bunde, Department of Energy, Robert Eble, Individual; Katherine McCurry, U.S. Nuclear Regulatory Commission; Dennis Mennerdahl, E. Mennerdahl Systems; Arielle Miller (Associate Member), Defense Nuclear Facilities Safety Board; Quentin Newell (Associate Member), URENCO USA; Scott Revolinski, Nuclear Safety Associates; Dominic Winstanley, Sellafield-UK

Status: Reaffirmation received ANSI approval 5/16/2016. The ANS-8.12 standard was first approved in July 1978 and was revised in 1987. It was reaffirmed in 2002, 2011, and most recently in 2016. 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 (R2016), "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:
OPEN, Chair; Lawrence Berg, U.S. Department of Energy;

Status: The standard received ANSI approval of a reaffirmation on 6/29/16. The working group prepared a response to an inquiry in 2018. Comments from the ANS-8 ballot of the draft response are being resolved.

ANSI/ANS-8.15-2014, "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.; Hiroshi Okuno, Japan Atomic Energy Research Institute; Timothy Sippel, U.S. Nuclear Regulatory Commission; R. Michael Westfall,Oak Ridge National Laboratory; Ning Zhang, Los Alamos National Laboratory

Status: The standard was approved by ANSI on 10/10/14. The ANS-8.15 standard was initially approved in 1981 (with reaffirmations in 1987, 1995, and 2005). The revision revises most of the subcritical limits for the original 14 nuclides in the 1981 standard and adds 5 additional nuclides bringing the total number of nuclides to 19.

ANSI/ANS-8.17-2004 (R2014), "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:
Ellen Saylor, Chair, Oak Ridge National Laboratory; Dale Lancaster, NuclearConsultants.com; Calvin Manning, Framatome; William Marshall, Oak Ridge National Laboratory; Austin McGee (Associate Member), Consolidated Nuclear Facilities, LLC; Kristina Spencer (Associate Member), Los Alamos National Laboratory

Status: Reaffirmation received ANSI approval on 7/28/14. Ellen Saylor accepted the working group chair position for this project in February 2018.

ANSI/ANS-8.19-2014, "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; Kelsey Amundson (Associate Member), Defense Nuclear Safety Board; James Baker, Spectra Tech, LLC; Matthew Chapa (Associate Member), Consolidated Nuclear Security, LLC; Jerry Hicks, Individual; Ronald Knief, Sandia National Laboratories; Sandi Larson,21 Consulting Group Inc.; Jennifer Lyons, Pacific Northwest National Laboratory; Jeremy Munson, U.S. Nuclear Regulatory Commission; David Pilgrim (Secretary), Canadian National Laboratories; Ellen Saylor, Oak Ridge National Laboratory

Status: ANSI/ANS-8.19-2014 was approved by ANSI on July 28, 2014. Since 2015, the focus has been on establishing the working group membership with several additions and three associate members. A meeting was held at the June 2017 ANS Annual Meeting primarily to educate the newer members about historical view points and future plans. There were no official activities in 2018, although there was some discussion about the standard through the EFCOG NCS group about the independence term from Section 4.4, the history of what drove creating the original standard, and the current need/benefit of this standard today.

ANSI/ANS-8.20-1991 (R2015), "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:
Ronald Knief, Co-Chair, Sandia National Laboratories; Deborah Hill, Co-Chair, National Nuclear Laboratory (UK); Nichole Ellis, Vice Chair, Ellis Nuclear Engineering, Inc.; Kelsey Amundson (Associate Member), Defense Nuclear Safety Board; Wayne Andrews, Individual; Paul Burdick,C.S. Engineering, Inc.; Theresa Cutler, Los Alamos National Laboratory; Christopher Haught, Consolidated Nuclear Security, LLC; Jesse McBurney-Rebol, Naval Nuclear Laboratory; ; Thomas Marenchin, U.S. Nuclear Regulatory Commission; Catherine Percher, Lawrence Livermore National Laboratory; Christine Racicot McNally, Canadian Nuclear Laboratories; Randy Shackelford, Nuclear Fuel Services, Inc.; Robert P. Taylor, SNC-Lavalin/Atkins

Status: The last reaffirmation was approved 11/10/2015. A reaffirmation was processed to keep the standard current while comments on the revision are addressed. The working group has been working through the final remaining working group member comments during 2018. We plan to submit a draft to ANS-8 in early 2019.

ANSI/ANS-8.21-1995 (R2011), "Use of Fixed Neutron Absorbers in Nuclear Facilities Outside Reactors" (new standard)

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, Savanah River Nuclear Solutions; Kevin Carroll, Lawrence Livermore National Laboratory; Phillip Chou, Lawrence Livermore National Laboratory; Katherine Goluoglu, C.S. Engineering, Inc.; Jerry Hicks, Individual; Dennis Mennerdahl, E. Mennerdahl Systems-Sweden; Robert Wilson, U.S. Department of Energy; Emma Wong, Electric Power Research Institute

Status: Reaffirmation received ANSI approval 5/20/2011. The PINS, supporting a revision, was resubmitted. A revision to ANS-8.21, incorporating comments from the reaffirmation, and also including the salient requirements from ANS-8.5, was sent to NCSCC for ballot in August 2017. The working group is resolving comments. Reaffirmation of the standard is in process to keep it current during the revision.

ANSI/ANS-8.22-1997 (R2016), "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, Chair, Consolidated Nuclear Security, LLC; Brannen Adkins, U.S. Nuclear Regulatory Commission; Marvin Barnett, Savannah River Nuclear Solutions;; Donna D'Aquila,Fluor BWXT Portsmouth.; Sean Gough, Westinghouse Electric Company, LLC; Chris Haught, Consolidated Nuclear Security, LLC; Deborah Hill, National Nuclear Laboratories, UK; Robert Maurer, Nuclear Fuel Services, Inc.; Rahn Ross, Savannah River Solutions; Burton Rothleder, Individual; Richard Stachowiak,Interim Tech Solutions Inc..; Travis Wilson, Consolidated Nuclear Security, LLC

Status: This standard was reaffirmed on 10/17/2016. The working group met at the 2017 We are working to update the PINS to begin a revision to the standard. Additional working group meetings are planned for 2019. The revised PINS should be with ANS-8 before the annual meeting.

ANSI/ANS-8.23-2007 (R2012), "Nuclear Criticality Accident Emergency Planning and Response" (revision of ANSI/ANS-8.23-1997)

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;R2003,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:
James Baker, Chair,Spectra Tech, LLC; Peter Angelo, Consolidated Nuclear Security, LLC; Konner Cassanova, Idaho National Laboratory; Theresa Cutler (Associate Member), Los Alamos National Security, LLC; Matthieu Duluc, L'Institut de Radioprotection et de Sûreté Nucléaire; Eric Fillastre, Commissariat à L'Énergie Atomique; Neil Harris, UK National Nuclear Laboratory; Jerry Hicks, Individual; Patrick Moss, U.S. Department of Energy; Brandon O'Donnell, BWXT Technologies, Inc.; Blaine Rice (Associate Member), Nuclear Fuel Services, Inc.; Ellen Saylor, Oak Ridge National Laboratory; Wade Scates, Idaho National Laboratory; Jingjing Wang, Canadian Nuclear Laboratories; Ralph Winiarski, Paschal Solutions, Inc.; Dominic Winstanley, Sellafield Ltd.

Status: The standard was reaffirmed on 5/31/2012. The current draft revision of ANS-8.23 was approved by the ANS-8 Subcommittee and has been balloted by the NCSCC. The working group is currently working to achieve comment resolution and secure NCSCC ballot approval. The revision of ANS-8.23 should be completed by mid-2019.

ANSI/ANS-8.24-2017, "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, BWXT, Inc.; Robert Busch, University of New Mexico; Scott Finfrock, Savannah River Nuclear Solution; Clint Gross, Paschal Solutions Incorporated, Associates; Jerry Hicks, Individual; Kevin Kimball, Consolidated Nuclear Security, LLC; Cecil Parks, Oak Ridge National Laboratory; Andrew Prichard, Pacific Northwest National Laboratory; Christopher Tripp,Tripp Nuclear Consulting Services; Fitz Trumble, AECOM N&E Technical Services, LLC

Status: The standard was approved by ANSI on 12/12/2017. No activity in 2018.

ANSI/ANS-8.26-2007 (R2016), "Criticality Safety Engineer Training and Qualification Program" (new standard)

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, LLC; Kelsey Amundson, Defense Nuclear Facilities Safety Board; James Baker, Spectra Tech, LLC; Douglas Bowen, Oak Ridge National Laboratory; Joye Brotherton, Savannah River Site; Kevin Carroll, Lawrence Livermore National Laboratory; Theresa Cutler, Los Alamos National Security, LLC; Ruxandra Dranga, Canadian Nuclear Laboratories; David Erickson, Savannah River Nuclear Solutions; James Felty, Los Alamos National Laboratory; Makenzie Gorham, U.S. Department of Energy; Jerry Hicks, Individual; Calvin Hopper, Individual; Steve Kessler, Savannah River Nuclear Solutions; Ronald Knief, Sandia National Laboratories; Robert Maurer, Nuclear Fuel Services; Jerry McKamy, Sigma Science, Inc.; James Morman, Argonne National Laboratory; Lon Paulson, GE Hitachi Nuclear Energy; Catherine Percher, Lawrence Livermore National Laboratory; Nicholas Peterka, U.S. Nuclear Regulatory Commission; Chad Pope, Idaho State University; Andrew Prichard, Pacific Northwest National Laboratory; Gerald Sauve, U.S. Department of Energy;

Timothy Sippel, U.S. Nuclear Regulatory Commission; Norm Schwers, Sandia National Laboratories; Fitz Trumble, AECOM N&E Technical Services, LLC; Robert Wilson, U.S. Department of Energy

Status: Standard was reaffirmed by ANSI on December 15, 2016. The working group met twice in 2018 to continue work on a full revision of the standard.

ANSI/ANS-8.27-2015, "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:
Dale Lancaster, Chair, NuclearConsultants.com; Charles Rombough, Secretary, CTR Technical Services, Inc.; Stefan Anton, Hotlec International; Tony Attard, U.S. Nuclear Regulatory Commission; Steve Baker, TransWare Enterprises; Andrew Barto, U.S. Nuclear Regulatory Commission; Jack Boshoven, TransNuclear, Inc.; Joe Coletta, Duke Power; Mark DeHart, Idaho National Laboratory; Michael DeVoe, Progress Energy Carolinas; Jeffrey Dunlap, Exelon Corp.; James Gulliford, Nexia Solutions; John Hannah, Global Nuclear Fuels; Robin Jones, Southern Nuclear Operating Co.; John Kessler, Electric Power Research Institute; Ed Knuckles, Individual; Vefa Kucukboya, Westinghouse Electric Company, LLC; William Lake, Individual; Caroline Laverenne, Institute for Radiological Protection & Nuclear Safety; Albert Machiels, Electric Power Research Institute; Ludmila Markova, Nuclear Research Institute; Zita Martin, Tennessee Valley Authority; Mike Mason, TransNuclear, Inc.; John Massari, Constellation Energy; Dennis Mennerdahl, E. Mennerdahl Systems; Walid Metwally, Global Nuclear Fuels; Webb Mills, Global Nuclear Fuels; Susumu Mitake, Japan Nuclear Energy; Don Mueller, Oak Ridge National Laboratory; Prakash Narayanan, TransNuclear Inc.; Greg O'Connor, Department for Transport, UK; Paul O'Donnell, Individual; Cecil Parks, Oak Ridge National Laboratory; Holger Pfiefer, Nuclear Analysis Company International; Jerome Raby, Institute for Radiological Protection & Nuclear Safety; Meraj Rahimi, U.S. Nuclear Regulatory Commission; Everett Redmond, Nuclear Energy Institute; Dan Thomas, Framatome; John Wagner, Oak Ridge National Laboratory; Chris Walker, Entergy; Alan Wells, Electrical Power Research Institute; Kent Wood, U.S. Nuclear Regulatory Commission; Al Zimmer, General Atomics; John Zino, GE Nuclear

Status: This standard received ANSI approval on 11/10/2015. No activity reported in 2018.

ANS-8.28, "Administrative Practices for the Use of Non-Destructive Assay Measurements for Nuclear Criticality Safety" (proposed 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, Oak Ridge National Laboratory; Ernest Elliott, Co-chair), N3B – Los Alamos; Roger Bartholomay, C.S. Engineering Inc.; Lawrence Berg, , U.S. Department of Energy; Douglas Bowen, Oak Ridge National Laboratory; Ashby Bridges, Westinghouse Electric Company, LLC; Greg Chapman, U.S. Nuclear Regulatory Commission; David Dolin, Savannah River Solutions; Michael Dunn, Oak Ridge National Laboratory; A. Nichole Ellis, Ellis Nuclear Engineering, LLC;; Christopher Haught, Consolidated Nuclear Security, LLC; Robert Hayes, U.S. Department of Energy; David Kirkwood, Sellafield, Ltd.; David Kupferer, Defense Nuclear Facilities Safety Board; Frank Lamb, Individual; Sandra Larson,21 Consulting Group, Inc.; Jerry McKamy, U.S. Department of Energy; Tom Nirider, U.S. Department of Energy; Megan Pritchard, Nuclear Safety & Technology Services; Thomas Sampson, Sampson Professional Services; Wade Scates, Idaho National Laboratory; Gladys Udenta, U.S. Department of Energy; Robert Wilson, U.S. Department of Energy; John Winkel, CH2M-Hill Plateau Remediation Company; Fred Winstanley, Sellafield, Ltd.

Status: The PINS form was submitted to ANSI on 1/28/2011. The working group continues to work on the draft.

