American Nuclear Society

Standards Committee Report of Activities

2016

American Nuclear Society

STANDARDS COMMITTEE

Report of Activities

2016

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INTRODUCTION

The Report of Activities of the American Nuclear Society (ANS) Standards Committee represents a record of the Committee's achievements for the calendar year 2016. 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 2016, there were 81 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 (SubC) 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 SC 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 SubC approval is often achieved via internal committee discussion.

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. Balloters 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.

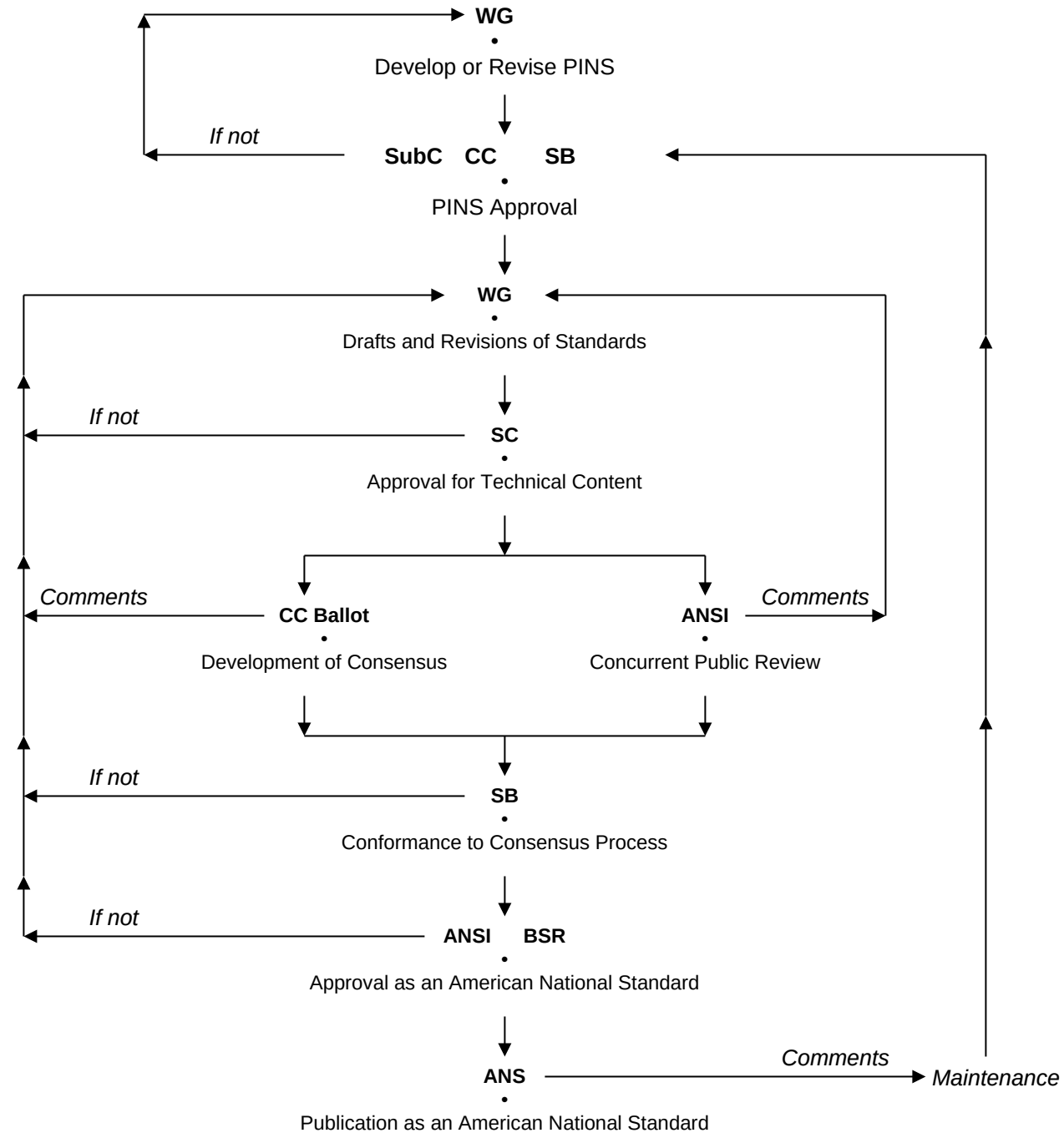
Simultaneous to the CC ballot, public review (PR) is conducted through the auspices of ANSI. ANSI announces a 45- or 60-day public review period for the proposed standard in its publication, *Standards Action*. As with CC comments, all comments from PR must be considered and resolved promptly.

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
George Flanagan, Chair

The ANS Standards Board approved the Standards Committee Strategic Plan in June of this year. An initial strategic plan was drafted in late 2015 and issued to Standards Board members for comment. A small task group of Standards Board members were assigned to address these comments and to better define actionable goals and objectives through 2020. The Plan has been implemented and metrics have been developed to measure progress. The plan has the following five high-level goals:

- Goal #1: Align Standards Development Priorities with Current and Emerging Industry Needs
- Goal #2: Develop and Maintain High Quality Standards
- Goal #3: Improve Standards Development Production and Efficiency
- Goal #4: Expand ANS Awareness and External Outreach
- Goal #5: Improve Industry Representation and Sustainability of Working Groups, Subcommittees, and Consensus Committees

To meet these goals, the Standards Board is undertaking several new initiatives including the following:

- Development of Standards Committee member training program
- Creation of a liaison program with the ANS Professional Divisions
- Solicitation of members through industry organization contacts and *Nuclear News*
- Broadcasts to solicit associate members from the ANS Young Member Group and Student Sections
- Development of a standards fee-based training program

As previously reported, a standard priority survey was issued in July of 2015 to ANS members and made available to nonmembers on the ANS home page. The identified top 10 priority standards are being tracked with an effort to initiate or expedite. Submitted comments were addressed and a letter of response was issued to survey participants. The second tier standards ranked between 11 and 20 are being evaluated. Suggestions for standards on export control, hydrogen containment, and severe accident are being considered. An informative standards presentation was developed for members in response and is scheduled to be offered to all ANS members on January 31, 2017

A significant effort of the ANS Standards Board in 2016 has been the initiation of a training program for Standards Committee members. The training program includes five power point presentations and three live demos on the use of Workspace all conducted by webinar. The power point presentations address five topical areas including 1) an overview of nuclear related standards, 2) ANS Standards Committee staffing and organizational structure, 3) the standards development progress, 4) governing documents: rules, procedures, policies, and 5) governing documents: consensus committee procedures and the toolkit. The program was initiated in hopes of increasing Standards Committee members' knowledge resulting in improved quality and consistency of ANS standards as well as expedite the development of ANS standards through a reduction of corrections and the use of technology.

A liaison program was created between ANS consensus committees and their related ANS Professional Division(s). The ANS Standards Committee looks to harvest expertise within the Professional Divisions to help maintain ANS standards, broaden input in setting standards priorities, and to populate working groups with expert individuals. The program is in the implementation stage.

The Standards Board is working with the ANS Membership and Marketing Department to explore the effectiveness of a fee-based training program for newly issued and revised standards. Many factors are being considered to insure that the program would be successful. Several standards are being evaluated as potential candidate for this program.

A broadcast was sent to ANS Student Section members in September of this year to join the ANS Standards Committee as an associate member. The associate member program allows young professionals to participate in writing standards with little to no experience and no requirement to attend meetings and teleconference. This was the second such broadcast to ANS Student Section members. Similar solicitation efforts in the past have been made to the ANS Young Member Group and the North-American Young

Generation Nuclear. A schedule has been set to send a broadcast to these groups on a biennial basis. Presently, the ANS Standards Committee has placed 35 young professionals on a standards committee.

Andrew O. Smetana was selected for the 2016 Standards Service Award. The award was granted in recognition of sustained, significant contributions to ANS standards for over three decades, initially through contributions and leadership of the ANS-10, Mathematics and Computations Subcommittee, and more recently serving as chairman of both the N17, Research Reactors, Reactor Physics, Radiation Shielding, and Computational Methods Consensus Committee and the Safety and Radiological Analyses Consensus Committee.

A new effort has been initiated to reduce the number of delinquent standards has proven to be very successful. The effort is two-fold. 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) processed or in works this year. Additionally, the Standards Board is working with the Professional Divisions Committee to utilize their members' expertise to help review delinquent standards and determine the appropriate maintenance action. In total, 20 standards are expected to be reaffirmed in 2016. This represents a 400% increase for 2016 to the average of 5 standards reaffirmed a year for the last 5 years. The increase in reaffirmations significantly reduces the number of delinquent standards from 22 (2015) to 15 (2016). With 5 of these standards under revision, the total of truly delinquent standards is reduced to 10 or 12% of the total number of current standards (81).

The U.S. Nuclear Regulatory Commission (NRC) launched the NRC Standards Forum to fill the gap left by the dissolution of the Nuclear Energy Standards Coordination Collaborative. The first NRC Standards Forum was held September 8, 2016, and focused on advanced reactors. ANS Standards Board Chair George Flanagan made a presentation on ANS's work in the area of advanced reactors and was recognized as one of the forerunners developing standards for this technology. The NRC plans to hold a Standards Forum at least once a year. Flanagan also made a presentation on behalf of ANS at the Engineering Vice Presidents' Meeting held at the Institute of Nuclear Power Operations on October 12, 2016. The presentation included a brief summary of the ANS Standards Committee organization, upcoming standards of importance to nuclear power plants, high priority standards activities including those on advanced reactors, common standards misconceptions, and industry membership on the Standards Committee.

The ANS Standards Committee issued responses to inquiries on ANSI/ANS-3.4-2013, "Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants," and ANSI/ANS-3.11-2015, "Determining Meteorological Information at Nuclear Facilities."

The ANS standards program was reaccredited by the American National Standards Institute (ANSI) on May 17, 2016. ANSI audited the ANS standards program in August of 2015 resulting in the request to update our rules and procedures to provide more detail on our current practices and to be consistent with ANSI requirements to complete maintenance on American National Standards within five years of approval. The approval of the revised rules and procedures closed the audit successfully. The accredited procedures were revised a second time in late 2016. The second revision includes a suggestion from ANSI during the earlier reaccreditation process and a change to the number of appointed Standards Board members made to the ANS Bylaws and Rules.

ANS has 81 current standards of which 13 are considered delinquent for lack of maintenance within five years of ANSI approval or reaffirmation. It is recognized that a good many of these standards are delinquent due to a lack of volunteer resources. An additional six standards have also exceeded five years since being approved by ANSI but are currently being revised and have submitted Project Initiation Notification System (PINS) forms to ANSI recognizing that maintenance is being performed.

The following standards projects were initiated in 2016 (PINS in approval or approved):

- ANS-2.6-201x, "Guidelines for Estimating Present and Forecasting Future Population Distributions Surrounding Nuclear Facility Sites" (proposed new standard)
- ANS-2.33-201x, "Aquatic Ecological Surveys Required for Siting, Design, and Operation of Thermal Power Plants" (proposed new standard)

- ANS-8.7-201x, “Nuclear Criticality Safety in the Storage of Fissile Materials” [proposed revision of ANSI/ANS-8.7-1998 (R2012)]
- ANS-8.23-201x, “Nuclear Criticality Accident Emergency Planning and Response” [proposed revision of ANSI/ANS-8.23-2007 (R2012)]
- ANS-19.4-201x, “A Guide for Acquisition and Documentation of Reference Power Reactor Physics Measurements for Nuclear Analysis Verification” [proposed revision of historical standard ANSI/ANS-19.4-1976 (R2000)]
- ANS-19.6.1-201x, “Reload Startup Physics Tests for Pressurized Water Reactors” (proposed revision of ANSI/ANS-19.6.1-2011 [R2016])
- ANS-20.2-201x, “Nuclear Safety Design Criteria and Functional Performance Requirements for Liquid-Fuel Molten Salt Reactor Nuclear Power Plants” (proposed new standard)
- ANS-30.2-201x , “Structures, Systems, and Component Classification for Nuclear Power Plants” (proposed new standard)

The following standards were approved in 2016:

- ANSI/ANS-2.2-2016, “Earthquake Instrumentation Criteria for Nuclear Power Plants” (revision of historical standard ANSI/ANS-2.2-2002)
- ANSI/ANS-2.3-2011 (R2016), “Estimating Tornado, Hurricane, and Extreme Straight Line Wind Characteristics at Nuclear Facility Sites” (reaffirmation of ANSI/ANS-2.3-2011)
- ANSI/ANS-2.17-2010 (R2016), “Evaluation of Subsurface Radionuclide Transport at Commercial Nuclear Power Plants” (reaffirmation of ANSI/ANS-2.17-2010)
- ANSI/ANS-2.21-2012 (R2016), “Criteria for Assessing Atmospheric Effects on the Ultimate Heat Sink” (reaffirmation of ANSI/ANS-2.21-2012)
- ANSI/ANS-2.23-2016, “Nuclear Power Plant Response to an Earthquake” [revision of ANSI/ANS-2.23-2002 (R2009)]
- ANSI/ANS-2.27-2008 (R2016), “Criteria for Investigations of Nuclear Facility Sites for Seismic Hazard Assessments” (reaffirmation of ANSI/ANS-2.27-2008)
- ANS-2.29-2008 (R2016), “Probabilistic Seismic Hazard Analysis” (reaffirmation of ANSI/ANS-2.29-2008)
- ANSI/ANS-6.4-2006 (R2016), “Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants” (reaffirmation of ANSI/ANS-6.4-2006)
- ANSI/ANS-6.4.2-2006 (R2016), “Specification for Radiation Shielding Materials” (reaffirmation of ANSI/ANS-6.4.2-2006)
- ANSI/ANS-8.12-1987 (R2016), “Nuclear Criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors” [reaffirmation of ANSI/ANS-8.12-1987 (R2011)]
- ANSI/ANS-8.14-2004 (R2016), “Use of Soluble Neutron Absorbers in Nuclear Facilities Outside Reactors” [reaffirmation of ANSI/ANS-8.14-2004 (R2011)]
- ANSI/ANS-8.22-1997 (R2016), “Nuclear Criticality Safety Based on Limiting and Controlling Moderators” [reaffirmation of ANSI/ANS-8.22-1997 (R2011)]
- ANSI/ANS-8.26-2007 (R2016), “Criticality Safety Engineer Training and Qualification Program” [reaffirmation of ANSI/ANS-8.26-2007 (R2012)]
- ANSI/ANS-10.4-2008 (R2016), “Verification and Validation of Non-Safety-Related Scientific and Engineering Computer Programs for the Nuclear Industry” (reaffirmation of ANSIANS-10.4-2008)
- ANSI/ANS-10.5-2006 (R2016), “Accommodating User Needs in Scientific and Engineering Computer Software Development” [reaffirmation of ANSI/ANS-10.5-2006 (R2011)]
- ANSI/ANS-15.2-1999 (R2016), “Quality Control for Plate-Type Uranium-Aluminum Fuel Elements” (reaffirmation of ANSI/ANS-15.2-1999 (R2009)]
- ANSI/ANS-15.4-2016, “Selection and Training of Personnel for Research Reactors” (revision of ANSI/ANS-15.4-2007)
- ANSI/ANS-15.11-2016, “Radiation Protection at Research Reactor Facilities” (revision of ANSI/ANS-15.11-2009)
- ANSI/ANS-18.1-2016, “Radioactive Source Term for Normal Operation of Light Water Reactors” (revision of historical standard ANSI/ANS-18.1-1999)
- ANSI/ANS-19.6.1-2011 (R2016), “Reload Startup Physics Tests for Pressurized Water Reactors” (reaffirmation of ANSI/ANS-19.6.1-2011)

- ANSI/ANS-19.10-2009 (R2016), “Methods for Determining Neutron Fluence in BWR and PWR Pressure Vessel and Reactor Internals” (reaffirmation of ANSI/ANS-19.10-2009)
- ANSI/ANS-40.37-2009 (R2016), “Mobile Low-Level Radioactive Waste Processing Systems” (reaffirmation of ANSI/ANS-40.37-2009)
- ANSI/ANS-53.1-2011 (R2016), “Nuclear Safety Design Process for Modular Helium-Cooled Reactor Plants” (reaffirmation of ANSI/ANS-53.1-2011)
- ANSI/ANS-56.8-2002 (R2016), “Containment System Leakage Testing Requirements” [reaffirmation of ANSI/ANS-56.8-2002 (R2011)]
- ANSI/ANS-57.10-1966 (R2016), “Design Criteria for Consolidation of LWR Spent Fuel” [reaffirmation of ANSI/ANS-57.10-1996 (R2006)]

The following standards were published in 2016:

- ANSI/ANS-2.2-2016, “Earthquake Instrumentation Criteria for Nuclear Power Plants” (revision of historical standard ANSI/ANS-2.2-2002)
- ANSI/ANS-2.23-2016, “Nuclear Plant Response to an Earthquake” [revision of ANSI/ANS-2.23-2002 (R2009)]
- ANSI/ANS-8.27-2015, “Burnup Credit for LWR Fuel” (revision of ANSI/ANS-8.27-2008)
- ANSI/ANS-10.8-2015, “Non-Real Time, High-Integrity Software for the Nuclear Industry—User Requirements” (new standard)
- ANSI/ANS-15.4-2016, “Selection and Training of Personnel for Research Reactors (revision of ANSI/ANS-15.4-2007)
- ANSI/ANS-15.11-2016, “Radiation Protection at Research Reactor Facilities” (revision of ANSI/ANS-15.11-2009)
- ANSI/ANS-18.1-2016, “Radioactive Source Term for Normal Operation of Light Water Reactors” (revision of historical standard ANSI/ANS-18.1-1999)

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

George F. Flanagan, **Chair**, Oak Ridge National Laboratory (RARCC)
Steven L. Stamm, **Vice Chair**, Member at Large, Individual

James K. August, Member at Large, Southern Company
Robert J. Budnitz, Ex Officio Member (JCNRM), WENRA Liaison, Lawrence Berkeley National Laboratory
Robert D. Busch, Ex Officio Member (NCSCC), University of New Mexico
C.E. (Gene) Carpenter, Ex Officio Member (LLWRCC), U.S. Department of Energy
Donald R. Eggett, Ex Officio Member (FWDCC), Individual
N. Prasad Kadambi, Member at Large, ANSI/ISO TC 85/SC 6, Individual
Carl A. Mazzola, Ex Officio Member (ESCC), Chicago Bridge & Iron Federal Services
John A. Naroski, Member at Large, U.S. Nuclear Regulatory Commission
Charles H. Moseley, Jr., Member at Large, Individual
James O'Brien, Ex Officio Member (NRNFCC), U.S. Department of Energy
R. David Sachs, Member at Large, Individual
Andrew O. Smetana, Ex Officio Member (SRACC), Savannah River National Laboratory
Andrew G. Sowder, Member at Large, Electric Power Research Institute
William M. Turkowski, Member at Large, Westinghouse Electric Company
Edward G. Wallace, Member at Large, GNBC Associates, Inc.

Calvin M. Hopper, Observer, Individual
Stanley H. Levinson, JCNRM/SCoRA Liaison, Individual
William B. Reuland, Observer, Individual
James H. Riley, NEI Liaison, Nuclear Energy Institute

Ex Officio Member = Consensus Committee Chair

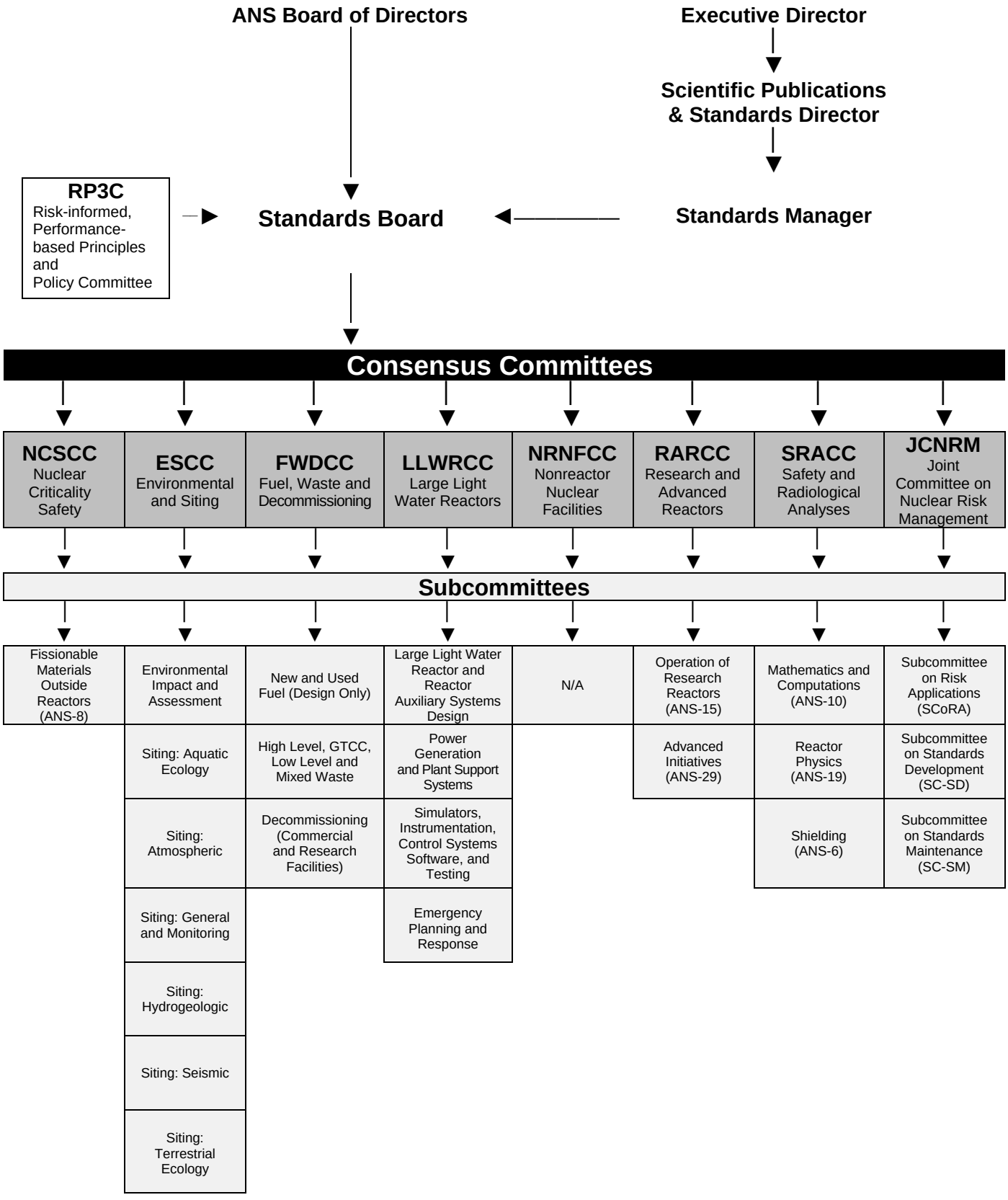


Figure 2 – ANS Standards Committee: Organizational Chart

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 (ESCC)	Kevin Bryson
Fissionable Material Outside Reactors/ANS-8 (NCSCC)	Brian Kidd
High Level, GTCC, Low Level, and Mixed Waste (FWDCC)	OPEN
Large Light Water Reactor and Reactor Auxiliary Systems Design (LLWRCC)	Mark Colby
Mathematics and Computations/ANS-10 (SRACC)	Paul Hulse
New and Used Fuel (Design Only) (FWDCC)	OPEN
Operation of Research Reactors/ANS-15 (RARCC)	Thomas Newton
Power Generation and Plant Support Systems (LLWRCC)	Leroy E. Kreider
Reactor Physics/ANS-19 (SRACC)	Dimitrios Cokinos
Shielding/ANS-6 (SRACC)	Charlotta Sanders
Simulators, Instrumentation, Control Systems, Software and Testing (LLWRCC)	Pranab Guha
Siting: Aquatic Ecology (ESCC)	Ann Miracle
Siting: Atmospheric	Jennifer Call
Siting: General and Monitoring (ESCC)	Leah Parks
Siting: Hydrogeologic (ESCC)	Yan Gao
Siting: Seismic (ESCC)	Quazi Hossain
Siting: Terrestrial Ecology (ESCC)	Peyton Doub
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 2016)

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-2.15-2013	Criteria for Modeling and Calculating Atmospheric Dispersion of Routine Radiological Releases from Nuclear Facilities (approved 2/27/2013)
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	Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design (reaffirmed 5/27/2010)
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	Managerial, Administrative, and Quality Assurance Controls for the Operational Phase of Nuclear Power Plants (approved 3/20/2012)
ANS-3.4-2013	Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants (approved 4/29/2013)
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	Group-Averaged Neutron and Gamma-Ray Cross Sections for Radiation Protection and Shielding Calculations for Nuclear Power Plants (approved 8/28/2013)
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	Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors (approved 4/15/2014)
ANS-8.3-1997; R2003 R2012	Criticality Accident Alarm System (reaffirmed 7/26/2012)
ANS-8.5-1996; R2002; R2007; R2012	Use of Borosilicate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material (reaffirmed 2/23/2012)
ANS-8.6-1983; R1988; R1995; R2001; R2010	Safety in Conducting Subcritical Neutron-Multiplication Measurements In Situ (reaffirmed 11/16/2010)
ANS-8.7-1998; R2007 R2012	Nuclear Criticality Safety in the Storage of Fissile Materials (reaffirmed 2/23/12)
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-8.24-2007; R2012	Validation of Neutron Transport Methods for Nuclear Criticality Safety Calculations (reaffirmed 5/31/2012)
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 (approved11/10/2015)
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	Non-Real Time, High-Integrity Software for the Nuclear Industry—Developer Requirements (approved 3/18/2013)
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	The Development of Technical Specifications for Research Reactors (reaffirmed 4/24/2013)
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	Quality Assurance Program Requirements for Research Reactors (reaffirmed 5/10/2013)
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	Format and Content for Safety Analysis Reports for Research Reactors (approved 4/3/2013)
ANS-16.1-2003; R2008	Measurement of the Leachability of Solidified Low-Level Radioactive Wastes by a Short-Term Test Procedure (reaffirmed 8/4/2008)
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	Steady-State Neutronics Methods for Power Reactor Analysis (approved 8/26/2011)

ANS-19.3.4-2002; R2008	The Determination of Thermal Energy Deposition Rates in Nuclear Reactors (reaffirmed 10/31/2008)
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-19.11-1997; R2002 R2011	Calculations and Measurement of the Moderator Temperature Coefficient of Reactivity for Water Moderated Power Reactors (reaffirmed 6/17/2011)
ANS-40.37-2009; R2016	Mobile Low Level Radioactive Waste Processing Systems (reaffirmed 6/30/2016)
ANS-41.5-2012	Verification and Validation of Radiological Data for Use in Waste Management and Environmental Remediation (approved 2/15/2012)
ANS-51.10-2002; R2008	Auxiliary Feedwater System for Pressurized Water Reactors (reaffirmed 10/14/2008)
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	Solid Radioactive Waste Processing Systems for Light Water Cooled Reactor Plants (reaffirmed 6/15/2009)
ANS-55.4-1993; R1999 R2007	Gaseous Radioactive Waste Processing Systems for Light Water Reactor Plants (reaffirmed 5/14/2007)
ANS-55.6-1993; R1999; R2007	Liquid Radioactive Waste Processing System for Light Water Reactor Plants (reaffirmed 5/14/2007)
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-57.8-1995; R2005; R2011	Fuel Assembly Identification (reaffirmed 8/26/2011)
ANS-57.10-1996; R2006; R2016	Design Criteria for Consolidation of LWR Spent Fuel (reaffirmed 7/7/2016)
ANS-58.3-1992; R1998; R2008	Physical Protection for Nuclear Safety-Related Systems and Components (reaffirmed 3/18/2008)
ANS-58.8-1994; R2001; R2008	Time Response Design Criteria for Safety-Related Operator Actions (reaffirmed 8/25/2008)
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	Safety and Pressure Integrity Classification Criteria for Light Water Reactors (approved 4/22/2011)
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-1.4-2013	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
Chicago Bridge & Iron Federal Services

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: Acquatic Ecology*
- *Siting: Atmospheric*
- *Siting: General and Monitoring*
- *Siting: Hydrogeologic*
- *Siting: Seismic*
- *Siting: Terrestrial Ecology*

ESCC Membership:

Carl A. Mazzola, Chair, Chicago Bridge & Iron Federal Services
Yan Gao, Vice Chair, Westinghouse Electric Company
Thomas Bellinger, Consolidated Nuclear Security, llc
David Bruggeman, Los Alamos National Laboratory
(Alternate: Jean DeWart, Los Alamos National Laboratory)
Kevin Bryson, Individual
Jennifer Call, Oasys, Inc.
Peyton Doub, U.S. Nuclear Regulatory Commission
Quazi Hossain, Lawrence Livermore National Laboratory
R. Joseph Hunt, Consolidated Nuclear Security, llc
Ann L. Miracle, Pacific Northwest National Laboratory
Kit Ng, Bechtel Power Corporation
James O'Brien, U.S. Department of Energy
Leah Parks, U.S. Nuclear Regulatory Commission
Todd Rassmussen, University of Georgia
Jean Savy, Individual
Ali Simpkins, Dade Moeller, an NV5 Company
Paul Snead, Duke Energy
Steven Vigeant, Chicago Bridge & Iron Federal Services
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 2016 (April and August), and a physical meeting was held during the ANS Winter Meeting in Las Vegas, NV, on Wednesday, November 9. Four new members joined the ESCC. New members include David Bruggeman, Kit Ng, Ali Simpkins, and Paul Snead. The addition of these four members brings the ESCC membership up to 20.

Approved in 2016:

ANSI/ANS-2.2-2016, "Earthquake Instrumentation Criteria for Nuclear Power Plants" (supersedes ANSI/ANS-2.2-2002 – new standard)

ANSI/ANS-2.3-2011 (R2016), "Estimating Tornado, Hurricane, and Extreme Straight Line Wind Characteristics at Nuclear Facility Sites" (reaffirmation of ANSI/ANS-2.3-2011)

ANSI/ANS-2.17-2010 (R2016), "Evaluation of Subsurface Radionuclide Transport at Commercial Nuclear Power Plants" (reaffirmation of ANSI/ANS-2.17-2010)

ANSI/ANS-2.21-2012 (R2016), "Criteria for Assessing Atmospheric Effects On the Ultimate Heat Sink" (reaffirmation of ANSI/ANS-2.21-2012)

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

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

ANSI/ANS-2.29-2008 (R2016), "Probabilistic Seismic Hazard Analysis" (reaffirmation of ANSI/ANS-2.29-2008)

Active standards/projects:

ANS-2.6, "Guidelines for Estimating Present and Projecting Future Population Distributions Surrounding Nuclear Facility Sites" (proposed new standard)

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

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

ANS-2.10, "Criteria for the Handling and Initial Evaluation of Records from Nuclear Power Plant Seismic Instrumentation" (historical revision of ANSI/ANS-2.10-2003 – 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-2.25, "Surveys of Ecology Needed to License Nuclear Facilities" (historical revision of ANSI/ANS-18.5-1982; R1989; redesignated ANS-2.25 – proposed new standard)

ANS-2.33 (previously designated ANS-18.4), "Aquatic Ecological Surveys Required for Siting, Design, and Operation of Nuclear Power Plants" Title TBD (proposed new standard)

ANS-2.34, "Probabilistic Volcanic Hazard Assessment" Title TBD (proposed new standard)

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

Environmental and Impact Assessment and Analysis Subcommittee

Membership:
Kevin Bryson, Chair, Individual

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

ANS-18.2.1, "Methods for Inferring Environmental Doses" (proposed standard under consideration)

Siting: Aquatic Ecology Subcommittee

Membership:
Ann Miracle, Chair, Pacific Northwest National Laboratory
Rebekah Krieg, Pacific Northwest National Laboratory

The Siting: Aquatic Ecology Subcommittee manages the following projects:

ANS-2.33 (previously designated ANS-18.4), "Aquatic Ecological Surveys Required for Siting, Design, and Operation of Nuclear Power Plants" – Title TBD (proposed new standard)

Scope:
This standard provides criteria for the types of surveys or studies that should be conducted to characterize aquatic ecological baseline conditions and assess the effects to aquatic ecology resources from siting, constructing, and operating nuclear power plants.

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

Status: Working group formed and PINS developed in 2016. Working group is resolving comments submitted with the Standards Board ballot of the PINS.

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ANS-18.3.1, "Entrainment: Guide to Steam Electric Power Plant Cooling System Siting, Design and Operation for Controlling Damage to Aquatic Organisms" (proposed new standard under consideration)

Status: Withdrawal of project proposed.

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ANS-18.3.2, "Cold Shock: Guide to Steam Electric Power Plant Cooling System Siting, Design and Operation for Controlling Damage to Aquatic Organisms" (proposed new standard under consideration)

Status: Withdrawal of project proposed.

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ANS-18.3.3, "Entrapment/Impingement: Guide to Steam Electric Power Plant Cooling System Siting, Design and Operation for Controlling Damage to Aquatic Organisms at Water Intake Structures" (proposed new standard under consideration)

Status: Withdrawal of project proposed.

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ANS-18.6, "Discharge of Thermal Effluents into Surface Waters" (proposed new standard under consideration)

Status: Withdrawal of project proposed.

Siting: Atmospheric Subcommittee

Membership:
Jennifer Call, Chair, Oasys, Inc.
Stephen Vigeant, Vice Chair, Chicago Bridge & Iron Federal Services
John Ciolek, AlphaTRAC, Incorporated
Brad Harvey, U.S. Nuclear Regulatory Commission
Carl Mazzola, Chicago Bridge & Iron Federal Services
Harold Thistle, U.S. Forest Service

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:
Brad Harvey, Chair, U.S. Nuclear Regulatory Commission; Mo Amin, Sargent & Lundy Engineers; Jennifer Call, Oasys, Inc.; Antonio Godoy, International Atomic Energy Agency; Quazi Hossain, Lawrence Livermore National Laboratory; Jeff Kimball, Individual; Carl Mazzola, Chicago Bridge & Iron Federal Services; James McDonald, Individual; Sujit Samaddar, U.S. Nuclear Regulatory Commission; Emil Simiu, National Institute of Standards Technology

Status:
ANSI/ANS-2.3-2011 (R2016) was reaffirmed 6/29/16. Rather than undertaking a major revision at this point, it was decided this standard should wait on new and emerging tornado research conducted by the National Institute of Standards and Technology and the American Society of Civil Engineers (ASCE). Applied Research Associates, as part of a contract task order, is developing new tornado hazard maps for the United States. These maps will provide an essential component for the development of a performance-based, tornado-resistant design standard planned to be implemented in a future edition of the ASCE/SEI 7, Standard – "Minimum Design Loads for Buildings and Other Structures." It was noted that ASCE/SEI 7-05 is referenced numerous times throughout ANSI/ANS-2.3-2011 (R2016), yet it was updated in 2010 (ASCE/SEI 7-10) with significant changes, including a change to the return period wind speed used to calculate wind loads resulting in higher wind speed considerations for structural integrity purposes. There is a great need for structural engineers to help evaluate and revise this standard and coordination with the ASCE should be pursued.