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

18 Current Standards

1 Proposed New Standard

Ⓟ = PINS submitted to ANSI

ANS-8.1-2014 (R2018) Ⓟ	Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors	RF 11/29/2018 (WGC: N. Brown)
ANS-8.3-1887 (R2017) Ⓟ	Criticality Accident Alarm System	RF 10/25/2017 (WGC: J. Hicks)
ANS-8.5-1996 (R2017) Ⓟ	Use of Borosilicate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material	RF 11/14/2017 (WGC: J. Hicks)
ANS-8.6-1983 (R2017)	Safety in Conducting Subcritical Neutron-Multiplication Measurements In Situ	RF 8/24/2017 (WGC. W. Myers)
ANS-8.7-1998 (R2017) Ⓟ	Nuclear Criticality Safety in the Storage of Fissile Materials	RF 12/14/2017 (WGC: K. Kimball)
ANS-8.10-2015	Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement	RV 2/12/2015 (WGC: A. Prichard)
ANS-8.12-1987 (R2016) Ⓟ	Nuclear Criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors	RF 5/6/2016 (WGC: C. Tripp)
ANS-8.14-2004 (R2016)	Use of Soluble Neutron Absorbers in Nuclear Facilities Outside Reactors	RF 6/29/2016 (WGC: L. Berg)
ANS-8.15-2014	Nuclear Criticality Control of Selected Actinide Nuclides	RV 10/10/2014 (C. Rombough)
ANS-8.17-2004 (R2014)	Criticality Safety Criteria for the Handling, Storage, and Transportation of LWR Fuel Outside Reactors	RF 7/28/2014 (WGC: E. Saylor)
ANS-8.19-2014	Administrative Practices for Nuclear Criticality Safety	RV 7/28/2014 (WGC: J. Miller)
ANS-8.20-1991 (R2015) Ⓟ	Nuclear Criticality Safety Training	RF 8/20/2015 (WGC: R. Knief / D. Hill)
ANS-8.21-1995 (R2011) Ⓟ	Use of Fixed Neutron Absorbers in Nuclear Facilities Outside Reactors	RF 5/19/2011 (WGC: D. Erickson)
ANS-8.22-1997 (R2016)	Nuclear Criticality Safety Based on Limiting and Controlling Moderators	RF 10/17/2016 (WGC: M. Crouse)
ANS-8.23-2007 (R2012) Ⓟ	Nuclear Criticality Accident Emergency Planning and Response	RF 5/31/2012 (WGC: J. Baker)
ANS-8.24-2017	Validation of Neutron Transport Methods for Nuclear Criticality Safety Calculations	RV 12/12/2017 (WGC: L. Wetzel)
ANS-8.26-2007 (R2016) Ⓟ	Criticality Safety Engineer Training and Qualification Program	RF 12/15/2016 (WGC: K. Reynolds)
ANS-8.27-2015	Burnup Credit LWR Fuel	RV 11/10/2015 (WGC: D. Lancaster)
ANS-8.28-201x Ⓟ	Administrative Practices for the Use of Non-Destructive Assay Measurements for Nuclear Criticality Safety	Active Project (WGC: J. Chapman)

Table 5 – NCSCC List of Standards/Projects

Research and Advanced Reactors Consensus Committee (RARCC)

George Flanagan, Chair
Oak Ridge National Laboratory

Scope: *The RARCC is responsible for the preparation and maintenance of voluntary consensus standards for 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.

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:

- *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:
George Flanagan, Chair, Oak Ridge National Laboratory
Bruce B. Bevard, Vice Chair, Oak Ridge National Laboratory
Thomas Newton, Vice Chair, National Institute of Standards & Technology
Alexander Adams, Jr., U.S. Nuclear Regulatory Commission
Amir Afzali, Southern Company
James K. August, Southern Company
Edward D. Blandford, Kairos Power
Robert E. Carter, Individual
Leslie P. Foyto, University of Missouri
Tony Grenci, WECTEC
Brian Grimes, Individual
David R. Lawson, U.S. Department of Energy
Mark A. Linn, Oak Ridge National Laboratory
Jan Mazza, U.S. Nuclear Regulatory Commission
Matthew J. Memmott, Brigham Young University
D. Sean O'Kelly, Idaho National Laboratory
Mark W. Peres, Fluor Enterprises, Inc.
Donald Spellman, IEEE-NPEC Liaison (Individual)
Steven R. Reese, Oregon State University
Richard S. Turk, Individual
Anthony R. Veca, General Atomics

Observer:
David E. Holcomb, Oak Ridge National Laboratory

Report of RARCC:
The RARCC met during the 2018 ANS Winter Meeting in Orlando, FL. Marya Morrison resigned from the committee. Donald Spellman asked to rejoin the RACCC and was reconfirmed.

Approved in 2018:

ANS-15.1-2007 (R2018), “The Development of Technical Specifications for Research Reactors” (reaffirmation of ANSI/ANS-15.1-2007 (R2013))

ANS-15.8-1995 (R2018), “Quality Assurance Program Requirements for Research Reactors” (reaffirmation of ANSI/ANS-15.8-1995 (R2013))

ANS-15.21-2012 (R2018), “Format and Content for Safety Analysis Reports for Research Reactors” (reaffirmation of ANSI/ANS-15.21-2012)

Active Standards/Projects (Approved PINS):

ANS-1, "Conduct of Critical Experiments" (revision of ANSI/ANS-1-2012)

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

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

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

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

ANS-54.1 “Nuclear Safety Criteria and Design Process for Liquid-Sodium-Cooled-Reactor NPPs” (historical revision of ANSI/ANS-54.1-1989 – proposed new standard)

Advanced Initiatives Subcommittee (ANS-29)

Membership:
Bruce Bevard, Chair, Oak Ridge National Laboratory
Amir Afzali, Southern Company
James August, Southern Company
Edward Blandford, Kairos Power
Matthew R. Denman, Sandia National Laboratories
George Flanagan, Oak Ridge National Laboratory
David Holcomb, Oak Ridge National Laboratory
Mark Linn, Oak Ridge National Laboratory
David Moses, 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:
Edward Blandford, Co-Chair, Kairos Power; Matthew Denman, Co-Chair, Sandia National Laboratory; Zhaolin Chen, Chinese National Nuclear Safety Administration; Ronald Cocherell, Southern Company; George Flanagan, Oak Ridge National Laboratory; Charles Forsberg, Massachusetts Institute of Technology; David Holcomb, Oak Ridge

National Laboratory; Jan Mazza, U.S. Nuclear Regulatory Commission; Matthew Memmott, Westinghouse Electric Company, LLC; Per Peterson, University of California-Berkeley; Bojan Petrovich, Westinghouse Electric Company, LLC; Benjamin Prewitt (Associate Member), Missouri University of Science & Technology; Carl Stoots, Idaho National Laboratory

Status: The project has been put on hold. When the ANS-20.1 Working Group was originally formed there was a diverse set of stakeholders that participated in the development of the proposed standard. However as Kairos was formed, a number of these stakeholders joined the company which resulted in a less diverse working group. In addition, NRC has been hesitant to provide support to a standard with only one "credible" vendor participating. Due to a combination of these factors and credible progress being made with the LMP and DOE/NRC work on the ARDCs, the participation in ANS-20.1 has really dwindled. The PINS was not withdrawn so that the project can be reinvigorated should additional vendors emerge.

ANS-20.2, "Nuclear Safety Design Criteria and Functional Performance Requirements for Liquid-Fuel Molten Salt Reactor Nuclear Power Plants" (proposed 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, Oak Ridge National Laboratory; Amir Afzali, Southern Company; Bernard Carluec, Framatome; Sacit Cetiner, Oak Ridge National Laboratory; Kun Chen, Shanghai Institute of Applied Physics; Ondrej Chvala, University of Tennessee; Stephen Cook, Canadian Nuclear Safety Commission; George Flanagan, Oak Ridge National Laboratory; Charles Forsberg, Massachusetts Institute of Technology; Jess Gehin, Oak Ridge National Laboratory; Chris Johns, TerraPower; Brian Johnson, TerraPower; Lars Jorgensen, Thorcon; Kevin Kramer, TerraPower; John Kutsch, Terrestrial Energy; Imtiaz Madni; U.S. Nuclear Regulatory Commission; Christian Marciulescu, Electric Power Research Institute; Jan Mazza, U.S. Nuclear Regulatory Commission; Laurence Miller, University of Tennessee; Per Peterson, University of California – Berkley; Nicholas Smith, Southern Company; Andrew Sowder, Electric Power Research Institute; Edward Wallace, GNBC Associates, Inc.

Status: The PINS was approved and submitted to ANSI on 7/7/16. Work on the draft continues.

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

Scope: *This standard is technology-neutral and applicable to new reactor designs. It specifies objectives for augmenting deterministic nuclear safety design practices using risk-informed, performance-based (RIPB) methods. The application of RIPB methods to high level safety criteria selection, nuclear safety functions and margin, licensing-basis-event selection, equipment classification, and defense-in-depth adequacy is described to ensure RIPB-augmentation of nuclear safety design practices is consistently applied for all new reactor technologies. The application of this standard to existing reactors is beyond the scope of this standard*

Membership*:*
Mark Linn, Chair, Oak Ridge National Laboratory; David Johnson, Vice Chair, ABS Consulting; David Blanchard, Applied Reliability Engineering; Milton Capiotis, Worley Parsons Resources and Energy; Gary Corpora, Westinghouse Electric Company, LLC; William McTigue, URS Safety Management Solutions; Paul Sicard, Entergy; Kristina Soderholm, Fortum Corporation; Kent Welter, NuScale Power Inc.; Russell Williston, Individual

Status: PINS approved in 2015. The draft is in development.

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:
Amir Afzali, Chair, Southern Company; David Blanchard, Applied Reliability Engineering; William Culp, Fluor Enterprises; Bryan Erler Individual (alternate), ASME Board of Governors; C. Rick Grantom, ASME BNCS; Raymond Herb, Southern Company; Ralph Hill, Hill Engineering Solutions LLC, ASME BNCS; Brian Johnson, TerraPower; Prasad Kadambi, Individual; Russ Lake, BWX Technologies, Inc.; Herbert Massie, Individual; John McLean, Sargent & Lundy, LLC; Enerel Munkhzul, Associate Member, Holtec International; James Pappas, Westinghouse Electric Company, LLC; Hanh Phan, U.S. Nuclear Regulatory Commission; Johannes Pickelmann, Framatome; Kristiina Soderholm, Fortum Corporation; Ralph Surman, Westinghouse Electric Company, LLC; Richard Turk, Individual; Kent Welter, NuScale Power; Inc.

Status: PINS was submitted to ANSI on 7/7/2016. Work on the draft was put on hold until completion of the Licensing Modernization Project.

ANSI/ANS-53.1-2011 (R2016), "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, Southern Company

Status: The standard was reaffirmed on 10/31/2016. 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. To that end, working group members are being reviewed, new members solicited, and other interested parties identified. The working group will collect suggested updates from other ANS parties working on related materials, primary in the RARRC & LLWRCC. Based on these suggestions, the working group will identify top areas for review and update development, and once approved, set about developing revisions for those. The working group expects that the basic content of ANS-53.1 will remain the same but that the overall length and complexity of the existing standard will fall. The working group believes that the revision will be an improved version of ANS-53.1 that will be more useful to all MHR designers.

ANS-54.1, "Nuclear Safety Criteria and Design Process for Liquid-Sodium-Cooled Nuclear Power Plants" (historical revision of ANSI/ANS-54.1-1989 – proposed new standard)

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

Membership:
George Flanagan, Chair, Oak Ridge National Laboratory, Robert Budnitz, Vice Chair, Lawrence Berkley National Laboratory; Robert Bari, Brookhaven National Laboratory; Peter Gaillard, TerraPower; Michael Garrett, TerraPower; 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 Reguatory Commission; Yasushi Okano, Japan Atomic Energy Agency; Roald Wigeland, Idaho National Laboratory

Status: The draft standard was balloted by the subcommittee in 2017 and by the RARCC in 2018. The working group is working to resolve RARCC comments and revise the draft.

Operation of Research Reactors Subcommittee (ANS-15)

Membership:
Thomas Newton, Chair, National Institute of Standards & Technology
Alexander Adams, Jr., U.S. Nuclear Regulatory Commission
(Alternate: Anthony Mendiola, U.S. Nuclear Regulatory Commission)
Leo M. Bobek, University of Massachusetts, Lowell
Matthew Burger, Sandia National Laboratories
Daniel Cronin, University of Florida at Gainesville
Leslie Foyto, University of Missouri
Gary Harms, Sandia National Laboratories
Stephen Miller, Armed Forces Radiobiology Research Institute
Marya Morrison, Idaho National Laboratory
Sean O'Kelly, Idaho National Laboratory
Daniel Pinkston, Oak Ridge National Laboratory
Steven Reese, Oregon State University
Randolph Strader, National Institute of Standards & Technology

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

ANSI/ANS-1-2000 (R2012), "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:
Gary A. Harms, Chair, Sandia National Laboratories; Robert Busch, University of New Mexico; David Hayes, Los Alamos National Laboratory; Ronald Knief, Sandia National Laboratories; Thomas McLaughlin, Individual; Richard Paternoster, Los Alamos National Laboratory; Steven Payne, U.S. Department of Energy; Jeffrey Philbin, Sandia National Laboratories; Abraham Weitzberg, Individual

Status: The standard was reaffirmed on 10/5/12. A PINS for a revision was submitted to ANSI on 7/7/2017. With the passing of working group chair, Theodore Schmidt, Gary Harms assumed the chair position. David Hayes from LANL was added to the working group. The group will seek reaffirmation of the standard in 2019 to keep it current while the revision is completed.

ANSI/ANS-14.1-2004 (R2014), "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:
Matt Burger, Chair, Sandia National Laboratories; Rick Anderson, Los Alamos National Laboratory; James Bryson, Sandia National Laboratories; Armando De La Paz, Vista Technologies; James Felty, Science Applications International Corporation; Michael Flanders, White Sands Missile Range; Joetta Goda, Los Alamos National Laboratory; Abdul Kazi, Aberdeen Pulse Radiation Facility; Ronald Knief, Sandia National Laboratories; Marvin Mendonca, U.S. Nuclear Regulatory Commission; Douglas Minnema, National Nuclear Security Administration; Gerald Schlapper, National Nuclear Security Administration

Status: The standard was reaffirmed in 12/12/2014. With the passing of long-time working group chair, Theodore Schmidt, Matt Burger took over as chair. A revision will likely be initiated in the 2019 timeframe. The working group will seek reaffirmation of the standard to keep it current during the revision.

ANSI/ANS-15.1-2007 (R2018), "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 Missouri; Alexander Adams, U.S. Nuclear Regulatory Commission, Leo Bobek, University of Massachusetts-Lowell; Daniel Cronin, University of Florida; Stephen Miller, Armed Forces Radiobiology Research Institute; Sean O'Kelly, Idaho National Laboratory; Steve Reese, Oregon State University; Theodore Schmidt, Sandia National Laboratories; Brian Shea, University of Florida

Status: This standard received ANSI approval of a reaffirmation on 4/10/18. Research reactor licensees and NRC staff have discussed updating definitions and phrases in the standard from lessons learned during recent license renewals. A revision will be initiated in the near future.

ANSI/ANS-15.2-1999 (R2016), "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:
Daniel Pinkston, Co-Chair, Oak Ridge National Laboratory; Jeffrey Brower, Co-Chair, Idaho National Laboratory; Clinton Cooper, Idaho National Laboratory; Randolph Strader, National Institute of Standards and Technology; John Sease, Individual

Status: The reaffirmation of this standard was approved by ANSI on 8/18/2016. 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. No activity reported in 2018.

ANSI/ANS-15.4-2016, "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:
Leo Bobek, Co-chair, University of Massachusetts–Lowell; Christopher Heysel, McMaster University; Daniel Hughes, National Institute of Standards and Technology; Michael Krause, University of Texas at Austin; Stephen Miller, Armed Forces Radiobiology Research Institute; Phillip Young, U.S. Nuclear Regulatory Commission.

Status: Received ANSI approval on 4/19/2016. No activity reported in 2018.

ANSI/ANS-15.8-1995 (R2018), "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:
Randolph Strader, Chair, National Institute of Standards and Technology; Gary Kirk, Oak Ridge National Laboratory; Daniel Menchaca, Texas A&M University; Richard Pratt, Sandia National Laboratory; Jared Wright, Babcock & Wilcox Nuclear Operations Group

Status: A reaffirmation was approved by ANSI on 7/18/2018. No activity reported in 2018.

ANSI/ANS-15.11-2016, "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; David Brown, National Institute of Standard and Technology; Ronald Dobey, University of Missouri; Wesley Frey, University of California at Davis

Status: The revised standard was approved by ANSI on 5/13/16 and published July 2016. No work occurred on the standard in 2018.

ANSI/ANS-15.16-2015, "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 Missouri; Steven Miller, Armed Forces Radiobiology Research Institute; Michael Norris, U.S. Nuclear Regulatory Commission; Sean O'Kelly, Idaho National Laboratory

Status: The revised standard was approved by ANSI on 2/11/2015. No work on this standard occurred in 2018.

ANSI/ANS-15.21-2012 (R2018), "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 repot. This standard provides the criteria for the format and content for safety analysis reports for research reactors.*

Membership:
Alexander Adams, Chair, U.S. Nuclear Regulatory Commission; Steven Miller, Armed Forces Radiobiology Research Institute, National Naval Medical Center; Steven Reese, Oregon State University; Clifford Stanley, Idaho National Laboratory

Status: The standard was reaffirmed by ANSI on 2/27/2018.

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:
Daniel Cronin, Chair, University of Florida-Gainesville; Alexander Adams, U.S. Nuclear Regulatory Commission; Leo Bobek, University of Massachusetts-Lowell; Joshua Halsted (Associate Member), Oregon State University; Brenden Heidrich, Idaho National Laboratory; Jere Jenkins, Thermo Risher Scientific; Steven Lynch, U.S. Nuclear Regulatory Commision; Bruce Meffert, University of Missouri; Steven Reese, Oregon State University; Patrick Snouffer, Bechtel Power Corporation; Clifford Stanley, Los Alamos National Laboratory; Randy Strader, National Institute of Standards & Technology; Carroll Trull, Westinghouse Electric Company, LLC

Status: The PINS was submitted to ANSI on 3/27/2017. Several new members were added to the working group. Member opinions sought on appropriate SSC classifications and threshold dose levels for the new standard.

Research Advanced Reactors Consensus Committee (RARCC) Organizational Chart

Chair: George F. Flanagan
Vice Chairs: Bruce B. Bevard, Thomas Newton

ANS-15	ANS-29
Operation of Research Reactors	**Advanced Initiatives**
Thomas Newton (Chair)	Bruce B. Bevard (Chair)
9 Current Standards	**1 Current Standards**
1 Project	**5 Projects**
Ⓟ = PINS submitted to ANSI	
ANS-1-2000 (R2012) Ⓟ Conduct of Critical Experiments RF 10/5/2012 (WGC: G. Harms)	ANS-20.1 (NEW) Ⓟ Nuclear Safety Criteria and Design Process for Fluoride Salt-Cooled High-Temperature Reactor NPPs **-- PROJECT ON INDEFINITE HOLD --** (WGC: E. Blandford/M. Denman)
ANS-14.1-2004 (R2014) Operation of Fast Pulse Reactors RF 12/12/14 (WGC: M. Burger)	ANS-20.2 (NEW) Ⓟ Nuclear Safety Design Criteria and Functional Performance Requirements for Liquid-Fuel Molten Salt Reactor Nuclear Power Plants (WGC: D. Holcomb)
ANS-15.1-2007 (R2018) Development of Technical Specifications for Research Reactors RF 4/10/18 (WGC: L. Foyto)	ANS-30.1 (NEW) Ⓟ Integrating Risk and Performance Objectives into New Reactor Nuclear Safety Designs (WGC: M. Linn)
ANS-15.2-1999 (R2016) Quality Control for Plate-Type Uranium-Aluminum Fuel Elements RF 8/18/16 (WGC: D. Pinkston)	ANS-30.2 (NEW) Ⓟ Categorization and Classification of Structures, Systems, and Components for New Nuclear Power Plants (WGC: A. Afzali)
ANS-15.4-2016 Selection and Training of Personnel for Research Reactors App'd 4/19/16 (WGC: L. Bobek)	ANS-53.1-2011 (R2016) Nuclear Safety Design Process for Modular Helium-Cooled Reactor Plants RF 10/31/16 (WGC: J. August)
ANS-15.8-1995 (R2018) Ⓟ Quality Assurance Program Requirements for Research Reactors RF 7/18/18 (WGC: R. Strader)	ANS-54.1 (W1999) Ⓟ Nuclear Safety Criteria and Design Process for Sodium Fast Reactor NPPs (WGC: G. Flanagan)
ANS-15.11-2016 Radiation Protection at Research Reactors App'd 5/13/16 (WGC: S. Reese)	
ANS-15.16-2015 Emergency Planning for Research Reactors App'd 2/11/15 (WGC: S. Reese)	
ANS-15.21-2012 (R2018) Format and Content for Safety Analysis Reports for Research Reactors RF 2/27/2018 (WGC: A. Adams)	
ANS-15.22 (NEW) Ⓟ Classification of Structures, Systems, and Components for Research Reactors (WGC: D. Cronin)	

Table 6 – RARCC Organizational Chart

Safety and Radiological Analyses Consensus Committee (SRACC)

Andrew O. Smetana, Chair
Savannah River National Laboratory

Scope: *The SRACC is responsible for the preparation and maintenance of voluntary consensus standards for 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, Savannah River National Laboratory
Julie Jarvis, Vice Chair, Bechtel Power Corporation
F. Arzu Alpan, Westinghouse Electric Company, LLC
Richard S. Amato, Individual
Dimitrios M. Cokinos, Brookhaven National Laboratory
Donald J. Dudziak, Los Alamos National Laboratory
Christopher Graham, Health Physics Society Representative (Employed by Ameren)
Mukesh K. Gupta, AECOM – Professional Solutions
Nolan E. Hertel, Georgia Institute of Technology
Paul Hulse, Sellafield, LTD.
Donald E. Palmrose, U.S. Nuclear Regulatory Commission
Charles T. Rombough, CTR Technical Services, Inc.
Charlotta E. Sanders, University of Nevada, Las Vegas
Abraham Weitzberg, Individual

Report of SRACC:
The SRACC held a physical meeting during the 2018 ANS Winter Meeting in Orlando, FL. No membership changes were made in 2018.

Approved in 2018:

ANSI/ANS-6.1.2-2013 (R2018), "Group-Averaged Neutron and Gamma-Ray Cross Sections for Radiation Protection and Shielding Calculations for Nuclear Power Plants" (reaffirmation of ANSI/ANS-6.1.2-2013)

ANSI/ANS-10.7-2013 (R2018), "Non-Real Time, High Integrity Software for the Nuclear Industry--Developer Requirements" (reaffirmation of ANSI/ANS-10.7-2013)

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

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

ANS-19.5, "Requirements for Reference Reactor Physics Measurements" (historical revision of ANS-19.5-1995 – proposed new standard)

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

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
Byron Frank, Westinghouse Electric Company, LLC
Robin Jones, Southern Company
Charles Martin, National Security Technologies
Yuri Orechwa, U.S. Nuclear Regulatory Commission
Paul Romano (Associate Member), Argonne National Laboratory
Robert Singleterry, NASA Langley Research Center
Andrew Smetana, Savannah River National Laboratory
Charlie Sparrow, Individual

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

ANSI/ANS-10.2-2000 (R2009), "Portability of Scientific and Engineering Software" (revision of ANSI/ANS-10.2-1988)

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: A reaffirmation was approved by ANSI on 8/14/2009. The working group recommends letting the standard be withdrawn administratively on 8/14/19 (10th anniversary). 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.

ANSI/ANS-10.4-2008 (R2016), "Verification and Validation of Non-Safety Related Scientific and Engineering Computer Programs for the Nuclear Industry" (historical revision of ANSI/ANS-10.4-1987; R1998 – new standard)

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:
Robin Jones, Chair, Southern Company; Nima Fathi (Associate Member), University of New Mexico; Byron Frank, Westinghouse Electric Company, LLC; Paul Hulse, Sellafield Ltd. Wai Law, Tennessee Valley Authority Paul Romano (Associate Member), Argonne National Laboratory; Ralph Schwartzbeck, Highland TEMS, LLC; Andrew Smetana, Savannah River National Laboratory

Status: The standard was reaffirmed on 9/26/16. A working group has been formed to update this standard. Particular focus is being placed on updating the definitions and nomenclature to ensure they are consistent with both modern usage and similar ANS standards.

ANSI/ANS-10.5-2006 (R2016), "Accommodating User Needs in Scientific and Engineering Computer Software Development" (historical revision of ANSI/ANS-10.5-1994 – new standard)

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

Membership:
Andrew Smetana, Chair, Savannah River National Laboratory; Jennifer Manneschmidt, Oak Ridge National Laboratory

Status: The standard was reaffirmed on 12/8/16. No activity in 2018.

ANSI/ANS-10.7-2013 (R2018), "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:
OPEN, Chair; Mark Baird, Oak Ridge National Laboratory; Forrest Brown, Los Alamos National Laboratory; Phillip Ellison, GE-Hitachi; Paul Hulse, Sellafield Ltd.; Vincent Penkrot, Westinghouse Electric Company, LLC; Bradley Rearden, Oak Ridge National Laboratory; William Rider, Sandia National Laboratories; J. R. Shultz, U.S. Department of Energy; Shivaji Seth, U.S. Department of Energy; Andrew Smetana, Savannah River National Laboratory; Jin Yan, Westinghouse Electric Company, LLC

In addition, substantial contributions towards the development of earlier drafts of this proposed standard were received from the following: Toni Austin, U.S. Department of Energy; Brett Dooies, GE-Hitachi; Jim Fawks, GE-Hitachi; Ahmad Haidari, ANSYS; Sherry Hardgrave, Consolidated Nuclear Security, LLC, National Nuclear Security Administration; Edwin Harvego, Idaho National Laboratory; Harvey S. Hopkins, Lawrence Livermore National Laboratory; Jed Jordan, GE-Hitachi; Bernadette Kirk, Oak Ridge National Laboratory; Timothy M. Lloyd, BNFL Fuel Solutions; Jennifer Manneschmidt, Oak Ridge National Laboratory; Yuri Orechwa, U.S. Nuclear Regulatory Commission; Julio Pardo, Savannah River Technology Center; David Peercy, Sandia National Laboratories; Gregory Pope, Lawrence Livermore National Laboratory; and R. C. Singleterry, NASA Langley Research Center; Robert Singleterry, NASA Langley Research Center; Charles Sparrow, Consultant

Status: ANSI approval was received 3/18/2013. Reaffirmation of this standard was approved on 8/13/2018.

ANSI/ANS-10.8-2015, "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, National Security Technologies, LLC; Vincent S. Penkrot, Westinghouse Electric Company, LLC; Subir Sen, U.S. Department of Energy; Shivajli Seth, U.S. Department of Energy; J. R. Shultz, U.S. Department of Energy; Andrew Smetana, Savannah River Nuclear Solutions

Status: ANSI/ANS-10.8-2015 received ANSI approval on 11/19/2015. This standard is a complement to ANSI/ANS-10.7-2013, “Non-Real Time, High-Integrity Software Industry—Developer Requirements.” No activity in 2018.

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ANSI/ANS-41.5-2012 (R2018), “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.*

*****Maintenance of this standard was transferred to the Siting: General & Monitoring Subcommittee of the Environmental & Siting Consensus Committee.*****

Reactor Physics Subcommittee (ANS-19)

Membership:
Dimitrios Cokinos, Chair, Brookhaven National Laboratory
Charles Rombough, Secretary, CTR Technical Services, Inc

John Bess, Idaho National Laboratory
Anthony Campos, Framatome
Ren-Tai Chiang, Individual
Mark DeHart, Idaho National Laboratory
David Diamond, Brookhaven National Laboratory
Mark Eckenrode, Framatome
Ian Gauld, Oak Ridge National Laboratory
Alireza Haghighat, Virginia Tech Research Center
Jun-ichi Katakura, Japan Atomic Energy Agency
Edward Knuckles, Individual
Robert Little, Los Alamos National Laboratory
Moussa Mahgerefteh, Exelon Corporation
Eleodor Nichita, University of Ontario Institute of Technology
Georgeta Radulescu, Oak Ridge National Laboratory
Benjamin Rouben, Individual
Abraham Weitzberg, Individual

Status: 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, "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:
Ian Gauld, Chair, Oak Ridge National Laboratory; Mourad Aissa, U.S. Nuclear Regulatory Commission; Jesse Klingensmith, Westinghouse Electric Company, LLC; Edward Knuckles, Individual; Dmitri Ziabletsev, Framatome

Status: ANSI approved ANSI/ANS-5.1-2014 on 11/4/2014. The working group membership was reformed in 2017. In 2018, the working group initiated the process for reaffirmation which is expected to be approved in early 2019. An inquiry was received and responded to in 2018.

ANSI/ANS-19.1-2002 (R2011), "Nuclear Data Sets for Reactor Design Calculations" (revision of ANSI/ANS-19.1-1983; R1989)

Scope: *This standard identifies and describes the specifications for developing, preparing, and documenting nuclear data sets to be used in reactor design calculations. The specifications include (a) criteria for acceptance of evaluated nuclear data sets, (b) criteria for processing evaluated data and preparation of processed continuous data and averaged data sets (c) identification of specific evaluated, processed continuous, and averaged data sets that meet these criteria for specific reactor types.*

Membership:
Robert Little, Chair, Los Alamos National Laboratory; Arzu Alpan, Westinghouse Electric Company, LLC; Steve Baker, Transware Enterprises; Dimitrios Cokinos, Brookhaven National Laboratory; Dermott Cullen, Individual; Michael Dunn, Oak Ridge National Laboratory; Mike Garland, Oak Ridge National Laboratory; Donald Harris, RPI - Retired; Michal Herman, Brookhaven National Laboratory; Albert Kahler, Los Alamos National Laboratory; Russell Mosteller, Individual; Benjamin Rouben, Atomic Energy of Canada Limited; Mike Zerkle, Bettis

Status: Reaffirmation received ANSI approval 6/17/2011. The proposed revision was issued to the SRACC for ballot on 10/30/18 with a close date of 1/28/19. No technical comments were received on the ballot at year end.

ANSI/ANS-19.3-2011 (R2017), "Steady-State Neutronics Methods for Power Reactor Analysis" (revision of ANSI/ANS-19.3-2005)

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; Steven Baker, Transware Enterprises; John Bess, Idaho National Laboratory; Ren-Tai Chiang, Individual; Dimitrios Cokinos, Brookhaven National Laboratory; Ronald Ellis, Oak Ridge National Laboratory; Godfrey Gert, Global Nuclear Fuel; Donald Harris, Rensselaer Polytechnic Institute-retired; Greg Hobson,Framatome; Ken Kozier, Atomic Energy of Canada Limited; Guy Marleau, Ecole Polytechnique de Montreal; Russell Mosteller, Individual; Charles Rombough, CTR Technical Services; Benjamin Rouben, 12 & 1 Consulting; Wei Shen, Canadian Nuclear Safety Commission; Robert St. Clair, Duke Energy; Scott Thomas, Duke Power; William Walters, Penn State University; Peter Yarsky, U.S. Nuclear Regulatory Commission; Baocheng Zhang, Westinghouse Electric Company, LLC

Status: The standard was reaffirmed on 1/24/2017. The working group met at the ANS Annual Meeting in Philadelphia. The working group is currently working on small revisions and updates to the standard.