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ANSI/ANS-2.15-2013, "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.; Cliff Glantz, Co-chair, Pacific Northwest National Laboratory; Mark Abrams, ABS Consulting, Inc.; Ron Baskett, Lawrence Livermore National Laboratory; Thomas Bellinger, Consolidated Nuclear Security, llc; David Brown, National Institute of Standards & Technology; Mark Carroll, Individual; Toree Cook, Tennessee Valley Authority; Brad Harvey, Office of New Reactors, U.S. Nuclear Regulatory Commission; Chuck Hunter, Savannah River National Laboratory; Marsha Kinley, Duke Energy; Y. J. Lin, Bechtel Power Corp.; Mike Mazaika, Nuclear Regulatory Commission; Carl Mazzola, Chicago Bridge & Iron Federal Services; 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, an NV5 Company; Steve Vigeant, Chicago Bridge & Iron Federal Services; Ping Wan, Individual; Ken Wastrack, Tennessee Valley Authority

Status: This standard was approved by ANSI on 2/27/13. No activity in 2016.

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

Harold Thistle, Chair, U.S. Forestry Service; Jeremy Rishel, Vice Chair, Pacific Northwest National Laboratory; Mark Abrams, ABS Consulting, Inc.; Ron Baskett, Lawrence Livermore National Laboratory; 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; Brad Harvey, U.S. Nuclear Regulatory Commission; Chuck Hunter, Savannah River National Laboratory; Marsha Kinley, Duke Energy; Y. J. Lin, Bechtel Power Corp.; Carl Mazzola, Chicago Bridge & Iron Federal Services; 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, an NV5 Company; Steve Vigeant, Chicago Bridge & Iron Federal Services; Ping Wan, Individual; Ken Wastrack, Tennessee Valley Authority

Status: The PINS was approved and submitted to ANSI in 2005. Harold Thistle replaced Ron Baskett as chair in December 2016. Jennifer Call and Carl Mazzola are bringing the new chair up to speed via emails and conference calls. A face-to-face meeting for this working group is being discussed to be held in conjunction with the upcoming NUMUG meeting in June 2017 in Indianapolis, Indiana.

Consideration is being given to give priority to ANS-3.8.10 over ANS-2.16. Although much work has already been completed on ANS-2.16, ANS-3.8.10 is considered a higher priority due to the fact that the U.S. Department of Energy (DOE) has issued DOE O 151.1D which includes requirements for emergency response consequence assessment models.

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:

Stephen Vigeant, Chair, Chicago Bridge & Iron Federal Services; Chris Cook, U.S. Nuclear Regulatory Commission; Brad Harvey, U.S. Nuclear Regulatory Commission; Stan Gardocki, U.S. Nuclear Regulatory Commission; Robert Kannor, Bechtel Power; Al Garrett, Savannah River National Laboratory; Matt Parker, Savannah River National Laboratory

Status: This standard was reaffirmed on 4/18/2016.

ANS-2.31, "Standard for Estimating Extreme Precipitation at Nuclear Facility Sites" (proposed new standard)

Scope:

The scope of this standard address extreme natural site hazards associated with precipitation (rain, snow, ice and their combination) which are applicable to structures, systems and components in nuclear safety-related facilities with probabilities of exceedence or return periods consistent with extreme design basis category wind, flood and earthquake phenomena (i.e. ANS-2.1, ANS-2.3, ANS-2.8, ANS-2.14, ANS-2.26, ANS-2.27 and ANS-2.29).

Membership:

Carl Mazzola, Temporary Chair, Chicago Bridge & Iron Federal Services; Matt Carney, Bechtel National, Inc.; Yan Gao, Westinghouse Electric Co.; Quazi Hossain, Lawrence Livermore National Laboratory; Daniel Howell, FM Global; Roy Hunt, Consolidated Nuclear Security, llc; Joseph Kanney, U.S. Nuclear Regulatory Commission, Yonas Kinfu, Bechtel Power Corporation; Kit Ng, Bechtel Power Corporation; Walter Schalk, Air Resources Laboratory; Stephen Vigeant, Chicago Bridge & Iron Federal Services; Wesley Wu, Bechtel Power Corporation

Status: This proposed standard has been merged with ANS-2.8, "Determination of External Flood Hazards for Nuclear Facilities." Jennifer Call is currently working with Yan Gao and his working group to be sure that the intent of ANS-2.31 is adequately covered in ANS-2.8. Consequently, work on ANS-2.31 has been terminated.

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:

Harold Thistle, Chair, U.S. Forestry Service; Jeremy Rishel, Vice Chair, Pacific Northwest National Laboratory; Mark Abrams, ABS Consulting, Inc.; Ron Baskett, Lawrence Livermore National Laboratory; 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; Bruce Egan, Egan Environmental; Cliff Glantz, Pacific Northwest National Laboratory; Brad Harvey, U.S. Nuclear Regulatory Commission; Chuck Hunter, Savannah River National Laboratory; Marsha Kinley, Duke Energy; Y. J. Lin, Bechtel Power Corp.; Michael Mazaika, U.S. Nuclear Regulatory Commission; Carl Mazzola, Chicago Bridge & Iron Federal Services; 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; Jeremy Rishel, Pacific Northwest National Laboratory; Ali Simpkins, Dade Moeller, an NV5 Company; Steve Vigeant, Chicago Bridge & Iron Federal Services; Ping Wan, Individual; Ken Wastrack, Tennessee Valley Authority

Status:

Harold Thistle replaced Ronald Baskett as chair in December 2016. Jennifer Call and Carl Mazzola are bringing the new chair up to speed via emails and conference calls. A face-to-face meeting for this working group is being discussed to be held in conjunction with the upcoming NUMUG meeting in June 2017 in Indianapolis, Indiana. Consideration is being given to give priority to ANS-3.8.10 over ANS-2.16. Although much work has already been completed on ANS-2.16, ANS-3.8.10 is considered a higher priority due to the fact that the U.S. Department of Energy (DOE) has issued DOE O 151.1D which includes requirements for emergency response consequence assessment models.

Siting: General and Monitoring Subcommittee

Membership:

Leah Parks, Chair, U.S. Nuclear Regulatory Commission
Thomas Bellinger, Consolidated Nuclear Security, llc

Jennifer Call, Oasys, Inc.
David Kosson, Vanderbilt University
Daniel Mussatti, U.S. Nuclear Regulatory Commission

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

ANS-2.6, "Guidelines for Estimating Present and Projecting Future Population Distributions Surrounding Nuclear Facility Sites" (proposed new standard)

Scope:

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

Membership:

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, AREVA Inc.; Nate Bixler, Sandia National Laboratories; Olufemi Omtaomu, Oak Ridge National Laboratory; Mary Richmond, Bechtel Corporation; Amy Rose, Oak Ridge National Laboratory; Robert Sachs, Individual; Bo Saulsbury, Oak Ridge National Laboratory; Harold Stiles, Duke Energy; Seshagiri Tammara, U.S. Nuclear Regulatory Commission; Rachel Turney-Work; Kevin Weinisch, KLD Engineering, P.C.

Status: Daniel Mussatti was appointed the new working group chair in 2015 and reconstituted a working group. The PINS was submitted to ANSI on 6/24/2016. The working group held a meeting December 12, 2016, to go over high level issues for the current draft of the standard and to make short term assignments to working group members. The working group set a goal for mid-March of 2017 to deliver a draft to ESCC Chair for informal review. Monthly teleconferences will continue next calendar year.

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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:

OPEN

Status: Working group chair being pursued to initiate this proposed project.

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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; Jennifer Call, Co-Chair, Oasys, Inc.; Mark Abrams, ABS Consulting; Robert Banta, National Oceanic and Atmospheric Administration; Ronald Baskett, Lawrence Livermore National Laboratory; Kevin Birdwell, Oak Ridge National Laboratory; Patrick T. Brennan, Meteorological Evaluation Services; Mark Carroll, Murray and Trettel, Inc.; John Ciolek, AlphaTrac; Kirk Clawson, NOAA Air Resources Laboratory; Thomas Coulter, Coulter Air Quality Services; James Fairobent, U.S. Department of Energy/NNSA; Paul Fransioli, Kleinfelder; 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; John Irwin, John S. Irwin & Associates; 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 A. Mazzola, Chicago Bridge & Iron Federal Services; Edward McCarthy, E.F. McCarthy & Associates; Matthew Parker, Savannah River National Laboratory; Doyle Pittman, Meteorologist (Retired); Kevin Quinlan, U.S. Nuclear Regulatory Commission; Walter Schalk, NOAA ARL/SORD; Adam Smith, Tennessee Valley Authority; Stephen Vigeant, Chicago Bridge & Iron Federal Services, Ping Wan, Bechtel Power Corporation; Ken Wastrack, Tennessee Valley Authority

Status: Standard was approved by ANSI on 8/20/2015. No activity needed in 2016.

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ANSI/ANS-16.1-2003 (R2008), "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, Chair, Vanderbilt University; Susan Thorneloe, U.S. Environmental Protection Agency; Albert Kruger, U.S. Department of Energy; Kevin Brown, Vanderbilt University; Hans van der Sloot (formerly with the Energy Research Centre of the Netherlands); Eric Pierce, Oak Ridge National Laboratory; David DiPoali, Savannah River National Laboratory

Status: A reaffirmation received ANSI approval 8/4/2008. A reaffirmation ballot was issued in 2016. ANSI approval should be received in January 2017. The working group plans to hold a teleconference mid-January to continue work on the revision to the standard.

Siting: Hydrogeologic Subcommittee

Membership:

Yan Gao, Chair, Westinghouse Electric Company
James Bollinger, Savannah River National Laboratory
Angelos Findikakis, Bechtel National Incorporated
Todd Rasmussen, University of Georgia

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

ANS-2.8, "Criteria for Assessing Tectonic Surface Fault Rupture and Deformation at 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, Westinghouse Electric Company; 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 Associates; 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, Chicago Bridge & Iron Federal Services; Marty McCann, Jack Benjamin & Associates,

Inc.; Kit Ng, Bechtel Power Corporation; Robert Rishel, Duke Energy; Raymond Schneider, Westinghouse Electric Company; 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 2017 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:
James S. Bollinger, Administrative Co-chair, Savannah River National Laboratory; Todd Rasmussen, Technical Co-Chair, University of Georgia; 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; David Scott, Radiation Safety and Control Services; Stewart Taylor, Bechtel Corporation; Mike Young, University of Texas

Status: The process of developing ANS-2.9 was initiated in 2011 once the companion standard ANSI/ANS-2.17-2010 was approved. No activity in 2016.

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:
James S. Bollinger, Administrative Co-Chair, Savannah River National Laboratory; Todd Rasmussen, Technical Co-Chair, University of Georgia; Matt Barvenik, GZA GeoEnvironmental, Inc.; Rick Beauheim, Sandia National Laboratories; 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.

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; Angelos Findikakis, Bechtel National Inc.; Pat Ryan, Individual

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.

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.

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:

Yan Gao, Chair; Westinghouse Electric Company; Joseph Carlson, U.S. Department of Energy

Status: Comments on a PINS issued to the NFSC (predecessor consensus committee) remain unresolved. Yan Gao has temporarily taken on the chair position for this standard until a chair can be sought.

Siting: Seismic Subcommittee

Membership:
Quazi Hossain, Chair, Lawrence Livermore National Security
Jim Xu, Vice Chair, U.S. Nuclear Regulatory Commission
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
Jean Savy, Individual
Ivan Wong, Lettis Consultants International

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

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.; Jon Ake, U.S. Nuclear Regulatory Commission; Aejaz Ali, AREVA Inc.; Vladimir Graizer, U.S. Nuclear Regulatory Commission; Roy Joe Hunt, Consolidated Nuclear Security, llc; James Johnson, James Johnson & Assoc.; Roger Kenneally, Individual; Richard Lee, Los Alamos National Laboratory; Michael Lewis, Bechtel Corp.; James Marrone, Bechtel Corp.; Robert Nigbor, University of California-Los Angeles; Mauricio Ciudad-Real, Kinematrics, Inc.

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

ANS-2.10, "Criteria for the Handling and Initial Evaluation of Records from Nuclear Power Plant Seismic Instrumentation" (historical revision of ANSI/ANS-2.10-2003– proposed new standard)

Scope:
This standard provides criteria for the timely retrieval and the subsequent processing, handling, and storage of data obtained from seismic instrumentation specified in ANSI/ANS-2.2-2002. Also included are initial evaluation criteria to determine whether earthquake motion at the site has exceeded the plant's operating basis earthquake ground motion (OBE). This standard does not address procedures for plant walkdowns immediately (within 8 hours) after an earthquake, for ensuring a safe and orderly shutdown, for long-term evaluations of the building and equipment response data, and for subsequently returning the plant to operation. These topics are addressed in ANSI/ANS-2.23-2002.

Membership:
Jim Xu, 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

Status: Jim Xu replaced Robert Carpenter as chair. A revision of the historical standard is underway.

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 (R2010), "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:

Quazi Hossain, Chair, Lawrence Livermore National Laboratory; Steve Additon, Rocky Flats Environmental Technology Site; Neil W. Brown, Lawrence Livermore National Laboratory; Harish Chander, U.S. Department of Energy; Chris Chaves, U.S. Department of Energy; Daniel Guzy, U.S. Department of Energy; Asadour Hadjian, Defense Nuclear Facilities Safety Board; George Inch, Constellation Nuclear; Calvin Morrell, Shaw Group, Inc.; Andrew Persinko, U.S. Nuclear Regulatory Commission; Howard C. Shaffer, Consultant; Charles M. Vaughan, Global Nuclear Fuel

Status: Received ANSI approval for a reaffirmation on 5/27/2010. No activity in 2016.

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, KLHanson Consulting LLC; Jon Ake, U.S. Nuclear Regulatory Commission; M. Logan Cline, RIZZO Associates, Inc.; Carl J. Costantino, Carl J. Constantino & Associates; Richard Lee, Los Alamos National Laboratory; William Lettis, William Lettis & Associates, Inc.; Yong Li, Defense Nuclear Facilities Safety

Board; Clifford Munson, U.S. Nuclear Regulatory Commission; Robert Nigbor, Consultant; Susan Olig, Olig Seismic Geology, Inc.; Ellen Rathje, University of Texas-Austin; William Savage, Consultant

Status: A reaffirmation was approved by ANSI on 6/7/2016. The reaffirmation was approved with the understanding that the standard will be revised in the future to update it and bring it in line with revisions to ANSI/ANS-2.29-2008, "Probabilistic Seismic Hazard Analysis," that are currently underway. A new PINS will be prepared in early 2017 and an updated roster for a new working group to complete the update will also be provided in early 2017.

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:
Jean Savy, Chair, Individual; Emily Gibson, Vice Chair, Schnabel Engineering; Jon Ake, U.S. Bureau of Reclamation; Kenneth Campbell, EQECAT Inc.; Nelish Chokshi, U.S. Nuclear Regulatory Commission; Kevin Coppersmith, Coppersmith Consulting; Carl Costantino, Individual; C.B. Crouse, URS Professional Solutions; Asa Hadjian, Defense Nuclear Facilities Safety Board; Quazi Hossain, Lawrence Livermore National Laboratory; Jeffrey Kimball, U.S. Department of Energy; Jerry King, Individual; Richard Lee, Individual; Martin McCann, JBA Associates; Maurice Power, Geomatrix Consultants; Gabriel Toro, Risk Engineering; Ivan Wong, URS Professional Solutions; Robert Youngs, Geomatrix Consultants, Inc.

Status: A reaffirmation of this standard was approved 10/11/2016. Revision activities started in 2015. Currently, the scope and rationale for the changes are being reviewed and discussed among the members of the working group. A PINS will be prepared. The revision is being coordinated with the revision of ANSI/ANS-2.27-2008.

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 K. 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, "Probabilistic Volcanic Hazard Assessment" (Title TBD) (proposed new standard)

Scope:

In development.

Membership:
Stephen McDuffie, Chair, U.S. Department of Energy

Status: Stephen McDuffie has accepted the position of working group chair for this proposed new standard and is soliciting working group members. A PINS will be developed.

Siting: Terrestrial Ecology Subcommittee

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

The Siting: Terrestrial Ecology Subcommittee manages the following projects and current standards:

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: Additional working group members were recruited in 2016.