ANSI/ANS-19.3.4-2002 (R2017), "The Determination of Thermal Energy Deposition Rates in Nuclear Reactors" (revision of ANSI/ANS-19.3.4-1976; R1983; R1989)

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, Westinghouse Electric Company, LLC; John Bess, Idaho National Laboratory; Dimitrios Cokinos, Brookhaven National Laboratory; Adolpho Ferrer, Studsvik Scandpower Inc.; Joel Rhodes, Studsvik Scandpower Inc.; Baocheng Zhang, Westinghouse Electric Company, LLC

Status: Standard was reaffirmed on 5/18/2017. The PINS form for a revision of the standard was approved and submitted to the ANSI on 8/17/2017. Work is on-going on the next revision with a goal of submitting a complete draft to review in 2020.The working group met at the 2018 ANS Annual Meeting in Orlando, FL, to discuss the contents of a proposed appendix to the next revision of the standard.

ANSI/ANS-19.4-2017, "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, Idaho National Laboratory; Ren-Tai Chiang, Individual, Dimitrios Cokinos, Brookhaven National Laboratory; Mark Eckenrode, Framatome; Moussa Mahgerefteh, Exelon Corporation; Jeremy Roberts, Kansas State University; Charles Rombough, CTR Technical Services, Inc.; Benjamin Rouben, Individual; Rick Sancton, Individual

Status: Standard received ANSI approval on 8/24/2017. Reaffirmation will be sought in 2022.

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

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; Anthony Attard, U.S. Nuclear Regulatory Commission; John Bess, Idaho National Laboratory; Blair Briggs, Idaho National Laboratory; Jeffrey Brown, Westinghouse Electric

Company, LLC; Chris Ellis, General Atomics; Sedat Goluoglu, Oak Ridge National Laboratory; Louis Grobmyer, Westinghouse Electric Company, LLC; Albert Hanson, Brookhaven National Laboratory; Germina Ilas, Oak Ridge National Laboratory; Zain Karriem, Idaho National Laboratory; Trent Primm, Primm Consulting; Abul Shakil, Florida Power & Light; Wei Shen, Canadian Nuclear Safety Commission; Alan Wells, Interserve; Won Sik Yang, Purdue University

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). The working group was reformed and the draft was initiated. No activity in 2018.

ANSI/ANS-19.6.1-2011 (R2016) "Reload Startup Physics Tests for Pressurized Water Reactors" (revision of ANSI/ANS-19.6.1-2005)

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).

Membership:
Charles Rombough, Chair, CTR Technical Services, Inc.; Paul Adam, Wolf Creek NOC; Tony Attard, U.S. Nuclear Regulatory Commission; Robert Borchert, Dominion Nuclear Connecticut; Jason Dever, Framatome; Mark Eckenrode, Framatome; Anthony Campos, Framatome; Fred Gershkoff, Southern California Edison; Louis Grobmyer, Westinghouse Electric Company, LLC; Dan Kelley, FirstEnergy Nuclear Operating Company; Moussa Mahgerefteh, Exelon Corporation; Michael Presnell, Duke Power Company; Paul Rohr, Westinghouse Electric Company, LLC; Ken Sahadewan, Exelon Nuclear; John Singleton, Constellation Energy; Carl Stafford, Arizona Public Service Company; Daniel Wellbaum, Duke Energy

Status: A reaffirmation of the standard was approved by ANSI on 8/5/16. A PINS for the next revision was submitted to ANSI on 10/14/16.

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

Unapproved 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:
Dimitrios Cokinos, Chair pro tem, Brookhaven National Laboratory; William Wilson, Los Alamos National Laboratory; Robert Perry, Instituto Nacional de Invest. Nuclear; Individual

Status: ANS-19.8 was previously designated ANS-5.2. A permanent chair is being sought to initiate this project. A PINS will be the first task.

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:
OPEN

Status: A skeleton of the standard has been completed. A working group of active participants is needed to move forward.

ANSI/ANS-19.10-2009 (R2016), "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; F. Arzu Alpan, Westinghouse Electric Company, LLC; Dimitrios Cokinos, Brookhaven National Laboratory; Edward Knuckles, Individual; Robert Little, Los Alamos National Laboratory; Moussa Mahgerefteh, Exelon Corporation; Benjamin Parks, U.S. Nuclear Regulatory Commission; Amrit Patel, U.S. Nuclear Regulatory Commission; Joes Risner, Oak Ridge National Laboratory; Steven Thompson (Associate Member), Dominion

Status: A reaffirmation was approved by ANSI on 10/11/2016.

ANSI/ANS-19.11-2017, "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, Exelon Corporation; Steven Baker, Transware Enterprises; Robert Borland, First Energy Nuclear Operating Company; David Brown, Tennessee Valley Authority; Dimitrios Cokinos, Brookhaven National Laboratory; Mark Eckenrode, Framatome; Edward Knuckles, Individual

Status: The revision of ANSI/ANS-19.11-1997 was completed and approved by ANSI on 4/11/2017.

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 tem, Brookhaven National Laboratory; Steve Binney, Oregon State University–retired; Ken Krane, Oregon State University–retired; Saed Mirzadeh, Oak Ridge National Laboratory; Frank Schmittroth, Westinghouse Electric Company, LLC; Chuck Alexander; Oak Ridge National Laboratory

Status: PINS approved and submitted to ANSI in 2010. The project is in need of a permanent chair.

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, –Sanders Engineering
F. Arzu Alpan, Westinghouse Electric Company, LLC
Richard Amato, Individual
Paul Bergstrom, National Institute of Standards and Technology
Carl Beyer, Individual
Donald Duziak, Los Alamos National Laboratory
Mukesh Gupta, AECOM – Professional Solutions
Nolan Hertel, Georgia Institute of Technology
Brian Hinderliter, University of Minnesota - Duluth
Sharad (Ken) Jha, Bechtel Corporation
Steven Nathan, Savannah River Nuclear Solutions
Jeffrey C. Ryman, Individual
Ali A. Simpkins, HPS Liaison (Employed by Dade Moeller, an NV5 Company)

Shielding Subcommittee (ANS-6) Report

The Shielding Subcommittee (ANS-6) activities fall under the shielding track of the Safety & Radiological Analyses Consensus Committee (SRACC). During 2017, the PINS for ANSI/ANS-6.1.1-1991 (W2001), “Neutron and Photon Fluence-to-Dose Conversion Coefficients ,” was submitted to SRACC for approval (comments were provided and currently awaiting resolution). Additionally, the International Organization of Standardization (ISO), Subcommittee 6 (Reactor Technology), Working Group 1, is exploring a new work item to issue a standard titled “Group-Averaged Neutron and Gamma-Ray Cross Sections for Radiation Protection and Shielding Calculations for Nuclear Reactors,” which is based on ANSI/ANS-6.1.2-2013, “Neutron and Gamma-Ray Cross Sections for Nuclear Radiation Protection Calculations for Nuclear Power Plants.”

The Shielding Subcommittee manages the following active and current standards:

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

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:
Carl Beyer, Chair, Individual; A. J. Turnbul, Vice Chair, Consultant; Daniel Baron, EDF - France; Michelle Billaux, .Framatome; Paul Clifford, U.S. Nuclear Regulatory Commission; Nayem Jahingir, Global Nuclear Fuel; Erik Kolstad, Institutt for Energiteknikk; Brent Lewis, Royal Military College of Canada; Yun Long, Westinghouse Electric Company, LLC; Robert Montgomery, Anatech; Chuck Patterson, Global Nuclear Fuel; C.S. Rim, Consultant; John Voglewede, U.S. Nuclear Regulatory Commission; Bob Weiner, K W Consulting; S.L. Wu, U.S. Nuclear Regulatory Commission

Status: Received ANSI approval on 5/19/2011. No activity in 2018.

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ANSI/ANS-5.10-1998 (R2013), "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, AECOM–Professional Solutions; Gerard Couture, Westinghouse Electric Company, LLC; Terry Foppe, Foppe & Associates; Derek Gordon, Los Alamos National Laboratory; Geoffrey Kaiser, Science Applications International Corporation; Robert Link, Framatome; Jofu Mishima, Consultant; Lon Paulson, General Electric; David Pinkston, Lawrence Livermore National Laboratory; Louis Restrepo, Omicron; Al Wooten, URS Professional Solutions

Status: Reaffirmation approved by ANSI 1/15/2013. Industry use is being researched. The appropriate maintenance action is being considered.

ANS-6.1.1, "Neutron and Photon Fluence-to-Dose Conversion Coefficients " (historical revision of ANSI/ANS-6.1.1-1991 – proposed new standard)

Scope from 1991 standard: *This standard presents data recommended for computing the biologically relevant dosimetric quantity in neutron and gamma-ray radiation fields. Specifically, this standard is intended for use by shield designers to calculate effective dose equivalent. Values are given for effective dose equivalent per unit fluence for neutron energies from 1eV to 14 MeV and for gamma-ray energies from 0.01 to 12 MeV. Establishing maximum permissible exposure limits is outside the scope of this standard.*

Membership:
Paul Bergstrom, Co-chair, National Institute of Standards and Technology; Nolan Hertel, Co-chair, Georgia Institute of Technology; Elijah Dickson, U.S. Nuclear Regulatory Commission

Status: This standard was administratively withdrawn in 2001. A reinvigoration of the historical standard has been suggested. A PINS form was submitted to ANSI on 10/24/18 with a new title -- Neutron and Photon Fluence-to-Dose Conversion Coefficients.

ANSI/ANS-6.1.2-2013, "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:
Arzu Alpan, Chair, Westinghouse Electric Company, LLC; James Adams, Corvus Integration, Inc.; Stanwood Anderson, Westinghouse Electric Company, LLC; John Carew, Brookhaven National Laboratory; Juan-Luis Francois, UNAM-Mexico; Patrick Griffin, Sandia National Laboratories; Alireza Haghighat, Virginia Tech; Robert Little, Los Alamos National Laboratory; Yuri Orechwa, U.S. Nuclear Regulatory Commission; Jeffrey Ryman, URS Professional Solutions; Mark Williams, Oak Ridge National Laboratory

Status: The standard was approved by ANSI on 8/28/2013. No activity in 2017.

ANSI/ANS-6.3.1-1987 (R2015), "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

Status: Reaffirmation received ANSI approval 12/11/2015. No current activity. A working group chair is being sought.

ANSI/ANS-6.4-2006 (R2016), "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:
Sharad (Ken) Jha, Chair, Bechtel Corporation; Hiruta Hikaru, Idaho National Laboratory; Julie Jarvis, Bechtel Corporation

Status: Reaffirmation of the standard was approved by ANSI on 8/4/2016. In reviewing the standard for reaffirmation, the working group suggested that the next revision include a discussion of hybrid methods as well as additional codes such as MicroShield and SCALE. It is expected that the next revision will be initiated after the reissue of ANS-6.4.3, which is currently being revised. No activity in 2018.

ANSI/ANS-6.4.2-2006 (R2016), "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:
Steven Nathan, Chair, Savannah River Nuclear Solutions; Peter Caracappa, Rensselaer Polytechnic Institute; Stanley Haynes, Sandia National Laboratories; Brian Hinderliter, University of Minnesota-Duluth; Ahmad Ibrahim, Oak Ridge National Laboratory; Timothy Lloyd, Westinghouse Electric Company, LLC; Bill McTigue, URS Professional Solutions; Kathryn Robertson-DeMers, Spectrum Technical Services, Inc.; Kenneth Shultis, Kansas State University; Stanley Tackett (Associate Member), Franklin University; Nancy Willoughby, New York City Department of Design & Construction

Status: The standard was reaffirmed on 9/27/2016. A PINS was prepared for a revision of this standard and submitted to ANSI in 2012. The reaffirmation will keep the standard current while the revision is completed.

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)

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:
Jeffrey C. Ryman, Co-Chair, Individual; Donald Dudziak, Co-Chair, Individual; F. Arzu Alpan, Westinghouse Electric Company, LLC; Adam Davis, Los Alamos National Laboratory; Keith Eckerman, Oak Ridge National Laboratory; Richard Faw, Kansas State University, Emeritus; Jack Higginbotham, Oregon State University; Brian Hinderliter, University of Minnesota – Duluth; Essam A. Hussein, University of New Brunswick; Darby Kimball, Lawrence Livermore National Laboratory; Irina Popova, Oak Ridge National Laboratory; Thomas Rosener, TASC, Inc.; Yukio Sakamoto, Japan Atomic Energy Agency; Charlotta E. Sanders, University of Las Vegas/Sanders Engineering; Sylvia Wang, Westinghouse Electric Company, LLC

Status: The PINS form for a historical revision of ANSI/ANS-6.4.3-1991 was approved and submitted to ANSI on 3/15/2012. No activity reported for 2018.

ANSI/ANS-6.6.1-2015, "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/ANS-6.6.1-2015 was approved by ANSI on 8/21/2015.

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
2 = Projects	0 = Projects	4 = Projects
7 = Current Standards	5 = Current Standards	8 = Current Standards
Ⓟ = PINS submitted to ANSI		
ANS-5.4-2011 Method for Calculating the Fractional Release of Volatile Fission Products from Oxide Fuel Approved 5/19/2011 (WGC: C. Beyer)	ANS-10.2-2000 (R2009) Portability of Scientific and Engineering Software RF 8/14/2009 (WGC: R. Singleterry)	ANS-5.1-2014 Decay Heat Power in Light Water Reactors Approved 11/7/14 (WGC: I. Gauld)
ANS-5.10-1998 (R2013) Airborne Release Fractions at Non-Reactor Nuclear Facilities RF 1/15/2013 (WGC: M. Gupta)	ANS-10.4-2008 (R2016) Verification and Validation of Non-Safety-Related Scientific and Engineering Computer Programs for the Nuclear Industry RF 9/26/2016 (WGC: R. Jones)	ANS-19.1-2002 (R2011) Ⓟ Nuclear Data Sets for Reactor Design Calculations RF 6/17/2011 (WGC: R. Little)
ANS-6.1.1 (W2001) Neutron and Photon Fluence-to-Dose Conversion Coefficients (WGC: N. Hertel/P. Bergstrom)	ANS-10.5-2006 (R2016) Accommodating User Needs in Scientific and Engineering Computer Software Development RF 12/8/2016 (WGC: A. Smetana)	ANS-19.3-2011 (R2017) Determination of Steady-State Neutron Reaction-Rate Distributions and Reactivity of Nuclear Power Reactors Approved 1/24/2017 (WGC: E. Nichita)
ANS-6.1.2-2013 (R2018) Group-Averaged Neutron and Gamma-Ray Cross Sections for Radiation Protection and Shielding Calculations for NPPs Approved 10/19/2018 (WGC: A. Alpan)	ANS-10.7-2013 (R2018) Non-Real-Time, High Integrity Software for the Nuclear Industry—Developer Requirements Approved 8/13/2018 (WGC: Open)	ANS-19.3.4-2002 (R2017) Ⓟ The Determination of Thermal Energy Deposition Rates in Nuclear Reactors RF 5/18/2017 (WGC: G. Radulescu)
ANS-6.3.1-1987 (R2015) Program for Testing Radiation Shields in Light Water Reactors (LWR) RF 12/11/2015 (WGC: Open)	ANS-10.8-2015 Non-Real Time, High Integrity Software for the Nuclear Industry—User Requirements Approved 11/19/2015 (WGC: Open)	ANS-19.4-2017 Acquisition and Documentation of Reference Power Reactor Physics Measurements for Nuclear Analysis Verification App'd 8/24/2017 (WGC: E. Knuckles)
ANS-6.4-2006 (R2016) Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants RF 8/4/2016 (WGC: K. Jha)		ANS-19.5 (W2005) Ⓟ Requirements for Reference Reactor Physics Measurements (WGC: M. DeHart)
ANS-6.4.2-2006 (R2016) Ⓟ Specification for Radiation Shielding Materials RF 9/27/2016 (WGC: S. Nathan)		ANS-19.6.1-2011 (R2016) Ⓟ Reload Startup Physics Tests for Pressurized Water Reactors RF 8/5/2016 (WGC: C. Rombough)
ANS-6.4.3 (W2001) Ⓟ Gamma-Ray Attenuation Coefficients and Buildup Factors for Engineering Materials (WGC: J. Ryman / D. Dudziak)		ANS-19.8 (NEW) Fission Product Yields for 235U, 238U, and 239P (WGC: Open)
ANS-6.6.1-2015 Calculation and Measurements of Direct and Scattered Gamma Radiation from LWR NPPs Approved 8/21/2015 (WGC: R. Amato)		ANS-19.9 (NEW) Ⓟ Delayed Neutron Parameters for Light Water Reactors (WGC: Open)
		ANS-19.10-2009 (R2016) Methods for Determining Neutron Fluence in BWR and PWR Pressure Vessel and Reactor Internals RF 10/11/2016 (WGC: A. Haghighat)
		ANS-19.11-1997 (R2011) Calculation and Measurement of the Moderator Temperature Coefficient of Reactivity for Pressurized Water Reactors RF 6/17/2011 (WGC: M. Mahgerefteh)
		ANS-19.12 (NEW) Ⓟ Nuclear Data for the Production of Radioisotope (WGC: Open)

Table 7 – SRACC Organizational Chart

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

Robert J. Budnitz, ANS Co-chair
Lawrence Berkeley National Laboratory (retired)

C. Rick Grantom, ASME Co-chair
C.R. Grantom P.E. & Associates, LLC

Scope: *The JCNRM Consensus Committee is responsible for the preparation and maintenance of voluntary consensus standards that establish safety and risk criteria and methods for completion of probabilistic risk analysis (PRA) and risk assessments. Additional related standards activities may be performed as upon concurrence of the ANS Standards Board and the ASME Standards and Certification Board. These criteria and methods are applicable to design, development, construction, operation, decontamination, decommissioning, waste management, and environmental restoration for nuclear facilities. 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.*

The JCNRM may be tasked with reviewing / commenting on risk technology related proposed provisions of standards developed by other ASME / ANS Standards Committees at the request of those standards committees.

JCNRM Membership:
Robert J. Budnitz, ANS Co-chair, Lawrence Berkeley National Laboratory (retired)
Rick Grantom, ASME Co-chair, Individual (C.R. Grantom P.E. Associates, LLC)
Dennis W. Henneke, ANS Co-vice-chair, General Electric
(Alternate: Yunlong Jonathan Li, General Electric)
Pamela F. Nelson, ASME Co-vice-chair, National Autonomous University of Mexico
Paul J. Amico, Jensen Hughes, Inc.
Victoria K. Anderson, Nuclear Energy Institute
George Apostolakis, Individual
Robert A. Bari, Brookhaven National Laboratory
Sidney Bernsen, Individual
James Chapman, Individual
Mary Drouin, U.S. Nuclear Regulatory Commission
(Alternate: Anders Gilbertson, U.S. Nuclear Regulatory Commission)
Matthew R. Denman, Kairos Power
Fernando Ferrante, Electric Power Research Institute
(Alternate: Douglas C. Hance, Electric Power Research Institute)
K. Raymond Fine, First Energy Nuclear Operating Company
Karl N. Fleming, Individual (KNF Consulting Services)
H. Alan Hackerott, Individual
Thomas G Hook, Arizona Public Service
Diane M. Jones, Maracor
Gerry W. Kindred, Tennessee Valley Authority
(Alternate: Michael J. Walker, TVA)
Shigeo Kojima, Individual (Kojima Risk Institute, Inc.)
Stanley H. Levinson, Individual
(Alternate: Paul W. Whiteman, Framatome)
Andrea Maioli, Westinghouse Electric Company, LLC
James O'Brien, U.S. Department of Energy
Mayasandra K. Ravindra, Individual, (MKRavindra Consulting)
Robert I. Rishel, Duke Energy
Raymond E. Schneider, Westinghouse Electric Company, LLC

Barry D. Sloane, Jensen Hughes, Inc.
Cornelia Spitzer, International Atomic Energy Agency
Jeffrey L. Stone, Exelon Corp.
(Alternate: Gregory A. Krueger, Exelon Corp.)
Douglas E. True, Nuclear Energy Institute
Donald J. Wakefield, ABS Consulting, Inc.
Ian B. Wall, Individual
James W. Young, GE Hitachi

Report of JCNRM:
In 2018, the JCNRM held two 4-day meetings; in February 2018 in Portland, Oregon and in September 2018 in Baltimore, Maryland. It is a pleasure to report that there seems to be almost no "friction" between the two societies in terms of how this merger has worked so far or will work in the future. The two co-chairs and the staff of the two societies are working well together and rather little in the way of a legacy of the two societies' former roles remains as an impediment. The business agreement between ASME and ANS is now in place.

The JCNRM's Executive Committee has been meeting more-or-less bi-weekly by conference call to plan the next two years' activities. The main effort is to develop the next version of the main PRA Combined Standard, which is planned now for issuance in early 2020. This next version, which we will call the "new edition" instead of an "addendum," is expected to have substantial changes to the format as well as to the content, based largely on feedback received in the past 3 - 4 years as this standard has been used by the commercial nuclear power operating fleet and by the NRC. During this period of use, many areas have been identified where inconsistencies exist between different parts of the large PRA standard, mostly due to variable interpretations, and a few other problems have also been discovered during use. A number of what the JCNRM has called "cross cutting issues" have also been identified, each of which is being worked on by one of several ad hoc project teams within the larger JCNRM. Some of these issues have policy implications for how the standard is to be used, but mostly these are issues with technical substance.

The other major JCNRM task in the next year is to ballot and issue several new standards under development that are discussed later in this report. This is a major effort, involving several dozen volunteers.

In mid-2013, the JCNRM established a separate new subcommittee, the Subcommittee on Risk Applications (SCoRA), with the charter to be the JCNRM interface with ANS and ASME (and other SDOs in the future) so as to provide assistance to other standards-development projects whenever such a project desires to develop a new standard (or modify an existing standard) to provide risk-informed or performance-based requirements. SCoRA is the JCNRM interface with the ANS Standards Board's Risk-informed and Performance-based Principles and Policy Committee (RP3C.)

For several years, a series of grants to the ANS from the U.S. Nuclear Regulatory Commission (NRC) have provided financial support for the work of the standards committee, mainly to cover travel costs of participants who have no other financial support, but also to cover a few other selected expenses. The latest in this series of grants was approved by the NRC in February 2015 and will run out in early 2019.

Active standards/projects:

ASME/ANS RA-S-1.1, "Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications" (revision of ANSI/ASME/ANS-RA-Sb-2013). Work on a new edition in actively under way. The current version is ASME/ANS-RA-Sb -2013, which is informally called "Addendum B." The next edition will be ready by early 2020.

ASME/ANS RA-S-1.2-2014, "Standard for Severe Accident Progression and Radiological Release (Level 2) PRA Methodology to Support Nuclear Installation Applications" (previously ANS/ASME-58.24) (trial use standard to be revised and seek ANSI approval). The next version of the standard will be ready for ballot 6 months after approval of the next edition of RA-S.

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).

ASME/ANS RA-S-1.4-2013, "Advanced Non LWR PRA Standard" (trial use standard to be revised and seek ANSI approval). The next version of the standard will be ready for ballot 6 months after approval of the next edition of RA-S.

ASME/ANS RA-S 1.5, "Advanced Light Water Reactor PRA Standard" (proposed appendix of RA-S to be issued for trial use in late 2019).

ANS/ASME-58.22-2014, "Standard for Low Power and Shutdown Methodology for PRA Applications" " (standard issued for trial use in March 2015). The next version of the standard will be ready for ballot 6 months after approval of the next edition of RA-S.

The following three subcommittees report directly to the JCNRM:

Subcommittee on Standards Development (SC-SD)

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.*

SC-SD *Membership (as of December 2018):*
Barry D. Sloane, Chair, Jensen Hughes, Inc
Matthew Denman, Vice Chair, Kairos Power
Victoria K. Anderson, Nuclear Energy Institute
Sidney Bernsen, Individual
John H. Bickel, Evergreen Safety & Reliability Technologies, LLC
Sarah Bristol, Nuscale Power
Heather L. Detar, Westinghouse Electric Company, LLC
(Alternate: Nathan Larson, Westinghouse Electric Company, LLC)
Mary Drouin, U.S. Nuclear Regulatory Commission
(Alternate: Anders Gilbertson, US Nuclear Regulatory Commission)
Karl N. Fleming, KNF Consulting Services LLC
David Grabaskas, Argonne National Laboratory
Dennis W. Henneke, General Electric Company
(Alternate: Yunlong Jonathan Li, General Electric Company)
Eugene A. Hughes, Etranco, Inc.
Stuart R. Lewis, Jensen Hughes Inc.
Zhegang Ma, Idaho National Laboratory
James O'Brien, U.S. Department of Energy
Vish Patel, Southern Company
Benny Jebuna Ratnagaran, Southern Company
Martin B. Sattison, Idaho National Laboratory (retired)
Raymond Schneider, Westinghouse Electric Company, LLC
Vincent Sorel, EDF
Grant Teagarden, Jensen Hughes Inc.
Stephen D. Unwin, Pacific Northwest National Laboratory
Donald J. Wakefield, ABS Consulting Inc.
Paul Whiteman, Framatome
Keith Woodard, ABS Consulting
Fatma Yilmaz, South Texas Project Nuclear Operating Company

SC-SD REPORT:
The SC-SD is currently responsible for five authorized PRA standards in various stages of development and trial use. In addition to development of the new standards by separate writing groups (project teams) that report to SC-SD, 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 5 standards is provided in the following paragraphs. In addition to these, JCNRM is, at the time of this writing, balloting a PINS for a new trial use standard on multi-unit PRA.

ANS/ASME-58.22-2014, "Requirements for Low Power and Shutdown Probabilistic Risk Assessment" (trial-use standard)

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.*

LPSD P*RA Writing Group Membership (as of December 2018):*
Donald. J. Wakefield, Chair, ABS Consulting Inc.; Robert J. Budnitz, Lawrence Berkeley National Laboratory (retired); Doug Hance, Electric Power Research Institute; Dennis W. Henneke, GE Hitachi Nuclear Energy; Jeffrey Julius, Curtiss Wright; Kenneth L. Kiper, Westinghouse Electric Company, LLC; Yunlong Jonathan Li, General Electric Co.; Zhegang Ma, Idaho National Laboratory; Jeffrey Mitman, U.S. Nuclear Regulatory Commission; Leo Shanley, Jensen Hughes; Taeyong Sung, Southern Company; Vaibhav Yadav, Idaho National Laboratory; Fatma Yilmaz, South Texas Project Nuclear Operating Company; Marie Pohida (alternate for Jeffrey Mitman (NRC))

Status: This standard was issued for a 3-year trial use period in March 2015. A summary of trial uses completed or underway is provided in the table below. Feedback from these parallel trial use applications has been reported to SC-SD, and the feedbacks are being considered by the LPSD project team in revising the standard. The working group requested an extension of the trial-use period to address comments and align with the next edition of the PRA Standard (RA-S) that the LPSD standard references, and at the February 2018 meeting the JCNRM approved an extension to 6 months following approval of the next edition of RA-S for development of a final version to be balloted as an ANSI standard.

Issued for Trial Use	**Trial Use Application**	**Trial User**	**Trial Use Timeframe**
Mar 2015 through 6 months after approval of the next edition of RA-S	- Application to Palo Verde NPS - Self-assessment of APS pilot application - Exelon/BWROG test of Qualitative Risk portion - BWROG pilot of Quant portion - UK ABWR pilot - LPSD portion of NRC Level 3 PRA Pilot - AP1000 Trial of Qualitative portion - Korean Trial Use	• APS • EPRI • Exelon/BWROG • BWROG • GEH • NRC • Westinghouse • KHNP	Feb 2015 Mar 2015 2016-2017 2016-2017 2016 Feedback 2017 Feedback 2017 Undefined

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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 Schneider, Chair, Westinghouse Electric Company, LLC; Aram Hokobyan, Dominion; Donald Helton, U.S. Nuclear Regulatory Commission; Nathan LaBarge, Westinghouse Electric Company, LLC; John Lehner, Individual; Mark Leonard, dycoda, LLC; Wilson Luingdilok, Fauske and Associates; Jason Schaperow, US Nuclear Regulatory Commission (alternate for D Helton); Carroll Trull, Westinghouse Electric Company, LLC; Paul Whiteman, Framatome

Status: This trial use standard was published in early January of 2015 beginning a 24-month trial use period. An initial trial use was performed on the Level 2 portion of the NRC Level 3 PRA Pilot study, by the PWROG, which

performed a peer review of that portion of the PRA using the trial use standard, for NRC. An additional pilot and feedback has been provided by GE Hitachi as part of their UK ABWR PRA. Results of the uses have been informally shared with the L2 standard project team and this feedback has been considered in developing the final version. The trial use period was originally extended through February 2018 to allow completion of the final standard for ballot as an ANSI standard, and at the February 2018 JCNRM meeting the schedule for preparation of a final version for ballot as an ANSI standard was revised to be 6 months following JCNRM approval of the next edition of RA-S, to ensure consistency across the standards.

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 Teagarden, Chair, Jensen Hughes; Nathan Bixler, Sandia National Laboratories; Keith Compton, U.S. Nuclear Regulatory Commission; David Johnson, ABS; Gerry W. Kindred, Tennessee Valley Authority; Stanley Levinson, Individual; Carl Mazzola, Project Enhancement Corporation; Vinod Mubayi, Brookhaven National Laboratory; Kevin O'Kula, AECOM N&E Technical Services LLC; Joel Robinson, Atkins; Brian T. Wagner (alternate to K. Compton), U.S. Nuclear Regulatory Commission; Andrew Wallace Caldwell, Lloyd's Register Consulting, Keith Woodard, ABS Consulting (retired)

Status: This trial use standard was issued in July of 2017 for a 2-year trial use period. A trial use application, based on the ballot version, was performed in December 2015 by the PWR Owners Group in support of the Level 3 portion of the NRC Level 3 PRA Pilot. GE Hitachi has also provided trial use feedback from their UK ABWR PRA, and additional feedback has been received as part of the trial use feedback on the Non-LWR PRA trial use standard.