Environmental and Siting Consensus Committee (ESCC) Organizational Chart

Chair: Carl A. Mazzola — Vice Chair: Yan Gao

Environmental Impact Assessment and Analysis	*Siting: Atmosphere*	*Siting: Hydrogeologic*	*Siting: Seismic*	*Siting: Terrestrial Ecology*	*Siting: Aquatic Ecology*	*Siting: General and Monitoring*
Kevin Bryson (Chair)	**Jennifer Call (Chair)**	**Yan Gao (Chair)**	**Quazi Hossain (Chair)**	**Peyton Doub (Chair)**	**Ann Miracle (Chair)**	**Leah Parks (Chair)**
OPEN (Vice Chair)	**Stephen Vigeant (Vice Chair)**	**OPEN (Vice Chair)**	**Jim Xu (Vice Chair)**	**OPEN (Vice Chair)**	**OPEN (Vice Chair)**	**OPEN (Vice Chair)**
0 Current Standards	3 Current Standards	1 Current Standard	6 Current Standards	0 Current Standards	0 Current Standards	2 Current Standards
1 Proposed/ Active Project	2 Proposed/Active Projects	6 Proposed/Active Projects	2 Proposed/Active Projects	1 Proposed/Active Projects	6 Proposed/Active Projects	2 Proposed/Active Projects
18.2.1-(NEW) Methods for Inferring Environ-mental Doses (project being considered)	2.3-2011 (R2016) Estimating Tornado, Hurricane, and Extreme Straight Line Wind Characteristics at Nuclear Facility Sites RF 6/29/2016	2.8-(W2002) Determine External Flood Hazards for Nuclear Facilities (will incorporate proposed standard ANS-2.31, Estimating Extreme Precipitation at Nuclear Facility Sites)	2.2-2016 Earthquake Instrumentation Criteria for Nuclear Power Plants App'd 7/14/2016	2.25-(W1999) Surveys of Terrestrial Ecology Needed to License Thermal Power Plants	2.33 (NEW) (previously designated 18.4) Aquatic Ecological Surveys Required for Siting, Design, and Operation of Nuclear Power Plants	2.6-(NEW) Guidelines for Estimating Present and Projecting Future Population Distributions Surrounding Nuclear Facility Sites
	2.15-2013 Criteria for Modeling and Calculating Atmospheric Dispersion of Routine Radiological Releases from Nuclear Facilities App'd 2/27/2013	2.9-(W2000) Evaluation of Ground Water Supply for Nuclear Facilities	2.10-(W2013) Criteria for the Handling and Initial Evaluation of Records from Nuclear Power Plant Seismic Instrumentation		18.3.1-(NEW) Entrainment: Guide to Steam Electric Power Plant Cooling System Siting, Design and Operation for Controlling Damage to Aquatic Organisms	2.22-(NEW) Environmental Radiological Monitoring at Nuclear Facilities (project being considered)
	2.16-(NEW) Criteria for Modeling Design-Basis Accidental Releases From Nuclear Facilities	2.13-(W1998) Evaluation of Surface-Water Supplies for Nuclear Power Sites (project being considered)	2.23-2016 Nuclear Plant Response to an Earthquake App'd 4/7/2016		18.3.2-(NEW) Cold Shock: Guide to Steam Electric Power Plant Cooling System Siting, Design and Operation for Controlling Damage to Aquatic Organisms	3.11-2015 Determining Meteorological Information at Nuclear Facility Sites App'd 8/20/2015
	2.21-2012 (R2016) Criteria for Assessing Atmospheric Effects on the Ultimate Heat Sink RF 4/18/2016	2.17-2010 (R2016) Evaluation of Subsurface Radionuclide Transport at Commercial Nuclear Power Plants RF 3/10/2016	2.26-2004 (R2016) Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design RF 5/27/2016		18.3.3-(NEW) Entrapment/Impingement: Guide to Steam Electric Power Plant Cooling System Siting, Design and Operation for Controlling Damage to Aquatic Organisms at Water Intake Structures	16.1-2003 (R2008) Measurement of the Leachability of Solidified Low-Level Radioactive Wastes by a Short-Term Test Procedure RF 8/4/2008
	3.8.10-(NEW) Criteria for Modeling Real-Time Accidental Release Consequences at Nuclear Facilities	2.18-(NEW) Standards for Evaluating Radionuclide Transport in Surface Water for Nuclear Power Sites (project being considered)	2.27-2008 (R2016) Criteria for Investigations of Nuclear Facility Sites for Seismic Hazard Assessments RF 6/15/2016		18.4-(NEW) Aquatic Ecological Surveys Required for Siting, Design, and Operation of Thermal Power Plants	
		2.19-(W2001) Guidelines for Establishing Site-related Parameters for Site Selection and Design of ISFSIs (Water Pool Type) (project being considered)	2.29-2008 (R2016) Probabilistic Seismic Hazard Analysis RF 10/11/2016		18.6-(NEW) Discharge of Thermal Effluents into Surface Water	
		2.32 (NEW) Guidance on the Selection and Evaluation of Remediation Methods for Subsurface Contamination	2.30-2015 Criteria for Assessing Tectonic Surface Fault Rupture and Deformation at Nuclear Facilities App'd 5/26/2015			
			2.34 (NEW) Probabilistic Volcanic Hazard Assessment			

Table 1 – ESCC Organizational Chart

Fuel, Waste, and Decommissioning Consensus Committee (FWDCC)

Donald R. Eggett, Chair
Individual

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:

Donald R. Eggett, Chair, Individual
Sven O. Bader, AREVA Federal Services, LLC
Jeffery R. Brault, Individual
Harry Felsher, U.S. Nuclear Regulatory Commission
David Hillyer, Energy Solutions
Jodine Jansen Jehec, Individual
Anoop Kota, NAC International
Wayne Lewis, Chicago Bridge & Iron
Jean Francois Lucchini, Los Alamo National Laboratory
Coleman C. Miller, Pacific Gas & Electric Company
Mitchell Sanders, Westinghouse Electric Company
Steven W. Schithelm, BWXT, Inc.
Maryanne Stasko, Duke Energy

Report of FWDCC:
The FWDCC held a physical meeting during the 2016 ANS Annual Meeting in New Orleans, LA, and held two teleconferences (March and October). Sheila Lott and Donald Spellman resigned from the committee. Jodine Jansen Jehec and Jean Francois Lucchini were welcomed as new members.

Approved in 2016:

ANSI/ANS-57.10-1996 (R2016), “Design Criteria for Consolidation of LWR Spent Fuel” (reaffirmation of ANSI/ANS-57.10; R1996; R2006)

ANSI/ANS-40.37-2009 (R2016), “Mobile Low-Level Radioactive Waste Processing Systems” (reaffirmation of ANSI/ANS-40.37-2009)

Active Standards/Projects:

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

New and Used Fuel (Design Only) Subcommittee

Membership:
OPEN

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:
OPEN

Status: Reaffirmation received ANSI approval 6/16/2015.

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, Chicago Bridge & Iron; Timothy Ake, AREVA Inc.; Michael Akins, Worley Parsons (semi-retired); Gordon Bjorkman, Nuclear Regulatory Commission; Matthew Eyre, NETCO; Brian Gutherman, Gutherman Technical Services; Nathan Hottle, AREVA Inc.; Dale Lancaster, Nuclear Consultants; Christian Lobscheid, NuScale Power; Mark Peres, Flour Nuclear Power; Mitchell Sanders, Westinghouse; 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. In 2014, the working group reviewed and revised the initial draft. Questions are being investigated and addressed related to inclusion of beyond design basis accidents; risk-informed, performance-based principles; and results of recent studies that have been completed related to spent fuel storage risks. The draft of ANS-57.3 will be completed first with the draft of ANS-57.2 following closely. The draft of ANS-57.3 was issued to the FWDCC for formal ballot on 8/3/16 and closed 10/17/16. Several comments were submitted requiring resolution by the working group.

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

Scope:
This standard defines the required functions of dry storage facilities for new fuel at light water reactor nuclear power plants. It provides minimum design requirements for safe, dry 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 dry storage of new fuel containing uranium oxide and mixed oxides. The basis of this standard is to ensure the design of the facility will be performed in an efficient and economical manner to (a) preclude criticality, (b) ensure protection to new fuel assemblies, control components, plant personnel, and the public, and (c) maintain radiation exposures as low as reasonably achievable. This standard does not address dry cask storage or transportation of nuclear fuel.

Membership:
Richard Browder, Chair, Duke Energy; Brian Gutherman, Vice Chair, Gutherman Technical Services; Timothy Ake, AREVA Inc.; Michael Akins, Worley Parsons (semi-retired); Gordon Bjorkman, Nuclear Regulatory Commission; Matthew Eyre, NETCO; Nathan Hottle, AREVA Inc.; Dale Lancaster, Nuclear Consultants; Wayne Lewis, Chicago Bridge & Iron; Christian Lobscheid, NuScale Power; John Massey, California Maritime Academy (retired); Marcus Nichol, Nuclear Energy Institute; Mark Peres Fluor Nuclear Power; Mitchell Sanders, Westinghouse; Justin Schulte, Energy Solutions; Manit Shah (associate member), Texas A & M University; Maryanne Stasko, Duke Energy; Robert Tucker, Bechtel

Status: Because of their closely related scope, both the ANS-57.2 and ANS-57.3 standards are being developed jointly. In 2015, the working group reviewed and revised the initial draft. Questions have been investigated and addressed related to inclusion of beyond design basis accidents, risk-informed performance-based principles, and results of recent studies that have been completed related to spent fuel storage risks. The draft of ANS-57.3 will be completed first with the draft of ANS-57.2 following closely. The draft of ANS-57.3 was issued to the FWDCC for formal ballot on 8/3/16 and closed 10/17/16. Several comments were submitted required resolution by the working group.

ANSI/ANS-57.5-1996 (R2006), "Light Water Reactors Fuel Assembly Mechanical Design and Evaluation" (revision of ANSI/ANS-57.5-1981)

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:
OPEN

Status: This standard was administratively withdrawn by ANSI on 2/27/16 for lack of maintenance.

ANSI/ANS-57.8-1995 (R2011), "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:
OPEN

Status: Reaffirmed by ANSI on 8/26/2011. A reaffirmation ballot was issued to the FWDCC on 12/1/16. It is expected that another reaffirmation will be approved in early 2017.

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 7/7/2017.

High Level, GTCC, Low Level and Mixed Waste Subcommittee

Membership:
OPEN, Chair
D. Mark Gerboth, AEM Consulting, LLC
Coleman Miller, Pacific Gas & Electric Company

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

ANS-15.19, "Shipment and Receipt of Special Nuclear Material (SNM) by Research Reactor" (historical standard 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 2016. 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 2016. 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:
Mark Gerboth, Chair, AEM Consulting, LLC; Mike Akins, Parsons E&C

Status: No activity reported in 2016.

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:
Clint 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), "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:
OPEN

Status: This standard was reaffirmed on 6/15/09. No activity reported in 2016.

ANSI/ANS-55.4-1993 (R2007), "Gaseous Radioactive Waste Processing System for Light Water Cooled Reactor Plants" (revision of ANSI/ANS-55.4-1979)

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

Membership:
OPEN

Status: This standard was reaffirmed on 5/14/07. No activity reported in 2016.

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ANSI/ANS-55.6-1993 (R2007), "Liquid Radioactive Waste Processing System for Light Water Reactor Plants" (revision of ANSI/ANS-55.6-1979)

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:
OPEN

Status: This standard was reaffirmed on 5/14/07. No activity reported in 2016.

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 2016. Reinvigoration of historical standard being considered.

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

Chair: Donald R. Eggett Vice Chair: OPEN

New and Used Fuel (Design Only)	*High Level, GTCC, Low Level, and Mixed Waste*	*Decommissioning (Commercial and Research Facilities)*
Chair (TBD) **Vice-Chair (TBD)**	**Chair (TBD)** **Vice-Chair (TBD)**	**Chair (TBD)** **Vice-Chair (TBD)**
3 Current Standards	**4 Current Standards**	**0 Current Standards**
3 Proposed/Active Projects	**3 Proposed/Active Projects**	**1 Proposed/Active Project**
ANS-57.1-1992 (R2015) Design Requirements for Light Water Reactor Fuel Handling Systems RF 6/16/2015	ANS-15.19 (W2001) Shipment and Receipt of Special Nuclear Material (SNM) by Research Reactor (reinvigoration being considered)	ANS-15.10 (W2004) Decommissioning of Research Reactors (reinvigoration being considered)
ANS-57.2 (W1993) Design Requirements for Light Water Reactor Spent Fuel Facilities at Nuclear Power Plants	ANS-40.21 Siting, Construction, and Operation of Commercial Low Level Radioactive Waste Burial Grounds (inactive project in consideration for resurrection)	
ANS-57.3 (W1993) Design Requirements for New Fuel Storage Facilities at LWR Plants	ANS-40.35 (W2001) Volume Reduction of Low-Level Radioactive Waste or Mixed Waste	
ANS-57.5-1996 (W2016) Light Water Reactors Fuel Assembly Mechanical Design and Evaluation	ANS-40.37-2009 (R2016) Mobile Low-Level Radioactive Waste Processing Systems RF 6/30/2016	
ANS-57.8-1995 (R2011) Fuel Assembly Identification RF 8/26/2011	ANS-55.1-1992 (R2009) Solid Radioactive Waste Processing System for Light-Water-Cooled Reactor Plants RF 6/15/2009	
ANS-57.10-1996 (R2016) Design Criteria for Consolidation of LWR Spent Fuel RF 7/7/2016	ANS-55.4-1993 (R2007) Gaseous Radioactive Waste Processing Systems for Light Water Reactor Plants RF 5/14/2007	
	ANS-55.6-1993 (R2007) Liquid Radioactive Waste Processing System for Light Water Reactor Plants RF 5/14/2007	

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

LLWRCC Liaison:
James H. Riley, Nuclear Energy Institute

Observers:
J. Mike Bonfiglio, Florida Power & Light
R. Michael Ruby, Individual

Report of LLWRCC:
The LWRCC held a physical meeting during the ANS Winter Meeting in Las Vegas, NV, on November 7. Additionally, the LLWRCC held two teleconferences (June and September). Donald Spellman retired from the committee. Several new members were added including Robert Burg, Mark Colby, and Michelle French. Mike Bonfiglio changed from member to observer.

Approved in 2016:

ANSI/ANS-18.1-2016, "Radioactive Source Term for Normal Operation of Light Water Reactors" (supersedes ANSI/ANS-18.1-1999)

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

Active Standards/Projects:

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

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)

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

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

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

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

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

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

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

Large Light Water Reactor and Reactor Auxiliary Systems Design Subcommittee

Membership:
Mark Colby, Chair, GE Hitachi Nuclear Energy
Michelle French, Vice Chair, WECTEC
Kenneth Geelhood, Pacific Northwest National Laboratory
Earnestine Johnson-Turnipseed, Entergy Corporation
Leroy E. Kreider, Engineering, Planning & Management, Inc.
Mark Linn, Oak Ridge National Laboratory

The Large 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.

ANSI/ANS-51.10-1991 (R2008), "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; Richard Hill, Individual; Stanley Gardocki, U.S. Nuclear Regulatory Commission; Tasnima Matin, U.S. Patent Office; Collaboration by Osuke Imai, Mitsubishi Nuclear Energy Systems, Inc.

Status: The standard was last reaffirmed on 10/14/2008. The draft was issued to LLWRCC for ballot in early 2016. The working group chair and review committee are resolving comments.

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 2016.

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:
Leroy E. Kreider, Chair, Engineering Planning and Management, Inc.; Robert Burg, Engineering Planning and Management, Inc.; Tim Dodson, Engineering Planning & Management, Inc.; Ethan Hunt, Nuclear Energy Consultants, Inc.; Prasad Kadambi, Individual; 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 ANSI/ANS-58.9-2002. The standard is being considered by the working group for revision with risk-informed insights.

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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; R2003 – 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.

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ANSI/ANS-58.14-2011, "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; Sara Highley, AREVA Inc; Rick Hill, Individual.; Gary Locklear, Individual; Paul Sicard, Entergy; Russell Williston, Xcel Energy

Status: This standard received ANSI approval on 4/22/2011. The standard was revised and determined appropriate for reaffirmation. The reaffirmation ballot closed 12/2/16. ANSI approval is expected in early 2017.

Power Generation and Plant Support Systems Subcommittee

Membership:
Leroy E. Kreider, Chair, Engineering Planning & Management, Inc.
Robert Burg, Vice Chair, Engineering Planning & Management, Inc.
Margaret Harding, 4 Factor Consulting, LLC
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: A working group was formed in 2016 to initiate the proposed new standard. A PINS form is in development.

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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; Julie Jarvis, Bechtel Corporation; Manoj Karki, Duke Energy; Wai Law, Tennessee Valley Authority

Status: Dong Zheng accepted the working group chair position and began reforming the working group.

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ANSI/ANS-58.3-1992 (R2008), "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:
OPEN

Status: Reaffirmation received ANSI approval 3/18/08. A reaffirmation ballot was issued in 2016 to keep the standard current. The reaffirmation ballot resulted in a couple negative ballots that need resolutions in order to move forward.

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

Scope from historical standard:

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.

This standard applies only to the control air system and does not apply to air-operated devices or the emergency diesel generator starting 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: PINS form drafted and will be reviewed by the working group. Work on standard to recommence in 2017.

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:
OPEN

Status: Reaffirmation received ANSI approval 6/19/15. No activity in 2016.

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:
OPEN

Status: Reaffirmation received ANSI approval 6/16/15. No activity in 2016.

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 and is forming the working group. A draft PINS was prepared and is under review by the working group.

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
James Florence, Nebraska Public Power District
James Glover, Graftel, Inc.
Huafei (Harry) Liao, Sandia National Laboratories
Evan Lloyd, Exitech Corporation
Julie Sickle, Constellation Energy Nuclear Group
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, Constellation Energy Nuclear Group; Ted Amundson, Southern Company; Scott Bauer, Nuclear Energy Institute; Hamer Carter, Progress Energy; Theodore Green, Arizona Public Service; Paul Harlos, Southern Company; Jerry Hiatt, Bartlett Inc.; Al Lindsay, Duke Energy; Gregg Ludlam, Exelon; Paul McNulty, First Energy; Joseph Murray, Public Service Electric and Gas Company; Rick Pelton, U.S. Nuclear Regulatory Commission; Jay Phelps, STP; Chuck Sizemore, Florida Power & Light; Greg Sparks, Entergy; Geoffrey Steele, South Carolina Electric and Gas

Status: Standard was approved in 2014. Awaiting NRC issuance of Regulatory Guide 1.8 revision to endorse the standard before adoption by the nuclear industry. NRC estimates January 2018.

ANSI/ANS-3.2-2012, "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: Revision approved by ANSI on 3/20/2012. The working group was reconstituted in 2016 and voted to reaffirm the standard. A reaffirmation ballot will be issued to the LLWRCC in the New Year. The working group plans to reconvene and develop a plan for the next revision in 2017.

ANSI/ANS-3.4-2013, "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. 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.

Current Issue: Received an inquiry (dated Oct 2015) to provide a clarification to Section 5.8, and the application of Table 4 requirements regarding medications with a significant risk of cognitive impairment that may adversely impact the ability to perform license duties. A response has been prepared and verified that the proposed response does not modify the requirement(s) of the standard. The response to an inquiry was approved and sent in February 2016.

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; Robert Felker, Vice Chair, Western Services Corporation; 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; Robert Goldman, Entergy; David Goodman, Luminant;

William Hendy, Institute of Nuclear Power Operations; James Kellum, U.S. Nuclear Regulatory Commission; Jody Lawter, VC Summer Nuclear Station; 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; Dong (Allen) Wang, Shandong Nuclear Power Company Ltd.

Status: The latest revision was approved 9/4/2009. The standard has been under revision since the last approval. A draft was completed and issued for ballot in 2014. The ballot closed with a number of comments and a few negatives. Progress has been made on resolving objections. The working group will be holding a meeting in early 2017 to incorporate comments into the draft. A recirculation ballot may be needed to gain approval of substantive changes.

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; Heath Bishop, Chicago Bridge & Iron; James Halderman, Bechtel Power Corporation; N. Prasad Kadambi, Individual; Dong Thai Nguyen, Southern Company; Ayegbusi Odunayo, U.S. Nuclear Regulatory Commission; Al Paglia, South Carolina Electric & Gas Co.

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 due to working group member work commitments. Goals for 2017 are to shorten and refine the draft. The working group has extensive draft materials to work with. The 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. The working group has been through the standard development exercise already once, and failed to finish the work.

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; Lowell Christensen, Vice-Chair, Bechtel Corporation; Caroline Baylon, Chattham House; Ralph Branscomb, Yankee Atomic; Erik Dorman, AREVA Inc.; Gary Johnson, Individual; Ted Quinn, Technology Resources; Nageshwar Rao, Oak Ridge National Laboratory; Carol Smitdts, Ohio State University; Barry Westreich, Westreich Group LLC; Richard Wood, University of Tennessee- Knoxville

Status: The working group has been expanded with a number of new members from industry. Very limited progress has been made since the committee made a presentation to the Standards Board in June 2016. Staring January 2017, the working group plans to conduct monthly conference call meetings and pick up speed to make progress.

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; Wendell Brown, Shaw Group; Kenneth Clark, Individual; Mark Gowan, Tennessee Valley Authority (Corporate); Kelvin Green, Tennessee Valley Authority; Howard Hill, Individual; Gary Holtz, Pacific Gas & Electric, Diablo Canyon; Murray Jennex, University of Arizona; Steven Leighty, Westinghouse; Daniel Oakley, Exelon Corporation; Babul Patel, Consultant

Status: The current standard received ANSI approval of a reaffirmation on 5/26/2016. The group is active and meeting and working on a revision to the current standard. The working group expects to get a final version approved by the working group by mid-2017.

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ANSI/ANS-58.8-1994 (R2008), "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 Contargyris, AREVA Inc.; David Desaulniers, U.S. Nuclear Regulatory Commission; Robert Fuld, Westinghouse Electric Company; Richard A. Hill, Individual/ Consultant; Göran Hultqvist, Individual (Sweden); R. Michael Ruby, Individual/ Consultant; Logan Schulze, Xcel Energy (BWROG); Rachel (Beth) Vail, Washington Safety Management Solutions; Michael Weiner, Duke Power (PWROG)

Status: Reaffirmation received ANSI approval 8/25/08. The working group is being reconstituted to revise the standard. A decision has been made to reaffirm the standard to keep it current while the revision is completed. A reaffirmation statement will be prepared so that a ballot can be issued in 2017. The revision will address the process for the selection and verification of operator response times for safety related operator actions. Work on this revision is planned to start in early 2017. The standard is being significantly simplified and revised.

Emergency Planning and Response Subcommittee

Membership:
Ronald Markovich, Chair, Contingency Management Consulting
Steven Gebers, Vice Chair, Quantum Nuclear Services
Wayne Andrews, Jr., Individual
Evan Lloyd, Exitech Corporation
Manit Shah (associate member), 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 2016.

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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 2016.

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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 2016.

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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 2016.

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.

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: Mark Colby **Vice-Chair: Michelle French**	**Chair: Leroy E. Kreider** **Vice-Chair: Robert Burg**	**Chair: Pranab Guha** **Vice-Chair: Lowell Christensen**	**Chair: Ronald Markovich** **Vice-Chair: Steven Gebers**
3 = Projects	3 = Projects	1 = Projects	5 = Projects
3 = Current Standards	3 = Current Standards	6 = Current Standards	0 = Current Standards
ANS-18-1-2016 Radioactive Source Term for Normal Operation of Light Water Reactors Approved 11/1/2016	ANS-56.1 Containment Hydrogen Control	ANS-3.1-2014 Selection, Qualification, and Training of Personnel for Nuclear Power Plants Approved 11/20/14	ANS-3.8.1-(W2005) Properties of Radiological Emergency Response Functions and Organizations for Nuclear Facilities
ANS-51.10-1991 (R2008) Auxiliary Feedwater System for Pressurized Water Reactors RF 10/14/08	ANS-58.2-(W1998) Design Basis for Protection of Light Water Nuclear Power Plants Against the Effects of Postulated Pipe Rupture	ANS-3.2-2012 Managerial, Administrative, and Quality Assurance Controls for the Operational Phase of NPPs Approved 3/20/12	ANS-3.8.2-(W2005) Properties of Functional and Physical Characteristics of Radiological Emergency Response Facilities at Nuclear Facilities
ANS-58.6-(W2011) Criteria for Remote Shutdown for Light Water Reactors Facilities	ANS-58.3-1992 (R2008) Physical Protection for Nuclear Safety-Related Systems and Components RF 10/28/2008	ANS-3.4-2013 Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants Approved 4/29/13	ANS-3.8.3-(W2005) Properties of Radiological Emergency Response Plans and Implementing Procedures and Maintaining Emergency Response Capability for Nuclear Facilities
ANS-58.9-2002 (R2015) Single Failure Criteria for Light Water Reactor Safety-Related Fluid Systems RF 2/27/15	ANS-59.3-(W2010) Nuclear Safety Criteria for Control Air Systems (inactive project being considered)	ANS-3.5-2009 Nuclear Power Plant Simulators for Use in Operator Training and Examination Approved 9/4/09	ANS-3.8.6-(W2005) Properties of Radiological Emergency Response Plans and Implementing Procedures and Maintaining Emergency Response Capability for Nuclear Facilities
ANS-58.11-(W2012) Design Criteria for Safe Shutdown Following Selected Design Basis Events in Light Water Reactors	ANS-59.51-1997 (R2015) Fuel Oil Systems for Safety-Related Emergency Diesel Generators RF 5/19/15	ANS-3.13 (NEW) Nuclear Facility Reliability Assurance Program (RAP) Development	ANS-3.8.7-(W2008) Properties of Planning, Development, Conduct, and Evaluation of Drills and Exercises for Emergency Preparedness at Nuclear Facilities
ANS-58.14-2011 Safety and Pressure Integrity Classification Criteria for Light Water Reactors Approved 4/22/11	ANS-59.52-1998 (R2015) Lubricating Oil Systems for Safety-Related Emergency Diesel Generators RF 6/19/15	ANS-56.8-2002 (R2016) Containment System Leakage Testing Requirements RF 5/26/16	
	ANS-60.1 (NEW) Export Control Standard (Title TBD)	ANS-58.8-1994 (R2008) Time Response Design Criteria for Safety-Related Operator Actions RF 8/25/08	

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., AREVA Inc.
Mukesh K. Gupta, AECOM Professional Solutions
Jerry E. Hicks, Individual
Roman Kazban, Defense Nuclear Facilities Safety Board
Herbert W. Massie, Jr., Individual
Carl A. Mazzola, Chicago Bridge & Iron Federal Services
James F. Miller, SABIA, Inc.
Mohammad Modarres, University of Maryland
Brian Smith, U.S. Nuclear Regulatory Commission
Jennifer K. Wheeler, Nuclear Fuel Services, Inc.

Report of NRNFCC:

The NRNFCC held a conference call in September 2016. Donald Spellman retired from the committee. Roman Kazban joined the committee.

Approved in 2016:

No projects were approved in 2016.

Active Standards/Projects:

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, Chair, Enercon Federal Services; Craig McMullin, Vice 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: Todd Anselmi took over as working group chair of the project. Additional members are being recruited. The working group has developed an outline and has started to draft some sections.

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, AREVA Inc.; Sven Bader, AREVA Federal Services, LLC; Mosi Dayani (Associate Member), NNSA-Savannah River; Robert Faris, Westinghouse Fuel Fabrication; Thomas Hiltz, U.S. Department of Energy; Gary Kaplan, RSL Safety; Calvin Manning, AREVA Inc.; Andrew Maurer, U.S. Nuclear Regulatory Commission; Arielle Miller, AREVA Inc.; Kevin Morrissey, U.S. Nuclear Regulatory Commission; Wyatt Padgett, Urenco; Robert Pierson, Talisman; James Reeves, Global Nuclear Fuels; Jennifer Wheeler, Nuclear Fuel Services, Inc.

Status: A draft was issued to the NRNFCC for a preliminary review in November of 2015. Signification comments were received.

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:
Pranab Guha, Chair, U.S. Department of Energy; Robert Eble, Co-Chair, AREVA Inc.; Randy Bunt, Southern Company; Chris Chaves, U.S. Department of Energy; David Cook, Oak Ridge National Laboratory; Gerald Couture, Westinghouse Electric; Mosi Dayani, Savannah River Solutions; Richard Englehart (late), Individual;

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. No activity in 2016.

Nonreactor Nuclear Facilities Consensus Committee (NRNFCC) List of Standards/Projects Chair: James O'Brien Vice Chair: Jeffery R. Brault		
ANS-3.14	Process for Aging Management and Life Extension for Nonreactor Nuclear Facilities	Active Project
ANS-57.11	Integrated Safety Assessments for Fuel Cycle Facilities	Active Project
ANS-58.16	Safety Classification and Design Criteria for Nonreactor Nuclear Facilities	Approved 9/4/2014

Table 4 – NRNFCC List of Standards/Projects

Nuclear Criticality Safety Consensus Committee (NCSCC)

Robert D. Busch, Chair
University of New Mexico

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:

Robert D. Busch, Chair, University of New Mexico
Larry L. Wetzel, Vice Chair, BWXT, Inc.
Roger W. Bartholomay, URS Professional Solutions, LLC
Lawrence J. Berg, U.S. Department of Energy
William Doane, AREVA Inc.
Robert S. Eby, AIChE Representative (employed by Navarro Research & Engineering)
Calvin M. Hopper, Individual
Brian O. Kidd, Paschal Solutions, Inc. (ANS-8 Chair)
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.)
William R. Shackelford, Nuclear Fuel Services, Inc.
Richard G. Taylor, C.S. Engineering, Inc
R. Michael Westfall, Individual (Observer)
Robert E. Wilson, U.S. Department of Energy

Report of NCSCC:

The NCSCC met at the ANS Winter Meeting on November 7, 2016. The committee welcomed John Miller as a new member. Michael Westfall moved to the observer category. Robert Busch announced his intent to step down from the chair position. An election will be held in January of 2017. Progress on revisions and new standards are provided in subsequent reports.

Approved in 2016

ANSI/ANS-8.12-1987 (R2016), "Nuclear Criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors" (reaffirmation of ANSI/ANS-8.12-1987; R2011)

ANSI/ANS-8.14-2004 (R2016), "Use of Soluble Neutron Absorbers in Nuclear Facilities Outside Reactors" (reaffirmation of ANSI/ANS-8.14-2004; R2011)

ANSI/ANS-8.22-1997 (R2016), "Nuclear Criticality Safety Based on Limiting and Controlling Moderators" (reaffirmation of ANSI/ANS-8.22-1997; R2011)

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

Active Standards/Projects:

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

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

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

ANS-8.24, "Validation of Neutron Transport Methods for Nuclear Criticality Safety Calculations" (revision of ANSI/ANS-8.24-2007; 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:

Brian Kidd, Chair, Paschal Solutions, Inc.
Douglas Bowen, Vice Chair, Oak Ridge National Laboratory
Michael Crouse, Secretary, Consolidated Nuclear Security, llc
James Baker, Savannah River Nuclear Solutions
Marvin Barnett, URS Professional Solutions LLC (an AECOM Company)
Ernest Elliott, Los Alamos National Laboratory
David Erickson, Savannah River Nuclear Solutions
Kevin Kimball, Consolidated Nuclear Security, llc
Thomas McLaughlin, Individual
Shean Monahan, Sandia National Laboratories
James Morman, Argonne National Laboratory
Lon Paulson, GE Hitachi Nuclear Energy
Christopher Tripp, U.S. Nuclear Regulatory Commission
Dominic Winstanley, Sellafield Ltd. (U.K.)

Observers:
Peter Angelo, Consolidated Nuclear Security, llc
Lawrence Berg, U.S. Department of Energy
Debdas Biswas, Lawrence Livermore National Laboratory
Nicholas Brown, Nuclear Fuel Services, Inc.
Jeffrey Chapman, Oak Ridge National Laboratory
Jerry Hicks, Individual
Deborah Hill, National Nuclear Laboratory, U.K.
Ronald Knief, Sandia National Laboratories
Dale Lancaster, NuclearConsultants.com
John Miller, Sandia National Laboratories
William Myers, Los Alamos National Laboratory
Andrew Prichard, Pacific Northwest National Laboratory
Kevin Reynolds, Consolidated Nuclear Security, llc
Charles Rombough, CTR Technical Services, Inc.
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, New Orleans, LA, in June 2016, and Las Vegas, NV, in November 2016. Several ANS-8 series standards working groups made significant progress through ANS-8 and NCSCC ballots during 2016. In addition, the working group for proposed standard ANS-8.28 held several meetings and has made significant progress.

Current Standards and Active Projects:

ANSI/ANS-8.1-2014, "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:
Doug Bowen, Co-Chair, Oak Ridge National Laboratory; Nicholas Brown, Co-Chair, Nuclear Fuel Services; Clint Gross, Paschal Solutions; Chris Haught, BWXT Y12; Jerry Hicks, U.S. Department of Energy; John Miller, Sandia National Laboratories; Tom Marenchin, U.S. Nuclear Regulatory Commission; James Morman, Argonne National Laboratory; Lane Paschal, Paschal Solutions, Inc.; David Pilgrim, Canadian Nuclear Laboratories; Kevin Reynolds, BWXT; Ellen Saylor, Oak Ridge National Laboratory; Fred Winstanley, British Nuclear Fuels; Ning Zhang (Associate Member)

Status: The standard was approved 4/15/14. There were two working group meetings in 2016, one at the ANS Annual Meeting in New Orleans, LA, and one at the ANS Winter Meeting in Las Vegas, NV. Topics of discussion included feedback on the latest revision from the general community and the addition of subcritical limits to the standard for uranium metal and compounds for enrichments less than 10 wt. % U-235. A new PINS for general revision will be submitted by the end of CY2017. The current membership will be reviewed against the goals for the next revision as the new revision begins.

ANSI/ANS-8.3-1997 (R2012), "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:
Shean Monahan, Los Alamos National Laboratory; Mathieu Duluc, Institute for Radiological Protection & Nuclear Safety; Peter Angelo, Consolidated Nuclear Security, llc; Debdas Biswas, Lawrence Livermore National Laboratory; Warmer Blycert, Mohr and Associates; Edward Kendall, U.S. Department of Energy; Ronald Pevey, University of Tennessee; Lawrence Berg, Department of Energy; Tamara Powell, U.S. Nuclear Regulatory Commission; Valerie Putman, Idaho National Laboratory; Jinging Wang, AECL

Status: Reaffirmation received ANSI approval 7/26/2012. A rough draft was issued to ANS-8 for a preliminary ballot in 2015. Significant comments were received needing resolution by the working group.

ANSI/ANS-8.5-1996 (R2012), "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, U.S. Department of Energy

Status: Reaffirmation received ANSI approval 2/23/2012. Action on the standard is due in 2017. If substantial action is needed, a working group will need to be formed.

ANSI/ANS-8.6-1983 (R2010), "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, Defense Nuclear Facilities Safety Board; Jerry Hicks, U.S. Department of Energy; 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 11/16/2010. No activity reported for 2016.