ASME/ANS RA-S-1.4-2013, "Probabilistic Risk Assessment Standard for Advanced Non-LWR Nuclear Power Plants (trial use standard to be revised and seek ANSI approval)

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.*

NLWR PRA Writing Group Membership (as of December 2018):
Karl. N. Fleming, Chair, KNF Consulting Services, LLC; Frank. Schaaf, Vice Chair, Sterling Refrigeration Corporation; Robert J. Budnitz, Lawrence Berkeley National Laboratory (retired); Mark Caruso, US Nuclear Regulatory Commission; James Chapman, Individual; Matthew Denman, Kairos Power; David Grabaskas, Argonne National Laboratory; Alex Huning, X-Energy; Brian Johnson, TerraPower; David Johnson, ABS Consulting; Peter Lowry, Pacific Northwest National Laboratory; Ken Muramatsu, Tokyo City University; Martin B. Sattison, Idaho National Laboratory, retired; Grant A. Tinsley, Technology Insights; Jiejuan Tong, Tsinghua University; Stephen D. Unwin, Battelle Pacific Northwest National Laboratory; Zen Wang, X Energy; Jeffery Wood, U.S. Nuclear Regulatory Commission (alternate for Mark Caruso); James Young, GE Hitachi

Status: This standard was approved for trial use and issued December 9, 2013, for a 36-month trial use period. Several potential pilot applications have been identified internationally. The NLWR project team has been actively engaged with trial users representing several advanced reactor design concepts in various stages of design in the US, China, Great Britain, and Korea. The trial use period for this standard was extended through 2018 to allow the project team to develop a final version for ballot as an ANSI standard that would also be consistent with the requirements in the next edition of RA-S. At the February 2018 JCNRM meeting the Committee approved an extension to 6 months following approval of the next edition of RA-S.

Issued for Trial Use	**Trial Use Application**	**Trial User**	**Trial Use Timeframe**
Dec 2013 through 6 months after approval of the next edition of RA-S	− HTR-PM Pebble Bed Reactor − KAERI/ANL Sodium Cooled Fast Rx − TWR Sodium Cooled Fast Reactor − Molten Chloride Fast Reactor − GE PRISM Sodium Cooled Fast Rx − Xe-100 Pebble Bed Advanced Rx − Japan HTGR PRA − Japan LMFBR PRA − Fluoride Salt Cooled High Temp Rx − eVinci Micro Reactor − Lead Fast Reactor − Versatile Test Reactor − China Sodium Cooled Fast Reactor	• China • ANL • TerraPower • TerraPower • GEH • X-Energy/SNC • JAEA • JAEA • Kairos Power • Westinghouse • Westinghouse • ANL • ANL	• 2007-2017 • Ended • Ongoing • Ongoing • 2015-2017 • Just starting • 2016-2018 • 2016-2018 • Just starting • Just starting • Just starting • Just starting • Just starting

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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.*

ALWR PRA Writing Group Membership (as of December 2018):
Sarah Bristol, NuScale Power, Chair; ; Sidney Bernsen, Individual; Heather L. Detar, Westinghouse Electric Company, LLC; Karl N. Fleming, Individual (KNF Consulting Services); Hanh Phan, U.S. Nuclear Regulatory Commission; Dennis W. Henneke, General Electric; Eugene A Hughes, Etranco, Inc.; Patrick J. O'Regan, EPRI; Vincent Sorel, EDF

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 NRC to accommodate their intended application of that standard to the new plant licensing process. A ballot on this standard for trial use was held in the 4th quarter of 2017, but a number of comments were received regarding the need for a clear definition of large release that will be compatible across the JCNRM standards. A ballot on the large release definition was initiated in late 2018, and a reconsideration ballot on the ALWR standard is scheduled for first quarter of 2019. The ALWR appendix will be issued initially for a 3-year trial use once approved.

Subcommittee on Standards Maintenance (SC-SM)

SC-SM Membership:
Paul J. Amico, Chair, Jensen Hughes Inc.
Andrea Maioli, Vice Chair, Westinghouse Electric Company, LLC
Vincent Andersen, Jensen Hughes
John H. Bickel, Evergreen Safety & Reliability Technologies, LLC
John M. Biersdorf, Xcel Energy
Robert J. Budnitz, Lawrence Berkeley National Laboratory (retired)
Michelle Carr, Curtiss Wright
Matthew R. Denman, Kairos Power
(Alternate: M. Dennis, Sandia National Laboratories)
K. Raymond Fine, FENOC
C.J. Fong, U.S. Nuclear Regulatory Commission
(Alternate: Hanh Phan, U.S. Nuclear Regulatory Commission)
H. Alan Hackerott, Omaha Public Power District
Jason Hall, Entergy
Douglas C Hance, Electric Power Research Institute
Thomas G. Hook, Arizona Public Service
Eugene A Hughes, Etranco, Inc.
Francisco Joglar, Jensen Hughes
Annie M. Kammerer, Individual
Shigeo Kojima, Individual
James Lin, ABS Consulting
David N. Miskiewicz, Engineering Planning and Management, Inc.
Steve P. Nowlen, Sandia National Laboratories
Mayasandra K. Ravindra, MKRavindra Consulting
Alexander Rubbicco, Westinghouse Electric Company, LLC
Raymond E. Schneider, Westinghouse Electric Company, LLC
Robert Sewall, R.T. Sewell Associates
Kent Sutton, INGRID Consulting Services, LLC
Michael L. Szoke, EDF-Energy
Ian B. Wall, Individual
James W. Young, GE Hitachi
(Alternate: Yunlong Jonathan Li, General Electric)

Charter: To discuss, schedule, and approach technical issues related to updates to the current PRA standards. The SC-SD is responsible for the maintenance of the following standards:

ANSI/ASME/ANS RA-S-2008/Addenda A&B, "Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications" (consolidation and revision of ANSI/ASME RA-S- 2002, ANSI/ANS-58.21-2007, and ANSI/ANS-58.23-2007)

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)
h) Seismic Margin Assessment (Part 10)

Status: ANSI/ASME/ANS RA-S-2008 was initially published in 2008. Addendum B (of RA-S), which although labeled as an "addendum" is actually a new version of the standard, was approved and published in 2013. Addendum B contains changes that are mostly of a clarifying or consistency-across-the-standard nature, plus bringing many citations and other things up to date. A Code Case for Part 5 (seismic PRA) was approved in August and published in November 2017. Work on the next revision, which the JCNRM will call a "new edition," is well underway. This new version (to be designated RA-S-1.1) will contain many substantive changes based on feedback from recent users of the standard, along with extensive re-formatting and the like and including elimination of Capability Category III. Extensive efforts have been made to improve consistency in requirements, terminology, and clarity. The Part 5 Code Case already reflects many of the features of the new edition. 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, are being 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. A review and comment ballot was held in the summer of 2018, and resulted in over 2000 comments that the working groups had to address. As of the end of 2018, Parts 1 through 5 had addressed their comments and the revised version is now considered ready for a new ballot. Parts 6-9, having received the bulk of the comments, are very close to completion. However, there are still concerns about consistency issues and additional reviews specifically for those situations. The schedule calls for the new edition to be approved in late 2019. Because of the delays, a reaffirmation ballot was held for the 2013 version as five years had elapsed since it was issued. Each working group membership is listed below:

Part 1 Working Group, General Requirements for a Level 1 PRA, Including Large Early Release Frequency, Membership (as of December 2018):
Thomas G. Hook, Chair, Arizona Public Power; Mary Drouin, U.S. Nuclear Regulatory Commission; Fernando Ferrante, Electric Power Research Institute; Shigeo Kojima, Individual; Lawrence Mangan, FENOC; Raymond E. Schneider, Westinghouse Electric Company, LLC; Harold Stiles, Duke Energy; Ian B. Wall, Individual; C.J.Fong (Alternate for M. Drouin), U.S. Nuclear Regulatory Commission

Part 2 Working Group, Requirements for Internal Events at-Power PRA, Membership (as of December 2018):
H. Alan Hackerott, Chair, Omaha Public Power District; Jodine M. Jansen Vehec, Vice Chair; JTV Nuclear Consultants; Diane Jones, Vice Chair, Maracor--A Division of Enercon Services, Inc., John H. Bickel, Evergreen Safety & Reliability Technologies, LLC; John M. Biersdorf, Xcel Energy; Odunayo Ayegbusi, U.S. Nuclear Regulatory Commission; Doug Hance, Electric Power Research Institute; Gerry W. Kindred, Tennessee Valley Authority; Stanley H. Levinson, Individual; Pamela F. Nelson, National Autonomous University of Mexico; Kent Sutton, INGRID Consulting Services LLC; Paul Whiteman,Framatome; Adrienne Driver (Alternate for Odunayo Ayegbusi), U.S. Nuclear Regulatory Commission

Part 3 Working Group, Requirements for Internal Flood at-Power PRA, Membership (as of December 2018):
James C. Lin, Chair, ABS Consulting Inc.; Jason Hall, Vice Chair, Entergy; Alexander Rubbicco, Vice Chair, Duke Energy; Douglas Rapp, FENOC; Cassandra Ruch, GE-Hitachi; Ian B. Wall, Individual; Jeffery J. Wood, U.S. Nuclear Regulatory Commission; Tony Nakanishi (Alternate for J. Wood), U.S. Nuclear Regulatory Commission

Part 4 Working Group, Requirements for Fires at-Power PRA, Membership (as of December 2018):
Francisco Joglar, Chair, Jensen Hughes Inc.; Dennis W. Henneke, Vice Chair, General Electric; John M. Biersdorf, Xcel Energy; Margaret Curtis, University of Tennessee-Knoxville; J. S. Hyslop, U.S. Nuclear Regulatory Commission; Mardy Kazarians, Kazarians & Associates, Inc.; Ashley M. Lindeman, Electric Power Research Institute; David N. Miskiewicz, Engineering Planning and Management, Inc.; Bijan Najafi, Jensen Hughes Inc.; Steve P. Nowlen,Sandia National Laboratories; Mary R. Presley, Electric Power Research Institute; Jeffery Stone, Exelon; Richard Stremple; First Energy Nuclear Operating Company; Kiang Zee, Jensen Hughes Inc.; Raymond Gallucci (Alternate for J.S. Hyslop), U.S. Nuclear Regulatory Commission

Parts 5 - 10 Working Group, External Hazards at-Power PRA, Membership (as of December 2018):
[Note: There are several individual project teams under this working group.]
Mayasandra K. Ravindra, Chair, MKRavindra Consulting; Vincent Andersen, Vice Chair, Jensen Hughes Inc.; Michelle Bensi, Vice Chair, University of Maryland; Stephen Eder, Vice Chair, Facility Risk Consultants Inc.; K. Raymond Fine, Vice Chair, FENOC; Nicholas Lovelace, Jensen Hughes Inc, Vice Chair; Lawrence Twisdale, Vice Chair, Applied Research Associates; Paul J. Amico, Jensen Hughes Inc.; Robert J. Budnitz, Lawrence Berkeley National Laboratory (retired); Jennifer S. Butler, Individual; Michelle Carr, Curtiss Wright;

Parthasarathy Chandran, Individual; Nilesh C. Chokshi, Individual; Ovidiu L. Coman, International Atomic Energy Agency; Ahmed Jehmi Dababneh, US Army Corps of Engineers; Jerrod Demers, U.S. Nuclear Regulatory Commission; Matthew R. Denman, Kairos Power; Sarah De-Paula Lyons, U.S. Nuclear Regulatory Commission; Mary Drouin, U.S. Nuclear Regulatory Commission; Calin Eftimie, Individual; Mehdi Reisi Fard, U.S. Nuclear Regulatory Commission; Ian Gifford, U.S. Nuclear Regulatory Commission; Anders Gilbertson, U.S. Nuclear Regulatory Commission; Antonio Godoy, Individual; Fred Grant, Simpson Gumpertz & Heger; Eddie M. Guerra, Arup; Adam Helffrich, RIZZO International, Inc.; Stephen M. Hess, Electric Power Research Institute; Justin Hiller, American Missouri; Kyle Hope, Westinghouse Electric Company, LLC; Daniel Hudson, U.S. Nuclear Regulatory Commission; Yigit Isbiliroglu, RIZZO International, Inc.; Se-Kwon Jung, Duke; Annie M. Kammerer, Individual; Jeffrey Kimball, RIZZO International, Inc.; Benjamin Kosbab, SC Solutions; Shigeo Kojima, Individual; John Lane, U.S. Nuclear Regulatory Commission; Suzanne M. Loyd, Jensen Hughes Inc.; Zhegag Ma, Idaho National Laboratory; Andrea Maioli, Westinghouse Electric Company, LLC; Artur Mironenko, Duke; Malcolm Patterson , U.S. Nuclear Regulatory Commission; Marie Pohida, U.S. Nuclear Regulatory Commission; John M. Richards, Electric Power Research Institute; Glenn Rix, Geosyntec Consultants; Mark Rutherford, Grove Engineering, Inc.; Courtney St. Peter, U.S. Nuclear Regulatory Commission; Raymond Schneider, Westinghouse Electric Company, LLC; Ram Srinivasan, Individual; Martin Stutzke, U.S. Nuclear Regulatory Commission; Wen H. Tong, Simpson Gumpertz & Heger; Boback Torkian, Jensen Hughes

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Subcommittee on Risk Applications (SCoRA)

SCoRA Membership (as of December 2018
Gerry W. Kindred, Chair, Tennessee Valley Authority
Gary DeMoss, Vice Chair, PSEG Nuclear, LLC
Diane M. Jones, Vice Chair, Enercon
Robert J. Budnitz, Lawrence Berkeley National Laboratory (retired)
C. Rick Grantom, C.R. Grantom P.E. Associates, LLC
Jodine M. Jansen-Vehec, JTV Nuclear Consultants
Stanley H. Levinson, Individual
Pamela F. Nelson, National Autonomous University of Mexico
Vish Patel, Southern Company
Jeffrey Stone, EXELON
Kent Sutton, INGRID Consulting Services, LLC
Carroll Trull, Westinghouse Electric Company, LLC
Gregory Hudson, Metcalfe PLLC
James O'Brian, Department of Energy
Stacey Rosenberg, Nuclear Regulatory Commission
Vicki Warren, Jensen-Hughes
Allen Moldenhauer, Dominion
Roy Linthicum, EXELON/PWROG
Robert Rishel, Duke Energy/BWROG

Charter: To interface with the ANS Standards Board, the ASME Board on Nuclear Codes and Standards, and their subordinate groups, and other standards development organizations (SDOs) regarding nuclear related standards that include or plan to include risk assessment, risk management, and risk-informed applications. The work of the 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 consistency in other nuclear-related standards with risk management principles, in general, and to work toward consistency with the JCNRM's PRA standards.

When the SCoRA organizes a technical interface with a specific nuclear-related standard, it will draw upon the membership of the JCNRM, but the interface activity need not be limited to that 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, even if developed mainly by an ad hoc subsidiary group.

Part of the interface activity includes an education function, for which the SCoRA will avail itself of resources that exist among the broader JCNRM membership. The 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.

Status: The influence of SCORA continues to grow as the subcommittee's membership expands, and its role in affecting risk application standards matures. Two SCoRA project teams have made useful progress in these areas:

(1) The Risk-Informed Projects Team is tasked with identifying proposed applications for each standard and developing guidance on high-level activities associated with implementing the application. SCoRA's scope will need to be revised to accommodate implementation.
(2) Guidance is under development on how to write a Risk-Informed standard with a focus on functional organization impacts for implementation of a risk-informed application.
(3) SCoRA is leading an industry initiative for how to risk-inform nuclear security, both physical protection and cyber. Additionally, the SCoRA process for reviewing risk-informed codes and standards has been formalized and disseminated to stakeholders.

Finally, several SCoRA members continue to serve on the ANS Standards Board's Risk-informed, Performance-based Principles and Policy Committee (RP3C); the relationship between SCoRA and RP3C continues to evolve as each committee addresses specific requests.

ANS/ASME Joint Committee on Nuclear Risk Management
Organizational Chart

Cochair: Robert J. Budnitz — Cochair: C. Rick Grantom
Vice Cochair: Dennis W. Henneke — Vice Cochair: Pamela F. Nelson

Subcommittee on Risk Applications (SCoRA)	Subcommittee on Standards Development (SC-SD)	Subcommittee on Standards Maintenance (SC-SM)
Gerry Kindred (Chair) Gary DeMoss (Vice Chair) Diane Jones (Vice Chair)	Barry Sloane (Chair) Matthew Denman (Vice Chair)	Paul Amico (Chair) Andrea Maioli (Vice Chair)
SCoRA does not develop standards.	ANS/ASME-58.22, Low Power and Shutdown PRA Writing Group	ASME/ANS RA-S Level 1 PRA Working Group Including LERF (Part 1)
	ASME/ANS RA S-1.2 Level 2 PRA Writing Group (previously ANS-58.24)	ASME/ANS RA-S Internal Events Working Group At-Power PRA (Part 2)
	ASME/ANS RA-S-1.3 Level 3 PRA Writing Group (previously ANS-58.25)	ASME/ANS RA-S Internal Flood Working Group At-Power PRA (Part 3)
	ASME/ANS RA-S-1.4 Non-LWR PRA Writing Group	ASME/ANS RA-S Fires Working Group At-Power PRA (Part 4)
	ASME/ANS RA-S-1.5 Advanced LWR PRA Writing Group	ASME/ANS RA-S External Hazards Working Group At-Power PRA (Parts 5-10)

Table 8 – JCNRM Organizational Chart

Appendix A
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. Past recipients of the award include the following individuals:

Year Awarded	Recipients
2018	Robert D. Busch
2017	Abraham Weitzberg
2016	Andrew O. Smetana
2015	Jerry E. Hicks Donald J. Wakefield
2014	Steven L. Stamm
2013	Carl A. Mazzola
2012	Elizabeth B. Johnson (posthumously) Patricia A. Schroeder
2011	No recipient selected
2010	Allen L. Camp Thomas P. McLaughlin
2009	Calvin M. Hopper
2008	Donald J. Spellman
2007	William L. Whittemore (posthumously)
2006	Robert J. Budnitz
2005	James F. Mallay
2004	Charles H. Moseley
2003	Wade J. Richards
2002	Francis M. Alcorn
2001	Michael J. Wright
2000	William C. Hopkins
1999	Dimitrios Cokinos
1998	Marilyn D. Weber
1997	David R. Smith
1996	Tawfik M. Raby
1995	Hugh K. Clark
1994	George L. Wessman
1993	Joseph T. Thomas
1992	J. Ed Smith (posthumously)
1991	David K. Trubey
1990	James F. Mallay
1989	Walter H. D'Ardenne
1988	A. Dixon Callihan Ralph G. Chalker Miles C. Leverett

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American National Standards – Sales List

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CURRENT STANDARDS

ANS Designation	Price
ANS-1-2000 (R2012) Conduct of Critical Experiments (Revision of ANS-1-1987; R1992)	**$44**
ANS-2.2-2016 Earthquake Instrumentation Criteria for Nuclear Power Plants (Revision of ANS-2.2-2002)	**$155**
ANS-2.3-2011 (R2016) Estimating Tornado, Hurricane, and Extreme Straight Line Wind Characteristics at Nuclear Facility Sites (Supersedes ANS-2.3-1983)	**$77**
ANS-2.6-2018 Guidelines for Estimating Present & Projecting Future Population Distributions Surrounding Nuclear Facility Sites	**$147**
ANS-2.10-2017 Criteria for Retrieval, Processing, Handling, and Storage of Records from Nuclear Facility Seismic Instrumentation	**$121**
ANS-2.15-2013 (R2017) Criteria for Modeling and Calculating Atmospheric Dispersion of Routine Radiological Releases from Nuclear Facilities	**$188**
ANS-2.17-2010 (R2016) Evaluation of Subsurface Radionuclide Transport at Commercial Nuclear Power Plants (Supersedes ANS-2.17-1980; R1989)	**$152**
ANS-2.21-2012 (R2016) Criteria for Assessing Atmospheric Effects On the Ultimate Heat Sink	**$61**
ANS-2.23-2016 Nuclear Power Plant Response to an Earthquake (Revision of ANS-2.23-2002; R2009)	**$180**
ANS-2.26-2004 (R2017) Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design	**$131**
ANS-2.27-2008 (R2016) Criteria for Investigations of Nuclear Facility Sites for Seismic Hazard Assessments	**$133**
ANS-2.29-2008 (R2016) Probabilistic Seismic Hazard Analysis	**$152**
ANS-2.30-2015 Criteria for Assessing Tectonic Surface Fault Rupture and Deformation at Nuclear Facilities	**$250**
ANS-3.1-2014 Selection, Qualification and Training of Personnel for Nuclear Power Plants (Supersedes ANS-3.1-1993; R1999)	**$141**
ANS-3.2-2012 (R2017) Managerial, Administrative, and Quality Assurance Controls for the Operational Phase of Nuclear Power Plants (Revision of ANS-3.2-2006)	**$138**
ANS-3.4-2013 (R2018) Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants (Supersedes ANS-3.4-1996; R2002)	**$152**

CURRENT STANDARDS

ANS Designation	Price
ANS-3.5-2009 Nuclear Power Plant Simulators for Use in Operator Training and Examination (Supersedes ANS-3.5-1998)	**$133**
ANS-3.11-2015 Determining Meteorological Information at Nuclear Facilities (Revision of ANS-3.11-2005; R2010)	**$242**
ANS-5.1-2014 Decay Heat Power in Light Water Reactors (Revision of ANS-5.1-2005)	**$184**
ANS-5.4-2011 Method for Calculating the Fractional Release of Volatile Fission Products from Oxide Fuel (Revision of ANS-5.4-1982)	**$86**
ANS-5.10-1998 (R2013) Airborne Release Fractions at Non-Reactor Nuclear Facilities	**$145**
ANS-6.1.2-2013 (R2018) Group-Averaged Neutron and Gamma-Ray Cross Sections for Radiation Protection and Shielding Calculations for Nuclear Power Plants (Revision of ANS-6.1.2-1999; R2009)	**$61**
ANS-6.3.1-1987 (R2015) Program for Testing Radiation Shields in Light Water Reactors (LWR) (Revision of ANS-6.3.1-1980)	**$86**
ANS-6.4-2006 (R2016) Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants (Revision of ANS-6.4-1997; R2004)	**$229**
ANS-6.4.2-2006 (R2016) Specification for Radiation Shielding Materials (Revision of ANS-6.4-1985; R1997; R2004)	**$86**
ANS-6.6.1-2015 Calculation and Measurement of Direct and Scattered Gamma Radiation from LWR Nuclear Power Plants (Revision of ANS-6.6.1-1987; R2007)	**$158**
ANS-8.1-2014 (R2018) Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors (Revision of ANS-8.1-1998; R2007)	**$105**
ANS-8.3-1997 (R2017) Criticality Accident Alarm System (Revision of ANS-8.3-1986)	**$112**
ANS-8.5-1996 (R2017) Use of Borosilicate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material (Revision of ANS-8.5-1986)	**$70**
ANS-8.6-1983 (R2017) Safety in Conducting Subcritical Neutron-Multiplication Measurements in Situ (Revision of N16.3-1975)	**$35**
ANS-8.7-1998 (R2017) Nuclear Criticality Safety in the Storage of Fissile Materials (Revision of N16.5-1975; R1982; R1987)	**$96**
ANS-8.10-2015 Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement (Revision of ANS-8.10-1983; R2005)	**$61**

CURRENT STANDARDS

ANS Designation	Price
ANS-8.12-1987 (R2016) Nuclear Criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors (Revision of ANS-8.12-1978)	**$105**
ANS 8.14-2004 (R2016) Use of Soluble Neutron Absorbers in Nuclear Facilities Outside Reactors	**$52**
ANS-8.15-2014 Nuclear Criticality Control of Selected Actinide Nuclides (Revision of ANS-8.15-1981; R2005)	**$121**
ANS-8.17-2004 (R2014) Criticality Safety Criteria for the Handling, Storage, and Transportation of LWR Fuel Outside Reactors (Revision of ANS-8.17-1984; R1997)	**$52**
ANS-8.19-2014 Administrative Practices for Nuclear Criticality Safety (Revision of ANS-8.19-2005)	**$56**
ANS-8.20-1991 (R2015) Nuclear Criticality Safety Training	**$52**
ANS-8.21-1995 (R2011) Use of Fixed Neutron Absorbers in Nuclear Facilities Outside Reactors	**$52**
ANS-8.22-1997 (R2016) Nuclear Criticality Safety Based on Limiting and Controlling Moderators	**$62**
ANS-8.23-2007 (R2012) Nuclear Criticality Accident Emergency Planning and Response (Revision of ANS-8.23-1997)	**$131**
ANS-8.24-2017 Validation of Neutron Transport Methods for Nuclear Criticality Safety Calculations (Revision of ANS-8.24-2007; R2012)	**$135**
ANS-8.26-2007 (R2016) Criticality Safety Engineer Training and Qualification Program	**$44**
ANS-8.27-2015 Burnup Credit for LWR Fuel (Revision of ANS-8.27-2008)	**$103**
ANS-10.2-2000 (R2009) Portability of Scientific and Engineering Software (Revision of ANS-10.2-1988)	**$52**
ANS-10.4-2008 (R2016) Verification and Validation of Non-Safety Related Scientific and Engineering Computer Programs for the Nuclear Industry (Revision of ANS-10.4-1987; R1998)	**$143**
ANS-10.5-2006 (R2016) Accommodating User Needs in Scientific and Engineering Computer Software Development (Supersedes ANS-10.5-1994)	**$62**
ANS-10.7-2013 (R2018) Non-Real Time, High-Integrity Software for the Nuclear Industry—Developer Requirements	**$121**
ANS-10.8-2015 Non-Real-Time, High-Integrity Software for the Nuclear Industry—User Requirements	**$133**

CURRENT STANDARDS

ANS Designation	Price
ANS-14.1-2004 (R2014) Operation of Fast Pulse Reactors (Revision of ANS-14.1-1975; R2000)	**$52**
ANS-15.1-2007 (R2013) The Development of Technical Specifications for Research Reactors (Revision of ANS-15.1-1990; R1999)	**$105**
ANS-15.2-1999 (R2016) Quality Control for Plate-Type Uranium-Aluminum Fuel Elements (Revision of ANS-15.2-1990)	**$70**
ANS-15.4-2016 Selection and Training of Personnel for Research Reactors (Revision of ANS-15.4-2007)	**$103**
ANS-15.8-1995 (R2018) Quality Assurance Program Requirements for Research Reactors (Revision of ANS-15.8-1976; R1986)	**$70**
ANS-15.11-2016 Radiation Protection at Research Reactor Facilities (Revision of ANSI/ANS-15.11-2009)	**$164**
ANS-15.16-2015 Emergency Planning for Research Reactors (Revision of ANS-15.16-2008)	**$78**
ANS-15.21-2012 (R2018) Format and Content for Safety Analysis Reports for Research Reactors (Revision of ANS-15.21-1996; R2006)	**$136**
ANS-16.1-2003 (R2017) Measurement of the Leachability of Solidified Low-Level Radioactive Wastes by a Short-Term Test Procedure (Revision of ANS-16.1-1986)	**$149**
ANS-18.1-2016 Radioactive Source Term for Normal Operation of Light Water Reactors (Supersedes ANSI/ANS-18.1-1999)	**$112**
ANS-19.1-2002 (R2011) Nuclear Data Sets for Reactor Design Calculations (Revision of ANSI/ANS-19.1-1983; R1989)	**$77**
ANS-19.3-2011 (R2017) Steady-State Neutronics Methods for Power Reactor Analysis (Revision of ANS-19.3-2005)	**$141**
ANS-19.3.4-2002 (R2017) The Determination of Thermal Energy Deposition Rates in Nuclear Reactors (Revision of ANS-19.3.4-1976; R1983; R1989)	**$62**
ANS-19.4-2017 A Guide for Acquisition and Documentation of Reference Power Reactor Physics Measurements for Nuclear Analysis Verification (Supersedes ANS-19.4-1976; R2000)	**$116**
ANS-19.6.1-2011 (R2016) Reload Startup Physics Tests for Pressurized Water Reactors (Revision of ANS-19.6.1-2005)	**$133**
ANS-19.10-2009 (R2016) Methods for Determining Neutron Fluence in BWR and PWR Pressure Vessel and Reactor Internals	**$59**
ANS-19.11-2017 Calculation and Measurement of the Moderator Temperature Coefficient of Reactivity for Presurized Water Reactors (Revision of ANS-19.11-1997; R2011)	**$128**

CURRENT STANDARDS

ANS Designation	Price
ANS-40.37-2009 (R2016) Mobile Low Level Radioactive Waste Processing Systems (Supersedes ANS-40.37-1993)	**$161**
ANS-41.5-2012 (R2018) Verification and Validation of Radiological Data for Use in Waste Management and Environmental Remediation	**$177**
ANS-51.10-1991 (R2018) Auxiliary Feedwater System for Pressurized Water Reactors (Revision of ANS-51.10-1979)	**$121**
ANS-53.1-2011 (R2016) Nuclear Safety Design Process for Modular Helium-Cooled Reactor Plants	**$256**
ANS-55.1-1992 (R2017) Solid Radioactive Waste Processing System for Light-Water-Cooled Reactor Plants (Revision of ANS-55.1-1979)	**$164**
ANS-56.8-2002 (R2016) Containment System Leakage Testing Requirements (Revision of ANS-56.8-1994)	**$149**
ANS-57.1-1992 (R2015) Design Requirements for Light Water Reactor Fuel Handling Systems (Revision of ANS-57.1-1980)	**$77**
ANS-57.8-1995 (R2017) Fuel Assembly Identification (Revision of ANS-57.8-1978; R1987)	**$52**
ANS-57.10-1996 (R2016) Design Criteria for Consolidation of LWR Spent Fuel (Revision of ANS-57.10-1987)	**$149**
ANS-58.3-1992 (R2018) Physical Protection for Nuclear Safety-Related Systems and Components (Revision of ANS-58.3-1977)	**$152**
ANS-58.8-1994 (R2017) Time Response Design Criteria for Safety-Related Operator Actions (Revision of ANS-58.8-1984)	**$96**
ANS-58.9-2002 (R2015) Single Failure Criteria for Light Water Reactor Safety-Related Fluid Systems (Same as ANS-58.9-1981; R1987)	**$52**
ANS-58.14-2011 (R2017) Safety and Pressure Integrity Classification Criteria for Light Water Reactors (Supersedes ANS-58.14-1993)	**$213**
ANS-58.16-2014 Safety Categorization and Design Criteria for Nonreactor Nuclear Facilities	**$169**
ANS-59.51-1997 (R2015) Fuel Oil Systems for Safety-Related Emergency Diesel Generators (Revision of ANS-59.51-1989)	**$86**
ANS-59.52-1998 (R2015) Lubricating Oil Systems for Safety-Related Emergency Diesel Generators	**$77**