ANSI/ANS-8.7-1998 (R2012), "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-% ^{235}U, for ^{233}U, and for plutonium, as metals and oxides. Criteria for the range of application of these limits are provided.

Membership:
Kevin Kimball, Chair, Enercon Services, Inc.; 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

Status: This standard was reaffirmed on 2/23/2012. In 2016, a PINS was submitted and approved for a minor revision that incorporates comments from the 2012 reaffirmation process. The standard is now in the revision process.

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; Douglas G. Bowen, Oak Ridge National Laboratory; Linda M. Farrell, AREVA Inc.; Jerry Hicks, United States Department of Energy; Darby Kimball, Lawrence Livermore National Laboratory; Lon E. Paulson, GE Hitachi, Nuclear Energy

Status: The revision of ANSI/ANS-8.10-1983 (R2012) was approved by ANSI on 2/12/15.

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:
Debdas Biswas, Chair, Lawrence Livermore National Laboratory; Kermit Bunde, Department of Energy, Idaho; Jason Huffer, Consultant, Dennis Mennerdahl, EMS-Sweden; Lester Petrie, Oak Ridge National Laboratory; Scott Revolinski, Nuclear Safety Associates; Charles Robinson, Nuclear Associates; Michael J. Shea, Savannah River MOX Project; Christopher Tripp, U.S. Nuclear Regulatory Commission; 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:
Lawrence Berg, Chair, U.S. Department of Energy; Jeremy Munson, U.S. Nuclear Regulatory Commission

Status: The standard received ANSI approval of a reaffirmation on 6/29/16. The working group did not meet in 2016.

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.; Roger Brewer, Los Alamos National Laboratory; Hiroshi Okuno, Japan Atomic Energy Research Institute; Timothy Sippel, U.S. Nuclear Regulatory Commission; R. Michael Westfall, Individual; Ning Zhang, Los Alamos National Laboratory

Status: The standard was approved 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:
Brian O. Kidd, Chair, Paschal Solutions, Inc.; Dale Lancaster, NuclearConsultants.com; Calvin Manning, AREVA Inc.; Cecil Parks, Oak Ridge National Laboratory

Status: Reaffirmation received ANSI approval on 7/28/14. No activity reported in 2016.

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; James Baker, Savannah River Site; Matthew Chapa (associate member), BWXT, Inc.; Jerry Hicks, Individual; Ronald Knief, Sandia National Laboratories; Sandi Larson, Atkins Nuclear Solutions; Tom Marenchin, U.S. Nuclear Regulatory Commission; Jeremy Munson, U.S. Nuclear Regulatory Commission; David Pilgrim, Canadian National Laboratories; Ellen Saylor, Oak Ridge National Laboratory

Status: ANSI/ANS-8.19-2014 was approved by ANSI on July 28, 2014. No activity reported in 2016.

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, Chair, Sandia National Laboratories; Nichole Ellis, Vice Chair, Ellis Nuclear Engineering; Wayne Andrews, Defense Nuclear Facilities Safety Board; Paul Burdick, Washington Safety Management Solutions; Christopher Haught, Consolidated Nuclear Security, llc; Deborah Hill, National Nuclear Laboratory (UK); Jesse McBurney-Rebol, Bechtel Marine Propulsion Corp.; Allison Miller (associate member), Sandia National Laboratories; Thomas Marenchin, U.S. Nuclear Regulatory Commission; Christine Racicot McNally, Canadian Nuclear Laboratories; Randy Shackelford, Nuclear Fuel Services; Robert P. Taylor, Westinghouse Electric Company

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.

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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, Oak Ridge National Laboratory; Jerry Hicks, Individual; Dennis Mennerdahl, E. M. Systems-Sweden; Hans Toffer, Individual; Robert Wilson, U.S. Department of Energy; Emma Wong, U.S. Nuclear Regulatory Commission

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 ANS-8 for ballot in mid-2016. The comments were addressed, and a second ballot was held in late 2016. The few comments received on the latest draft are currently being addressed, and should be finalized soon. Once through the ANS-8 Subcommittee, the revision will be sent to the NCSCC for ballot.

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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, URS Professional Solutions; Donna D'Aquila, USEC, Inc.; Sean Gough, Westinghouse Electric Company; Chris Haught, Consolidated Nuclear Security, llc; Deborah Hill, National Nuclear Laboratories, UK; Robert Maurer, Nuclear Fuel Services; Rahn Ross, Savannah River Solutions; Burton Rothleder, U.S. Department of Energy; Richard Stachowiak, Fluor Government Group

Status:
This standard was reaffirmed on 10/17/2016. The working group met in November at the Winter ANS Meeting to discuss potential changes to the standard as a result of comments received during the reaffirmation review by ANS-8. Additional meetings are planned to develop a revision of this standard.

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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, Savannah River Nuclear Solutions, LLC; Peter Angelo, Consolidated Nuclear Security, llc; 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; Patrick Moss, U.S. Department of Energy; Brandon O'Donnell, BWXT, Inc.; Blaine Rice (Associate Member), Nuclear Fuel Services, Inc.; Ellen Saylor, Oak Ridge National Laboratory; Jingjing Wang, Canadian Nuclear Laboratories; Ralph Winiarski, AECL Chalk River Laboratories

Status: The standard was reaffirmed on 5/31/2012. The working group is actively working on Revision 2. The PINS form for revision 2 has been approved by ANS-8 and the NCSCC. Revision 2 will include an updated reference for the recently published version of HPS standard N13.3 on criticality accident dosimetry. Among other changes, this revision will remove the connection to a criticality accident alarm system.

ANSI/ANS-8.24-2007 (R2012), "Validation of Neutron Transport Methods for Nuclear Criticality Safety Calculations" (new standard)

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, U.S. Department of Energy; Kevin Kimball, Enercon Services; Cecil Parks, Oak Ridge National Laboratory; Andrew Prichard, Pacific Northwest National Laboratory; Christopher Tripp, U.S. Nuclear Regulatory Commission; Fitz Trumble, URS Professional Solutions LLC (an AECOM Company)

Status: The standard was reaffirmed on 5/31/2012. A draft was completed and issued to ANS-8 for ballot. Most of the year has been spent resolving comments. The standard is expected to be sent back to ANS-8 in January 2017.

ANSI/ANS-8.26-2007 (R2012), "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; Joye Brotherton, Savannah River Site; Kevin Carroll, Lawrence Livermore National Laboratory; Ruxandra Dranga, Canadian Nuclear Laboratories; James Felty, Los Alamos National Laboratory; Makenzie Gorham, U.S. Department of Energy; Calvin Hopper, Individual; Steve Kessler, Savannah River Nuclear Solutions; Ronald Knief, Sandia National Laboratories; William (Bill) Lee, Oak Ridge National Laboratory; Robert Maurer, Nuclear Fuel Services; Jerry McKamy, U.S. Department of Energy; 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; Gerald Sauve, U.S. Department of Energy; Timothy Sippel, U.S. Nuclear Regulatory Commission; Fitz Trumble, URS Professional Solutions; Robert Wilson, U.S. Department of Energy

Status: The standard received ANSI approval of a reaffirmation on 12/15/2016. The ANS-8.26 Working Group was taken over by Kevin Reynolds from Jim Morman this year. A PINS will be submitted in early 2017 authorizing a full revision which we hope to complete quickly.

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.; Michaele Brady Raap,Individual; 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; 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, Individual; 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, AREVA Inc.; 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 2016.

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, Chair, Oak Ridge National Laboratory; Lawrence Berg, Co-Chair, U.S. Department of Energy; Roger Bartholomay, C.S. Engineering Inc.; Douglas Bowen, Oak Ridge National Laboratory; Mikey Brady Raap, Individual; Ashby Bridges, Urenco; Greg Chapman, U.S. Nuclear Regulatory Commission; James Clark, Babcock & Wilcox Nuclear Operations GroupDavid Dolin, Savannah River Solutions; Michael Dunn, Oak Ridge National Laboratory; Ernest Elliott, Los Alamos National Laboratory; Nichole Ellis, Individual; Cynthia Gunn, Babcock & Wilcox Nuclear Operations Group; 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, Atkins Nuclear Solutions; Jerry McKamy, U.S. Department of Energy; Tom Nirider, U.S. Department of Energy; Wade Scates, Idaho National Laboratory; 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 had a few teleconferences during the year and some of the working group members met during the 2016 ANS Winter Meeting in Las Vegas, NV. The working group continues to work on the draft.

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

Chair: Robert D. Busch Vice Chair: Larry L. Wetzel

Fissionable Materials Outside Reactors Subcommittee (ANS-8) Chair: Brian O. Kidd		
ANS-8.1-2014	Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors	RV 4/15/2014
ANS-8.3-1887; R2007; R2012	Criticality Accident Alarm System	RF 7/26/2012
ANS-8.5-1996; R2002; R2007; R2012	Use of Borosilicate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material	RF 2/23/2012
ANS-8.6-1983; R1988; R1995; R2001; R2010	Safety in Conducting Subcritical Neutron-Multiplication Measurements In Situ	RF 11/16/2010
ANS-8.7-1998; R2007; R2012	Nuclear Criticality Safety in the Storage of Fissile Materials	RF 2/23/2012
ANS-8.10-2015	Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement	RV 2/12/2015
ANS-8.12-1987; 1993; R2002; R2011; R2016	Nuclear Criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors	RF 5/6/2016
ANS-8.14-2004; R2011; R2016	Use of Soluble Neutron Absorbers in Nuclear Facilities Outside Reactors	RF 6/29/2016
ANS-8.15-2014	Nuclear Criticality Control of Selected Actinide Nuclides	RV 10/10/2014
ANS-8.17-2004; R2009; R2014	Criticality Safety Criteria for the Handling, Storage, and Transportation of LWR Fuel Outside Reactors	RF 7/28/2014
ANS-8.19-2014	Administrative Practices for Nuclear Criticality Safety	RV 7/28/2014
ANS-8.20-1991; R1999; R2015	Nuclear Criticality Safety Training	RF 8/20/2015
ANS-8.21-1995; R2001; R2011	Use of Fixed Neutron Absorbers in Nuclear Facilities Outside Reactors	RF 5/19/2011
ANS-8.22-1997; R2006; R2011; R2016	Nuclear Criticality Safety Based on Limiting and Controlling Moderators	RF 10/17/2016
ANS-8.23-2007; R2012	Nuclear Criticality Accident Emergency Planning and Response	RF 5/31/2012
ANS-8.24-2007; R2012	Validation of Neutron Transport Methods for Nuclear Criticality Safety Calculations	RF 5/31/2012
ANS-8.26-2007; R2012; R2016	Criticality Safety Engineer Training and Qualification Program	RF 12/15/2016
ANS-8.27-2015	Burnup Credit LWR Fuel	RV 11/10/2015
ANS-8.28-201x	Administrative Practices for the Use of Non-Destructive Assay Measurements for Nuclear Criticality Safety	Active Project

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, University of New Mexico
Robert E. Carter, Individual
Leslie P. Foyto, University of Missouri
Tony Grenci, Chicago Bridge & Iron
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
Marya K. Morrison, Idaho National Laboratory
D. Sean O'Kelly, Idaho National Laboratory
Mark W. Peres, Fluor Enterprises, Inc.
Steven R. Reese, Oregon State University
Theodore R. Schmidt, Individual
Richard S. Turk, Individual
Anthony R. Veca, General Atomics

Report of RARCC:
The RARCC met during the 2016 ANS Winter Meeting in Las Vegas, NV.

Approved in 2016:

ANSI/ANS-15.2-1999 (R2016), “Quality Control for Plate-Type Uranium-Aluminum Fuel Elements” (reaffirmation of ANSI/ANS-15.2-1999; R2009)

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

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

ANSI/ANS-53.1-2011 (R2016), “Nuclear Safety Design Process for Modular Helium-Cooled Reactor Plants” (reaffirmation of ANSI/ANS-53.1-2011)

Active Standards/Projects:

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

ANS-15.1, "Development of Technical Specifications for Research Reactors" (revision of ANSI/ANS-15.1-2013)

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

ANS-20.1, “Nuclear Safety Criteria and Design Process for Fluoride Salt-Cooled High-Temperature Reactor NPPs” (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, University of New Mexico
Matthew Denman, Sandia National Laboratory
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, University of New Mexico; 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; Jan Mazza, U.S. Nuclear Regulatory Commission; Matthew Memmott, Westinghouse Electric Company, llc; Per Peterson, University of California-Berkeley; Bojan Petrovich, Georgia Institute of Technology; Benjamin Prewitt (associate member), Missouri University of Science & Technology; Carl Stoots, Idaho National Laboratory

Status: A PINS for this proposed new standard was approved and submitted to ANSI. Work has begun on the proposed standard.

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, AREVA Gmbh; 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 has started.

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. 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; Hanh Phan, U.S. Nuclear Regulatory Commission; Johannes Pickelmann, AREVA GmbH; 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.

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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.

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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; Neil Brown, Individual; Kamal El-Sheikh, The Cameron Group, Inc.; Michael Garrett, TerraPower; Christopher Grandy, Argonne National Laboratory; Tony Grenci Westinghouse; Prasad Kadambi, Individual; Thomas Kevern, U.S. Nuclear Regulatory Commission; Thomas King, Information Systems Laboratory, Inc; Christian Lobscheid, NuScale Power LLC; Imitiaz Madni, U.S. Nuclear Regulatory Commission; Hisato Matsumiya, Toshiba; Arielle Miller, AREVA Inc.; Yasushi Okano, Japan Atomic Energy Agency; Ronald Omberg, Battelle-NW; Toshiba; Roald Wigeland, Idaho National Laboratory

Status: The technical sections of the standard have been drafted and were reviewed by members of the working group. These are being edited and reformatted within the standard as agreed to by the working group members. Checks are being made to assure requirements are clearly stated. The working group is waiting for NRC documentation on the sodium fast reactor design criteria to be completed before issuing the draft to the RARCC for approval.

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)
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
Theodore Schmidt, Individual
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:
Theodore Schmidt, Chair, Sandia National Laboratories; Gary A. Harms, Vice 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 and is expected to seek another reaffirmation in 2017. David Hayes from LANL was added to the working group.

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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:
Theodore Schmidt, Chair, Sandia National Laboratories; Matt Burger, Vice 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. A revision will likely be initiated in the 2019 timeframe.

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ANSI/ANS-15.1-2007 (R2013), "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 4/24/2013. 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.

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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; Marya Morrison, 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.

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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:

Thomas Myers, Co-chair, Individual; 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.

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ANSI/ANS-15.8-1995 (R2013), "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; Devon Engleman, SHINE Medical Group; Gary Kirk, Oak Ridge National Laboratory; Richard Pratt, Sandia National Laboratory; Jared Wright, Babcock & Wilcox Nuclear Operations Group

Status: A reaffirmation was approved by ANSI on 5/10/2013. No activity in 2016.

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.

ANS-15.15, "Criteria for the Reactor Safety Systems of Research Reactors" (revision of historical standard ANSI/ANS-15.15-1978 – proposed new standard)

Scope from historical standard:

This standard documents the criteria from which appropriate specific design requirements may be established for the reactor safety system of an individual research reactor.

Membership:

Daniel Cronin, Chair, University of Florida-Gainsville; Leo Bobek, University of Massachusetts-Lowell; Duane Hardesty, Stephen Miller, Armed Forces Radiobiology Research Institute; U.S. Nuclear Regulatory Commission; Dagistan Sahin, National Institute of Standards & Technology; Lawrence Welch, University of Texas-Austin

Status: The ANS-15.15 project is no longer active. Development of a proposed scope to resurrect this project remained stalled due to lack of consensus on SSCs and evolving regulatory approaches for implementation of digital I&C. In lieu of ANS-15.15, a new project has been initiated to provide a technology neutral performance-based and risk-informed SSC classification process for RTRs. The PINS for proposed standard ANS-15.22, "Classification of Structures, Systems and Components for Research Reactors," is currently in the approval process. With the approval of the PINS for ANS-15.22, the reinvigoration of ANS-15.15 will be terminated.

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 2016.

ANSI/ANS-15.21-2012, "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 approved by ANSI on 4/3/2013. There was no activity on the standard during 2016.

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

Proposed Scope:
There are several classification schemes being currently used for SSCs, necessitating one technology neutral system for classification based on risk informed and performance based criteria. This standard will harmonize international consensus and regulatory documents for research reactors regarding classification of Structures, Systems, and Components (SSCs) and will provide required treatment criteria based on classification. It may be applied to existing and future research reactors.

Membership:
Daniel Cronin, Chair, University of Florida-Gainesville; Alexander Adams, U.S. Nuclear Regulatory Commission; Leo Bobek, University of Massachusetts-Lowell; Brenden Heidrich, Idaho National Laboratory; Bruce Meffert, University of Missouri; Steven Reese, Oregon State University; Clifford Stanley, Idaho National Laboratory; Carroll Trull, Westinghouse Electric Company, LLC

Status: Working group is resolving comments submitted with the Standards Board review of the PINS.

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**
ANS-1-2000 (R2012) Conduct of Critical Experiments RF 10/5/2012	ANS-20.1-(NEW) Nuclear Safety Criteria and Design Process for Fluoride Salt-Cooled High-Temperature Reactor NPPs
ANS-14.1-2004 (R2014) Operation of Fast Pulse Reactors RF 12/12/14	ANS-20.2-(NEW) Nuclear Safety Design Criteria and Functional Performance Requirements for Liquid-Fuel Molten Salt Reactor Nuclear Power Plants
ANS-15.1-2007 (R2013) Development of Technical Specifications for Research Reactors RF 4/24/13	ANS-30.1-(NEW) Integrating Risk and Performance Objectives into New Reactor Nuclear Safety Designs
ANS-15.2-1999 (R2009) Quality Control for Plate-Type Uranium-Aluminum Fuel Elements RF 3/23/09	ANS-30.2-(NEW) Structures, Systems, and Component Classification for Nuclear Power Plants
ANS-15.4-2016 Selection and Training of Personnel for Research Reactors App'd 4/19/16	ANS-53.1-2011 (R2016) Nuclear Safety Design Process for Modular Helium-Cooled Reactor Plants RF 10/31/16
ANS-15.8-1995 (R2013) Quality Assurance Program Requirements for Research Reactors RF 5/10/13	ANS-54.1-(W1999) Nuclear Safety Criteria and Design Process for Liquid-Sodium-Cooled-Reactor NPPs
ANS-15.11-2016 Radiation Protection at Research Reactors App'd 5/13/16	
ANS-15.15 (W1996) Criteria for the Reactor Safety Systems of Research Reactors (project to be terminated with the approval of the PINS for ANS-15.22)	
ANS-15.16-2015 Emergency Planning for Research Reactors App'd 2/11/15	
ANS-15.21-2012 Format and Content for Safety Analysis Reports for Research Reactors App'd 4/3/2013	
ANS-15.22 Classification of Structures, Systems, and Components for Research Reactors	

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
Abraham Weitzberg, Vice Chair, Individual
F. Arzu Alpan, Westinghouse Electric Company
Richard S. Amato, Individual
Michaele C. Brady Raap, 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.
Julie Jarvis, Bechtel Corporation
Donald E. Palmrose, U.S. Nuclear Regulatory Commission
Charles T. Rombough, CTR Technical Services, Inc.
Charlotta E. Sanders, University of Nevada, Las Vegas

Report of SRACC:

The SRACC held a physical meeting during the 2016 ANS Winter Meeting in Las Vegas, NV.

Approved in 2016:

ANSI/ANS-6.4-2006 (R2016), "Nuclear analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants" (reaffirmation of ANSI/ANS-6.4-2006)

ANSI/ANS-6.4.2-2006 (R2016), "Specification for Radiation Shielding Materials" (reaffirmation of ANSI/ANS-6.4.2-2006)

ANSI/ANS-10.4-2008 (R2016), "Verification and Validation of Non-Safety-Related Scientific and Engineering Computer Programs for the Nuclear Industry" (reaffirmation of ANSI/ANS-10.4-2008)

ANSI/ANS-10.5-2006 (R2016), "Accommodating User Needs in Scientific and Engineering Computer Software Development" (reaffirmation of ANSI/ANS-10.5-2006)

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

ANSI/ANS-19.10-2009 (R2016), "Methods for Determining Neutron Fluence in BWR and PWR Pressure Vessel and Reactor Internals" (reaffirmation of ANSI/ANS-19.10-2009)

Active Standards/Projects:

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-19.4, "A Guide for Acquisition and Documentation of Reference Power Reactor Physics Measurements for Nuclear Analysis Verification" (historical revision of ANSI/ANS-19.4-1976; R1983; R1989; R2000 – proposed new standard)

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

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

Mathematics and Computations Subcommittee (ANS-10)

Scope:

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

Membership:

Paul Hulse, Chair, Sellafield Ltd.
Mark Baird, Oak Ridge National Laboratory
Phillip Ellison, GE-Hitachi Nuclear Energy
Nima Fathi (associate member), University of Mexico
Byron Frank, Westinghouse Electric 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
Charlie Sparrow, Individual

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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:

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

Status: The standard was reaffirmed on 9/26/16.

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.

ANSI/ANS-10.7-2013, "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; 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

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. No activity in 2016.

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; 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 2016.

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

Scope:

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

Membership:

OPEN, 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 approved by ANSI on 2/15/2012. No activity in 2016.

Reactor Physics Subcommittee (ANS-19)

Membership:

Dimitrios Cokinos, Chair, Brookhaven National Laboratory
Charles Rombough, Secretary, CTR Technical Services, Inc
Anthony Attard, U.S. Nuclear Regulatory Commission
Steven Baker, Transware Enterprises
John Bess, Idaho National Laboratory
Michaele Brady Raap, Individual
Anthony Campos, AREVA Inc.
Ren-Tai Chiang, Individual
Mark DeHart, Idaho National Laboratory
David Diamond, Brookhaven National Laboratory
Mark Eckenrode, AREVA Inc.

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
Benjamin Rouben, Individual
Abraham Weitzberg, Individual
William Wilson, Individual

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; David Carpenter, Bettis Atomic Power Laboratory; Michaele Brady Raap, Individual; Ren-Tai Chiang, Individual; Arnold Fero, Westinghouse Electric Company, LLC; Jun-ichi Katakura, Japan Atomic Energy Agency; Jesse Klingensmith, Westinghouse Electric Company; Edward Knuckles, Individual; Holly Trellue, Los Alamos National Laboratory; Sylvia Wang, Westinghouse; William Wilson, Los Alamos National Laboratory; Tadashi Yoshida, Musashi Institute of Technology; Dmitri Ziabletsev, AREVA

Status: ANSI approved ANSI/ANS-5.1-2014 on 11/4/2014. The working group membership will be reformed in 2017.

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; 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. A revision is in works.

ANSI/ANS-19.3-2011, "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; Ren-Tai Chiang, AREVA Inc.; Dimitrios Cokinos, Brookhaven National Laboratory; Ronald Ellis, Oak Ridge National Laboratory; Donald Harris, Rensselaer Polytechnic Institute-retired; Greg Hobson, AREVA Inc.; Ken Kozier, Atomic Energy of Canada Limited; Russell Mosteller, Individual; Scott Palmtag, General Electric; Charles Rombough, CTR Technical Services; Benjamin Rouben, 12 & 1 Consulting; Wei Shen, Atomic Energy of Canada; Robert St. Clair, Duke Energy; Scott Thomas, Duke Power; Peter Yarsky, U.S. Nuclear Regulatory Commission

Status: Revision received ANSI approval 8/26/2011 with a new title. The working group met during the ANS Winter Meeting in Las Vegas. Balloting of the reaffirmation is in progress.

ANSI/ANS-19.3.4-2002 (R2008), "The Determination of Thermal Energy Deposition Rates in Nuclear Reactors" (revision of ANSI/ANS-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:
Dimitrios Cokinos, Chair pro tem, Brookhaven National Laboratory

Status: A reaffirmation received ANSI approval 10/31/2008. The standard will seek reaffirmation in 2017.

ANS-19.4, "A Guide for Acquisition and Documentation of Reference Power Reactor Physics Measurements for Nuclear Analysis Verification" (historical revision of ANSI/ANS-19.4-1976; R1983; R1989; R2000 – proposed new standard)

Scope:
This standard applies to measurements of reactor parameters in light water power reactors that are intended to serve as reference measurements to be used in evaluating reactor physics computational procedures. It includes: identification of the types of parameters of interest as reference measurements; a brief description of test conditions and experimental data required for such reference measurements; identification of problems and concerns which may affect the accuracy or interpretation of the data; and criteria to be used in documenting the results of reference measurements.

Membership:
Edward Knuckles, Chair, Brookhaven National Laboratory; John Bess, Idaho National Laboratory; Ren-Tai Chiang, Individual, Dimitrios Cokinos, Brookhaven National Laboratory; Mark Eckenrode, AREVA Inc.; Moussa Mahgerefteh, Exelon Corporation; Charles Rombough, CTR Technical Services, Inc.; Jeremy Roberts, Kansas State University; Benjamin Rouben, Individual; Rick Sancton, Individual

Status: The working group has increased to ten members with the recent addition of Jeremy Roberts in 2016. The scope for the revision has been revised for conciseness and clarity at the recommendation of the SRACC, and the PINS for ANS-19.4 was subsequently approved. A ballot supporting submittal of the proposed standard to the ANS-19 Subcommittee was approved by a plurality of the working group. The proposed standard will be finalized in preparation for submittal to the subcommittee in 2017 for review and approval.

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; Chris Ellis, General Atomics; Sedat Goluoglu, Oak Ridge National Laboratory; Louis Grobmyer, Westinghouse Electric, 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. The working group has been reformed and the draft is in development.

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, AREVA Inc.; Mark Eckenrode, AREVA Inc.; Anthony Campos, Areva Inc.; Fred Gershkoff, Southern California Edison; Louis Grobmyer, Westinghouse Electric, LLC; Dan Kelley, FirstEnergy Nuclear Operating Company; Moussa Mahgerefteh, Exelon Corporation; Michael Presnell, Duke Power Company; Paul Rohr, Westinghouse Electric Company; 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.

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; Michaele Brady Raap, 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, University of Florida; John Carew, Secretary, Brookhaven National Laboratory; James Adams, Individual; Stanwood Anderson, Westinghouse; Steven Baker, Transware Enterprises; Richard Cacciapouti, Duke Engineering; Robert Little, Los Alamos National Laboratory; Moussa Mahgerefteh, Exelon Corp; Yuri Orechwa, U.S. Nuclear Regulatory Commission; John Wagner, Oak Ridge National Laboratory; Tuck Worsham, AREVA Inc.

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

ANSI/ANS-19.11-1997 (R2011), "Calculation and Measurement of the Moderator Temperature Coefficient of Reactivity for Water Moderated Power Reactors" (new standard)

Scope:
This standard provides guidance and specifies criteria for determining the MTC in pressurized water 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. 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, AREVA Inc.; Edward Knuckles, Individual

Status: Reaffirmation received ANSI approval 6/17/2011. The title of the next revision will be changed to “Calculation and Measurement of the Moderator Temperature Coefficient of Reactivity for Pressurized Water Reactors” reflecting a slightly revised scope. The revision of the draft was completed and submitted for ballot to the SRACC.

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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; 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, University of Las Vegas - Nevada
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)
R. Michael Westfall, Individual

Shielding Subcommittee (ANS-6) Report

The Shielding Subcommittee (ANS-6), whose activities fall under the shielding track of the SRACC, has added new members to a few of the standard committees. During 2016, ANSI/ANS-6.4 -2006 (R2016) and ANSI/ANS-6.4.2-2006 (R2016) were reaffirmed. Additionally, a formal proposal was submitted in January 2016 to the International Organization of Standardization (ISO), Subcommittee 6 (Reactor Technology), Working Group 1, to develop ANSI/ANS-6.1.2 (2013), with minor modifications, as a new international standard.

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, AREVA Inc.; 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; 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 2016.

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; Terry Foppe, Foppe & Associates; Derek Gordon, Los Alamos National Laboratory; Geoffrey Kaiser, Science Applications International Corporation; Robert Link, AREVA Inc.; 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. No activity in 2016.

ANS-6.1.1, "Neutron and Gamma-Ray Fluence-To-Dose Factors" (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 withdrawn in 2001. A reinvigoration of the historical standard has been suggested. A PINS form will be needed to formally initiate this project.

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; James Adams, Corvus Integration, Inc.; Stanwood Anderson, Westinghouse Electric Company; 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 2016.

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:
Jha (Ken) Sharad, Chair, Bechtel Corporation; Hiruta Hikaru, Idaho National Laboratory; Julie Jarvis, Bechtel Corporation

Status: ANSI approved a reaffirmation of this standard 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.

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, Virginia Commonwealth University; Ahmad Ibrahim, Oak Ridge National Laboratory; Timothy Lloyd, Westinghouse Electric Company; 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 deep the standard current while the revision is completed.

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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, Chair, Individual; Donald Dudziak, Co-Chair, Individual; F. Arzu Alpan, Westinghouse Electric, 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, Virginia Commonwealth University; Essam A. Hussein, University of New Brunswick; Darby Kimball, Bechtel Systems & Infrastructure, Inc.; 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, LLC

Status: The Project Initiation Notification System (PINS) form for a historical revision of ANSI/ANS-6.4.3-1991 was approved and submitted to ANSI on 3/15/2012.

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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, Rensselaer Polytechnic Institute; Jianwei Chen, Westinghouse Electric Co.; Brian Hinderliter, Virginia Commonwealth University; Sylvia Wang, Westinghouse Electric Co.

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: Abraham Weitzberg

Shielding (ANS-6)	Mathematics and Computations (ANS-10)	Reactor Physics (ANS-19)
Chair: Charlotta Sanders	Chair: Paul Hulse	Chair: Dimitrios Cokinos
2 = Projects	0 = Projects	5 = Projects
7 = Current Standards	6 = Current Standards	7 = Current Standards
ANS-5.4-2011 Method for Calculating the Fractional Release of Volatile Fission Products from Oxide Fuel Approved 5/19/2011	ANS-10.2-2000 (R2009) Portability of Scientific and Engineering Software RF 8/14/2009	ANS-5.1-2014 Decay Heat Power in Light Water Reactors Approved 11/7/14
ANS-5.10-1998 (R2013) Airborne Release Fractions at Non-Reactor Nuclear Facilities RF Approved 1/15/2013	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	ANS-19.1-2002 (R2011) Nuclear Data Sets for Reactor Design Calculations RF 6/17/2011
ANS-6.1.1 (W2001) Neutron and Gamma-Ray Fluence-To-Dose Factors	ANS-10.5-2006 (R2016) Accommodating User Needs in Scientific and Engineering Computer Software Development RF 12/8/2016	ANS-19.3-2011 Determination of Steady-State Neutron Reaction-Rate Distributions and Reactivity of Nuclear Power Reactors Approved 10/31/2011
ANS-6.1.2-2013 Group-Averaged Neutron and Gamma-Ray Cross Sections for Radiation Protection and Shielding Calculations for NPPs Approved 8/28/2013	ANS-10.7-2013 Non-Real-Time, High Integrity Software for the Nuclear Industry—Developer Requirements Approved 3/18/2013	ANS-19.3.4-2002 (R2008) The Determination of Thermal Energy Deposition Rates in Nuclear Reactors RF 10/31/2008
ANS-6.3.1-1987 (R2015) Program for Testing Radiation Shields in Light Water Reactors (LWR) RF 12/11/2015	ANS-10.8-2015 Non-Real Time, High Integrity Software for the Nuclear Industry—User Requirements Approved 11/19/2015	ANS-19.4 (W2010) Acquisition and Documentation of Reference Power Reactor Physics Measurements for Nuclear Analysis Verification
ANS-6.4-2006 (R2016) Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants RF 8/4/2016	ANS-41.5-2012 Verification and Validation of Radiological Data for Use in Waste Management and Environmental Remediation Approved 2/15/2012	ANS-19.5 (W2005) Requirements for Reference Reactor Physics Measurements
ANS-6.4.2-2006 (R2016) Specification for Radiation Shielding Materials RF 9/27/2016		ANS-19.6.1-2011 (R2016) Reload Startup Physics Tests for Pressurized Water Reactors RF 8/5/2016
ANS-6.4.3 Gamma-Ray Attenuation Coefficients and Buildup Factors for Engineering Materials		ANS-19.8 (NEW) Fission Product Yields for 235U, 238U, and 239P
ANS-6.6.1-2015, Calculation and Measurements of Direct and Scattered Gamma Radiation from LWR NPPs Approved 8/21/2015		ANS-19.9 (NEW) Delayed Neutron Parameters for Light Water Reactors
		ANS-19.10-2009 (R2016) Methods for Determining Neutron Fluence in BWR and PWR Pressure Vessel and Reactor Internals RF 10/11/2016
		ANS-19.11-1997 (R2011) Calculation and Measurement of the Moderator Temperature Coefficient of Reactivity for Pressurized Water Reactors RF 6/17/2011
		ANS-19.12 (NEW) Nuclear Data for the Production of Radioisotope

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 Cochair
Lawrence Berkeley National Laboratory

C. Rick Grantom, ASME Cochair
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 Cochair, Lawrence Berkeley National Laboratory
Rick Grantom, ASME Cochair, Individual (C.R. Grantom P.E. Associates, LLC)
Dennis W. Henneke, ANS Co-vice-chair, General Electric
(Alternate: Yunlong Jonathan Li, GE Nuclear Energy)
Pamela F. Nelson, ASME Co-vice-chair, National Autonomous University of Mexico
Paul J. Amico, Jensen Hughes, Inc.
Victoria K. Anderson, Nuclear Energy Institute
Robert A. Bari, Brookhaven National Laboratory
Sidney Bernsen, Individual
Mary Drouin, U.S. Nuclear Regulatory Commission
(Alternate: Dale Yeilding, U.S. Nuclear Regulatory Commission)
K. Raymond Fine, FirstEnergy Nuclear Operating Company
Karl N. Fleming, Individual (KNF Consulting Services)
H. Alan Hackerott, Omaha Public Power District
Eugene A Hughes, Etranco, Inc.
Gerry W. Kindred, Tennessee Valley Authority
Kenneth L. Kiper, Westinghouse Electric Company
Shigeo Kojima, Individual (Kojima Risk Institute, Inc.)
Stanley H. Levinson, Individual
Stuart R. Lewis, Electric Power Research Institute
(Alternate: Douglas C. Hance, Electric Power Research Institute)
Andrea Maioli, Westinghouse Electric Company
James O'Brien, U.S. Department of Energy
Gareth Parry, Jensen Hughes, Inc.
Mayasandra K. Ravindra, Individual, (MKRavindra Consulting)
Martin B. Sattison, Idaho National Laboratory
Raymond E. Schneider, Westinghouse Electric Co.
Barry D. Sloane, Jensen Hughes, Inc.
Jeffrey L. Stone, Exelon Corp.
(Alternate: Gregory A. Krueger, Exelon Corp.)
Cornelia Spitzer, International Atomic Energy Agency
Douglas E. True, Jensen Hughes, Inc.