TRIAL USE STANDARDS

(Available in PDF format only)

ANS Designation	Price
ANS/ASME-58.22-2014 Requirements for Low Power and Shutdown Probabilistic Risk Assessment	**$440**
ASME/ANS RA-S-1.2-2014 Severe Accident Progression and Radiological Release (Level 2) PRA Standard for Nuclear Power Plant Applications for Light Water Reactors (LWRs)	**$220**
ASME/ANS RA-S-1.3-2017 Standard for Radiological Accident Offsite Consequence Analysis (Level 3 PRA) to Support Nuclear Installation Applications	**$220**
ASME/ANS RA-S-1.4-2013 Probabilistic Risk Assessment Standard for Advanced Non-LWR Nuclear Power Plants	**$550**

HISTORICAL STANDARDS

ANS Designation	Price
ANS-1-1987 (R1992) Safety Guide for the Performance of Critical Experiments	**$44**
ANS-2.2-2002 Earthquake Instrumentation Criteria for Nuclear Power Plants	**$62**
ANS-2.3-1983 Standard for Estimating Tornado and Extreme Wind Characteristics at Nuclear Power Sites	**$86**
ANS-2.7-1982 Criteria and Guidelines for Assessing Capability for Surface Faulting at Nuclear Power Plant Sites	**$62**
ANS-2.8-1992 Determining Design Basis Flooding at Power Reactor Sites	**$189**
ANS-2.9-1980 (R1989) Evaluation of Ground Water Supply for Nuclear Power Sites	**$105**
ANS-2.10-2003 Criteria for the Handling and Initial Evaluation of Records from Nuclear Power Plant Seismic Instrumentation	**$52**
ANS-2.11-1978 (R1989) Guidelines for Evaluating Site-Related Geotechnical Parameters at Nuclear Power Sites	**$145**
ANS-2.12-1978 Guidelines for Combining Natural and External Man-Made Hazards at Power Reactor Sites	**$178**
ANS-2.13-1979 (R1988) Evaluation of Surface-Water Supplies for Nuclear Power Sites	**$131**
ANS-2.17-1980 (R1989) Evaluation of Radionuclide Transport in Ground Water for Nuclear Power Sites	**$121**
ANS-2.19-1981 (R1990) Guidelines for Establishing Site-Related Parameters for Site Selection and Design of an Independent Spent Fuel Storage Installation (Water Pool Type)	**$156**

HISTORICAL STANDARDS

ANS Designation	Price
ANS-2.23-2009 Nuclear Plant Response to an Earthquake	**$142**
ANS-2.25-1982 (R1989) Surveys of Terrestrial Ecology Needed to License Thermal Power Plants (Formerly known as ANS-18.5)	**$133**
ANS-3.1-1993 (R1999) Selection, Qualification, and Training of Personnel for Nuclear Power Plants	**$96**
ANS-3.2-2006 Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants	**$160**
ANS-3.3-1988 Security for Nuclear Power Plants	**$86**
ANS-3.4-1996 (R2002) Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants	**$62**
ANS-3.5-1998 Nuclear Power Plant Simulators for Use in Operator Training and Examination	**$121**
ANS-3.7.1-1995 Facilities and Medical Care for On-Site Nuclear Power Plant Radiological Emergencies	**$70**
ANS-3.8.1-1995 Criteria for Radiological Emergency Response Functions and Organizations	**$121**
ANS-3.8.2-1995 Criteria for Functional and Physical Characteristics of Radiological Emergency Response Facilities	**$70**
ANS-3.8.3-1995 Criteria for Radiological Emergency Response Plans and Implementing Procedures	**$70**
ANS-3.8.4-1995 Criteria for Maintaining Radiological Emergency Response Capability	**$52**
ANS-3.8.5-1992 Criteria for Emergency Radiological Field Monitoring, Sampling, and Analysis	**$62**
ANS-3.8.6-1995 Criteria for the Conduct of Offsite Radiological Assessment for Emergency Response for Nuclear Power Plants	**$70**
ANS-3.8.7-1998 Criteria for Planning, Development, Conduct, and Evaluation of Drills and Exercises for Emergency Preparedness	**$70**
ANS-3.11-2005 (R2010) Determining Meteorological Information at Nuclear Facilities	**$149**
ANS-4.5-1980 (R1986) Criteria for Accident Monitoring Functions in Light-Water-Cooled Reactors	**$77**
ANS-5.1-2005 Decay Heat Power in Light Water Reactors	**$167**
ANS-5.4-1982 Method for Calculating the Fractional Release of Volatile Fission Products from Oxide Fuel	**$52**

HISTORICAL STANDARDS

ANS Designation	Price
ANS-6.1.1-1991 Neutron and Gamma-Ray Fluence-to-Dose Factors	**$112**
ANS-6.1.2-1999 (R2009) Neutron and Gamma-Ray Cross Sections for Nuclear Radiation Protection Calculations for Nuclear Power Plants	**$44**
ANS-6.4-1997 (R2004) Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants	**$217**
ANS-6.4.2-1985 (R2004) Specifications for Radiation Shielding Materials	**$209**
ANS-6.4.3-1991 Gamma-Ray Attenuation Coefficients and Buildup Factors for Engineering Materials	**$256**
ANS-6.6.1-1987 (R2007) Calculation and Measurement of Direct and Scattered Gamma Radiation from LWR Nuclear Power Plants	**$156**
ANS/HPSSC-6.8.1-1981 Location and Design Criteria for Area Radiation Monitoring Systems for Light Water Nuclear Reactors	**$77**
ANS/IEEE-7.4.3.2 (R2009) Application Criteria for Programmable Digital Computer in Safety Systems of Nuclear Power Generating Stations	**$70**
ANS-8.1-1998 (R2007) Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors	**$105**
ANS-8.3-1986 Criticality Accident Alarm System	**$77**
ANS-8.5-1986 Use of Borosilicate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material	**$70**
ANS-8.7-1975 (R1987) Guide for Nuclear Criticality Safety in the Storage of Fissile Materials (Formerly known as N16.5)	**$96**
ANS-8.9-1987 (R1995) Nuclear Criticality Safety Criteria for Steel-Pipe Intersections Containing Aqueous Solutions of Fissile Material	**$62**
ANS-8.10-1983 (R2005) Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement	**$61**
ANS-8.15-1981 (R2005) Nuclear Criticality Control of Special Actinide Elements	**$96**
ANS-8.17-1984 (R1997) Criticality Safety Criteria for the Handling, Storage and Transportation of LWR Fuel Outside Reactors	**$44**
ANS-8.19-2005 Administrative Practices for Nuclear Criticality Safety	**$44**
ANS-8.23-1997 Nuclear Criticality Accident Emergency Planning and Response	**$52**
ANS-8.24-2007 (R2012) Validation of Neutron Transport Methods for Nuclear Criticality Safety Calculations	**$121**
ANS-8.27-2008 Burnup Credit for Light Water Reactor Fuel	**$47**

HISTORICAL STANDARDS

ANS Designation	Price
ANS-10.2-1988 Recommended Programming Practices to Facilitate the Portability of Scientific and Engineering Computer Programs	**$47**
ANS-10.3-1995 Documentation of Computer Software	**$61**
ANS-10.4-1987 (R1998) Guidelines for the Verification and Validation of Scientific and Engineering Computer Programs for the Nuclear Industry	**$152**
ANS-10.5-1994 Accommodating User Needs in Computer Program Development	**$62**
ANS-14.1-1975 (R2000) Operation of Fast Pulse Reactors (Formerly known as N394)	**$35**
ANS-15.1-1990 (R1999) The Development of Technical Specifications for Research Reactors	**$77**
ANS-15.2-1990 Quality Control for Plate-Type Uranium-Aluminum Fuel Elements	**$62**
ANS-15.4-2007 Selection and Training of Personnel for Research Reactors	**$77**
ANS-15.7-1977 (R1986) Research Reactor Site Evaluation	**$70**
ANS-15.8-1976 (R1986) Quality Assurance Program Requirements for Research Reactors (Formerly known as N402)	**$44**
ANS-15.10-1994 Decommissioning of Research Reactors	**$131**
ANS-15.11-2009 Radiation Protection at Research Reactor Facilities	**$136**
ANS-15.12-1977 Design Objectives for and Monitoring of Systems Controlling Research Reactor Effluents	**$35**
ANS-15.15-1978 (R1986) Criteria for the Reactor Safety Systems of Research Reactors	**$70**
ANS-15.16-2008 Emergency Planning for Research Reactors	**$70**
ANS-15.17-1981 (R2000) Fire Protection Program Criteria for Research Reactors	**$52**
ANS-15.19-1991 Shipment and Receipt of Special Nuclear Material (SNM) by Research Reactor Facilities	**$105**
ANS-15.21-1996 (R2006) Format and Content for Safety Analysis Reports for Research Reactors	**$160**
ANS-16.1-1986 Measurement of the Leachability of Solidified Low-Level Radioactive Wastes by a Short-Term Test Procedure	**$149**
ANS-18.1-1999 Radioactive Source Term for Normal Operation of Light Water Reactors	**$105**
ANS-19.1-1983 (R1989) Nuclear Data Sets for Reactor Design Calculations	**$70**

HISTORICAL STANDARDS

ANS Designation	Price
ANS-19.3-2005 Determination of Steady-State Neutron Reaction-Rate Distributions and Reactivity of Nuclear Power Reactors	**$133**
ANS-19.3.4-1976 (R1989) The Determination of Thermal Energy Deposition Rates in Nuclear Reactors (Formerly N676)	**$62**
ANS-19.4-1976 (R2000) A Guide for Acquisition and Documentation of Reference Power Reactor Physics Measurements for Nuclear Analysis Verification (Formerly known as N652-1976)	**$86**
ANS-19.5-1995 Requirements for Reference Reactor Physics Measurements	**$35**
ANS-19.6.1-2005 Reload Startup Physics Tests for Pressurized Water Reactors	**$131**
ANS-19.11-1997 (R2011) Calculation and Measurement of the Moderator Temperature Coefficient of Reactivity for Water Moderated Power Reactors	**$105**
ANS-40.35-1991 Volume Reduction of Low-Level Radioactive Waste or Mixed Waste	**$121**
ANS-40.37-1993 Mobile Radioactive Waste Processing Systems	**$156**
ANS-51.1-1983 (R1988) Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants	**$231**
ANS-51.10-1979 Auxiliary Feedwater System for Pressurized Water Reactors	**$121**
ANS-52.1-1983 (R1988) Nuclear Safety Criteria for the Design of Stationary Boiling Water Reactor Plants	**$229**
ANS-54.1-1989 General Safety Design Criteria for a Liquid Metal Reactor Nuclear Power Plant	**$96**
ANS-54.2-1985 Design Bases for Facilities for LMFBR Spent Fuel Storage in Liquid Metal Outside the Primary Coolant Boundary	**$77**
ANS-54.8-1988 Liquid Metal Fire Protection in LMR Plants	**$86**
ANS-55.1-1979 Solid Radioactive Waste Processing System for Light Water Cooled Reactor Plants	**$138**

HISTORICAL STANDARDS

ANS Designation	Price
ANS-55.4-1993 (R2007) Gaseous Radioactive Waste Processing Systems for Light Water Reactor Plants	**$142**
ANS-55.6-1993 (R2007) Liquid Radioactive Waste Processing System for Light Water Reactor Plants	**$145**
ANS-56.2-1984 (R1989) Containment Isolation Provisions for Fluid Systems after a LOCA	**$198**
ANS-56.3-1977 (R1987) Overpressure Protection of Low Pressure Systems Connected to the Reactor Coolant Pressure Boundary	**$62**
ANS-56.4-1983 (R1988) Pressure and Temperature Transient Analysis for Light Water Reactor Containments	**$152**
ANS-56.5-1979 (R1987) PWR and BWR Containment Spray System Design Criteria	**$152**
ANS-56.6-1986 Pressurized Water Reactor Containment Ventilation Systems	**$112**
ANS-56.7-1978 (R1987) Boiling Water Reactor Containment Ventilation Systems	**$131**
ANS-56.8-1994 Containment System Leakage Testing Requirements	**$149**
ANS-56.10-1982 (R1987) Subcompartment Pressure and Temperature Transient Analysis in LWRs	**$142**
ANS-56.11-1988 Design Criteria for Protection Against the Effects of Compartment Flooding in LWR Plants	**$77**
ANS-57.1-1980 Design Requirements for Light Water Reactor Fuel Handling Systems	**$77**
ANS-57.2-1983 Design Requirements for Light Water Reactor Spent Fuel Storage Facilities at Nuclear Power Plants	**$132**
ANS-57.3-1983 Design Requirements for New Fuel Storage Facilities at Light Water Reactor Plants	**$70**
ANS-57.5-1996 (R2006) Light Water Reactors Fuel Assembly Mechanical Design and Evaluation	**$96**

HISTORICAL STANDARDS

ANS Designation	Price
ANS-57.7-1988 (R1997) Design Criteria for an Independent Spent Fuel Storage Installation (Water Pool Type)	**$164**
ANS-57.8-1978 (R1987) Fuel Assembly Identification	**$44**
ANS-57.9-1992 (R2000) Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)	**$193**
ANS-57.10-1987 Design Criteria for Consolidation of LWR Spent Fuel	**$142**
ANS-58.2-1988 Design Basis for Protection of Light Water Nuclear Power Plants Against the Effects of Postulated Pipe Rupture	**$210**
ANS-58.3-1977 Physical Protection for Systems and Components Important to Safety (Formerly known as N182)	**$110**
ANS-58.4-1979 Criteria for Technical Specifications for Nuclear Power Stations	**$105**
ANS-58.6-1996 (R2001) Criteria for Remote Shutdown for Light Water Reactors	**$62**
ANS-58.8-1984 Time Response Design Criteria for Nuclear Safety Related Operator Actions	**$77**
ANS-58.11-1995 (R2002) Design Criteria for Safe Shutdown Following Selected Design Basis Events in Light Water Reactors	**$77**
ANS-58.14-1993 Safety and Pressure Integrity Classification Criteria for Light Water Reactors	**$213**
ANS-58.21-2007 External-Events PRA Methodology	**$259**
ANS-58.23-2007 Fire PRA Methodology	**$234**
ANS-59.1-1986 Nuclear Safety Related Cooling Water Systems for Light Water Reactors	**$77**
ANS-59.2-1985 Safety Criteria for HVAC Systems Located Outside Primary Containment	**$133**
ANS-59.3-1992 (R2002) Nuclear Safety Criteria for Control Air Systems	**$62**
ANS-59.51-1989 Fuel Oil Systems for Emergency Diesel Generators	**$86**