Donald J. Wakefield, ABS Consulting, Inc.
Ian B. Wall, Individual
Timothy A. Wheeler, Sandia National Laboratories
James W. Young, GE Hitachi

Report of JCNRM:
In 2016, the JCNRM held two 4-day meetings; in February 2016 in Portland, Oregon, and in September 2016 in Pittsburgh, Pennsylvania. 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 late 2017. 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 2-3 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 the 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, 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. This JCNRM subcommittee is the JCNRM interface with the ANS Standards Board's Risk-informed and Performance-based Principles 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.

Active standards/projects:

ASME/ANS RA-S, "Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications" (revision of ASME/ANS RA-S-2008)

ASME/ANS RA-S-1.3, "Standard for Radiological Accident Offsite Consequence Analysis (Level 3 PRA) to Support Nuclear Installation Applications" (previously ANS/ASME-58.25) (proposed new standard to be issued for trial use)

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

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:*
Barry D. Sloane, Chair, Jensen Hughes, Inc

Dennis W. Henneke, Vice Chair, General Electric Company
(Alternate: Jonathan Li, General Electric Company)
Amir Afzali, Southern Company
Victoria K. Anderson, Nuclear Energy Institute
Sidney Bernsen, Individual
John H. Bickel, Evergreen Safety & Reliability Technologies, LLC
Edward T. Burns, Jensen Hughes, Inc.
Heather L. Detar, Westinghouse Electric Company
(Alternate: Nathan Larson, Westinghouse Electric Company)
Mary Drouin, U.S. Nuclear Regulatory Commission
(Alternate: C.J. Fong, US Nuclear Regulatory Commission)
Karl N. Fleming, KNF Consulting Services LLC
Eugene A. Hughes, Etranco, Inc.
Stuart R. Lewis, Electric Power Research Institute
Zhegang Ma, Idaho National Laboratory
James O'Brien, U.S. Department of Energy
Vish Patel, Southern Company
Martin B. Sattison, Idaho National Laboratory
Vincent Sorel, EDF
Stephen D. Unwin, Pacific Northwest National Laboratory
Donald J. Wakefield, ABS Consulting Inc.
Timothy A. Wheeler, Sandia National Laboratories
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. In addition to development of the new standards by separate writing groups (project teams) that report to SC-SD, the subcommittee recently completed developing a trial use procedure for use in consistently interacting with users of trial use standards during the trial use periods. This procedure is currently being balloted by the main JCNRM Committee. The status of the 5 standards is as follows:

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.

Membership:
Donald. J. Wakefield, Chair, ABS Consulting Inc.; Robert J. Budnitz, Lawrence Berkeley National Laboratory; Doug Hance, Electric Power Research Institute; Dennis W. Henneke, GE Hitachi Nuclear Energy; Gene Hughes, ETRANCO Inc.; Kenneth L. Kiper, Westinghouse Electric Company; Zhegang Ma, Idaho National Laboratory; Jeffrey Mitman, U.S. Nuclear Regulatory Commission; Fatma Yilmaz, South Texas Project Nuclear Operating Company; Antonio Zoulis (alternate for Jeffrey Mitman (NRC))

Status: This standard was issued for a 3-year trial use period in March 2015. In February 2015, an initial trial use, using a pre-publication draft, was conducted by Arizona Public Service (APS, Palo Verde), and in parallel a self-assessment of the Palo Verde LPSD PRA was performed by an Electric Power Research Institute sponsored team; feedback from these parallel trial use applications was reported to SC-SD and are being considered by the LPSD project team. Another trial use, focused on the qualitative risk portion of the trial use standard, was performed by Exelon and the BWR Owners Group in late 2015, and feedback from that pilot is also being considered.

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) (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 Corp.; Edward Burns, Jensen Hughes Inc.; Donald Helton, U.S. Nuclear Regulatory Commission; Mark Leonard, dycoda, LLC; Wilson Luingdilok, Fauske and Associates; Carroll Trull, Westinghouse Electric Co.

Status: The 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. Results of that trial use have been informally shared with the L2 standard project team and this feedback is being considered in developing the final version. The trial use period is being extended through 2017 to allow completion of the final standard for ballot as an ANSI standard.

ASME/ANS RA-S-1.3, "Standard for Radiological Accident Offsite Consequence Analysis (Level 3 PRA) to Support Nuclear Installation Applications" (previously ANS/ASME-58.25) (new standard)

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:

Keith Woodard, Chair, ABS Consulting; Grant Teagarden, Vice Chair, Jensen Hughes; Nathan Bixler, Sandia National Laboratories; Andrew Caldwell, Lloyd's Register Consulting; Keith Compton, U.S. Nuclear Regulatory Commission; David Johnson, ABS; Gerry W. Kindred, Tennessee Valley Authority; Stanley Levinson, AREVA Inc.; Vinod Mubayi, Brookhaven National Laboratory; Joel Robinson, Atkins; Brian T. Wagner (alternate to K. Compton), U.S. Nuclear Regulatory Commission

Status: A formal ballot on the draft standard was conducted in May 2016, and the project team is addressing the comments in anticipation of being able to issue the standard for trial use in early 2017. 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. Feedback from this application has been considered by the project team.

ASME/ANS RA-S-1.4-2013, "Probabilistic Risk Assessment Standard for Advanced Non-LWR Nuclear Power Plants" (new standard issued for trial use and pilot application)

Scope:

This standard establishes requirements for a PRA for advanced non-LWR nuclear power plants. The requirements in this standard were developed for a broad range of PRA scopes that may include:

a) Different sources of radioactive material both within and outside the reactor core but within the boundaries of the plant whose risks are to be determined in the PRA scope selected by the user. The technical requirements in this trial use version of the Standard are limited to sources of radioactive material within the reactor coolant system pressure boundary. Technical requirements for other sources of radioactive material such as the spent fuel system are deferred to future editions of this Standard.

b) Different plant operating states including various levels of power operation and shutdown modes.

c) Initiating events caused by internal hazards, such as internal events, internal fires and internal floods, and external hazards such as seismic events, high winds, and external flooding

d) Different event sequence end states including core or plant damage states, and release categories that are sufficient to characterize mechanistic source terms, including releases from event sequences involving two or more reactor units or modules for PRAs on multi-reactor or multi-unit plants.

e) Evaluation of different risk metrics including the frequencies of modeled core and plant damage states, release categories, risks of offsite radiological exposures and health effects, and the integrated risk of the multi-unit plant if that is within the selected PRA scope. The risk metrics supported by this Standard are established metrics used in existing LWR Level 3 PRAs such as frequency of radiological consequences (e.g., dose, health effects) which are inherently technology neutral. Surrogate risk metrics used in LWR PRAs such as core damage frequency and large early release frequency are not used as they may not be applicable to non-LWR PRAs.

f) Quantification of the event sequence frequencies, mechanistic source terms, offsite radiological consequences, risk metrics, and associated uncertainties, and using this information in a manner consistent with the scope and applications PRA.

Membership:
Karl. N. Fleming, Chair, KNF Consulting Services, LLC; Frank. Schaaf, Vice Chair, Sterling Refrigeration Corporation; Robert J. Budnitz, Lawrence Berkeley National Laboratory; David Grabaskas, Argonne National Laboratory; Brian Johnson, TerraPower; David Johnson, ABS Consulting; Peter Lowry, Pacific Northwest National Laboratory; Andrea Maioli, Westinghouse Electric Company; Martin B. Sattison, Idaho National Laboratory; Grant A. Tinsley, Technology Insights; Jiejuan Tong, Tsinghua University; Stephen D. Unwin, Battelle Pacific Northwest National Laboratory; Zen Wang, X Energy; John Wood, U.S. Nuclear Regulatory Commission; 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 ANLWR 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 would normally end at the end of 2016 but has been extended through 2017 to allow the project team to develop a final version for ballot as an ANSI standard.

ASME/ANS RA-S 1.5, "Advanced Light Water Reactor PRA Standard" (proposed new standard)

Membership:
Timothy Wheeler, Chair, Sandia National Laboratories; Amir Afzali, Southern Company, Sidney Bernsen, Individual; Heather L. Detar, Westinghouse Electric Company; Karl N. Fleming, Individual (KNF Consulting Services); Donnie G. Harrison, U.S. Nuclear Regulatory Commission; Dennis W. Henneke, General Electric; Eugene A Hughes, ETRANCO; Patrick J. O'Regan, EPRI; Vincent Sorel, EDF

Status: This standard is ultimately expected to be a mandatory appendix to the existing PRA standard, RA-S. This draft standard was planned to be balloted starting in September 2013, but two developments occurred that have delayed this. First, an effort was initiated to engage light water Small Modular Reactor (SMR) vendors to ensure that the standard would address their needs. Then, during the process of participating in this new activity, NRC notified JCNRM late in the process that they had identified inconsistencies between the draft standard and their intended application of that standard to the new plant licensing process. The working group is working on a markup of the NRC proposal and looks to finalize a draft for committee ballot by mid-2017. 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
Gareth W. Parry, Vice Chair, Jensen Hughes Inc.
Vincent Andersen, Nuclear Energy Institute
John H. Bickel, Evergreen Safety & Reliability Technologies, LLC
John M. Biersdorf, Xcel Energy
Robert J. Budnitz, Lawrence Berkeley National Laboratory
Matthew R. Denman, Sandia National Laboratories
K. Raymond Fine, FENOC
H. Alan Hackerott, Omaha Public Power District
Jason Hall, Entergy
Douglas C Hance, Electric Power Research Institute
Donnie G. Harrison, U.S. Nuclear Regulatory Commission
(Alternate: C.J. Fong, U.S. Nuclear Regulatory Commission)
Thomas G. Hook, Arizona Public Service
Eugene A Hughes, Etranco, Inc.
Annie M. Kammerer, Individual
Kenneth L. Kiper, Westinghouse Electric Company
Shigeo Kojima, Individual
James Lin, ABS Consulting
David N. Miskiewicz, Engineering Planning and Management, Inc.
Pamela F. Nelson, National Autonomous University of Mexico
Steve P. Nowlen, Sandia National Laboratories
Mayasandra K. Ravindra, MKRavindra Consulting
Alexander Rubbicco, Westinghouse Electric Company
Jean B. Savy, Individual
Raymond E. Schneider, Westinghouse Electric Company
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

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 standard:

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 as initially published in 2008. Addendum B (of RA-S) 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. Work on the next revision, which the JCNRM will call a "new edition" is well underway. This new version is expected to contain many substantive changes based on feedback from recent users of the standard, along with extensive re-formatting and the like. Part 5 (Seismic) is on a fast track as a code case because it is urgently needed by the industry to support responses to the 50.54(f) letter issued by USNRC regarding certain plants required to submit seismic PRAs. This is intended to be balloted and then issued by mid-2017. It is expected that it will not change between that date and the issuance of the new edition. The other parts for the next edition are in various states of completion, with all intended to be ready for SC-SM review in early 2017. The schedule calls for the new edition to be issued in late 2017. Each working group membership is listed below:

Part 1, General Requirements for a Level 1 PRA, Including Large Early Release Frequency, Membership:
Gareth W. Parry, Chair, Jensen Hughes Inc.; Thomas G. Hook, Vice Chair, Arizona Public Power; Mary Drouin, U.S. Nuclear Regulatory Commission; Shigeo Kojima, Individual; Lawrence Mangan, FENOC; Raymond E. Schneider, Westinghouse Electric Co. LLC; Harold Stiles, Duke Energy; Ian B. Wall, Individual; Donnie G. Harrison (Alternate for M. Drouin), U.S. Nuclear Regulatory Commission

Part 2, Requirements for Internal Events at-Power PRA Membership:
H. Alan Hackerott, Chair, Omaha Public Power District; Jodine M. Jansen Vehec, Vice Chair; RSC Engineers; Diane Jones, Vice Chair, Maracor--A Division of Enercon Services, Inc., John H. Bickel, Evergreen Safety & Reliability Technologies, LLC; John M. Biersdorf, Xcel Energy; Mary Drouin; U.S. Nuclear Regulatory Commission; Doug Hance, Electric Power Research Institute; Gerry W. Kindred, Tennessee Valley Authority; Stanley H. Levinson, AREVA Inc.; Pamela F. Nelson, National Autonomous University of Mexico; Kent Sutton, INGRID Consulting Services LLC; Donnie G. Harrison (Alternate for M. Drouin), U.S. Nuclear Regulatory Commission

Part 3, Requirements for Internal Flood at-Power PRA Membership:
James C. Lin, Chair, ABS Consulting Inc.; Jason Hall, Entergy; Douglas Rapp, FENOC; Alexander Rubbicco, Westinghouse Electric Company; Ian B. Wall, Individual; Jeffery J. Wood, U.S. Nuclear Regulatory Commission; Donnie G. Harrison (Alternate for J. Wood), U.S. Nuclear Regulatory Commission

Part 4, Requirements for Fires at-Power PRA Membership:
Steve P. Nowlen Chair, Sandia National Laboratories; Dennis W. Henneke, Vice Chair, General Electric; Francisco Joglar, Vice Chair, Jensen Hughes Inc.; 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.; Gareth W. Parry, Jensen Hughes Inc.; Mary R. Presley, Electric Power Research Institute; Jeffery Stone, Exelon; Richard Stremple; FirstEnergy Nuclear Operating Company; Kiang Zee, Jensen Hughes Inc.; Rayoond Gallucci (Alternate for J.S. Hyslop), U.S. Nuclear Regulatory Commission

Parts 5 - 10, External Hazards at-Power PRA Membership:
Mayasandra K. Ravindra, Chair, MKRavindra Consulting; Vincent Andersen, Vice Chair, Jensen Hughes Inc.; Michelle Bensi, Vice Chair, U.S. Nuclear Regulatory Commission; Stephen Eder, Vice Chair, Facility Risk Consultants Inc.; K. Raymond Fine, Vice Chair, FENOC; Lawrence Twisdale, Vice Chair, Applied Research Associates; Paul J. Amico, Jensen Hughes Inc.; Jose E. Blanco Beltran, Rizzo Associates; Robert J. Budnitz, Lawrence Berkeley National Laboratory; Jennifer S. Butler, Individual; Parthasarathy Chandran, Individual; Nilesh C. Chokshi, U.S. Nuclear Regulatory Commission; Ovidiu L. Coman, IIAEA; Matthew R. Denman, Sandia National Laboratories; Calin Eftimie, Individual; Anders Gilbertson, U.S. Nuclear Regulatory Commission; Eddie M. Guerra, Rizzo Associates; Donnie G. Harrison, U.S. Nuclear Regulatory Commission; Stephen M. Hess; Electric Power Research Institute; Justin Hiller, American Missouri; Kyle Hope, Westinghouse Electric Company; Annie M. Kammerer, Individual; Jeffrey Kimball, Rizzo Associates; Shigeo Kojima, Individual; Nicholas Lovelace, Jensen Hughes Inc.; Suzanne M. Loyd, Jensen Hughes Inc.; Arthur Lyubarskiy, IAEA; Zhegag Ma, Idaho

National Laboratory; Pierre Marcheret, Jensen Hughes Inc.; Andrea Maioli, Westinghouse Electric Company; Dean Ostenaa, Fugro Consultants, Inc.; John M. Richards, Electric Power Research Institute; Mark Rutherford, Grove Engineering, Inc.; Jean B. Savy, Individual; Raymond Schneider, Westinghouse Electric Company; Robert T. Sewell, R.T. Sewell Associates; Ram Srinivasan, Individual; Wen H. Tong, Simpson Gumpertz & Heger; Boback Torkian, Individual; Timothy Wheeler, Sandia National Laboratories; Mary Drouin (Alternate for N. Chokshi, D. Harrison, and S. Bensi), U.S. Nuclear Regulatory Commission

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Subcommittee on Risk Applications (SCoRA)

SCoRA Membership:
Gerry W. Kindred, Chair, Tennessee Valley Authority
Gary DeMoss, Vice Chair, PSEG Nuclear, LLC
Diane M. Jones, Vice Chair, Maracor
Robert J. Budnitz, Lawrence Berkeley National Laboratory
C. Rick Grantom, C.R. Grantom P.E. Associates, LLC
Jodine M. Jansen-Vehec, RSC Engineers
Kenneth L. Kiper, Westinghouse Electric Company
Stanley H. Levinson, AREVA Inc.
Lynn A. Mrowca, U.S. Nuclear Regulatory Commission
Pamela F. Nelson, National Autonomous University of Mexico
Patrick J. O'Regan, Electric Power Research Institute
Vish Patel, Southern Company
Ken Sutton, INGRID Consulting Services, LLC
Carroll Trull, Westinghouse Electric Company

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.

SCoRA REPORT:
The influence of SCORA continues to grow as the subcommittee's membership expands and its role in affecting risk application standards matures. With the dissolution of the PII Subcommittee, their Implementation Working Group moved to SCoRA. A SCoRA project team, headed by Rick Grantom, is beginning to develop an implementation guidance document for risk applications. If this proceeds, SCoRA's scope will need to be revised to accommodate implementation. A second SCoRA project team is drafting a guidance document on how to write a risk-informed standard. When this document is complete, it would serve as the template for SCoRA to provide consistent comments on standards they review. In addition, it might allow SDOs to implement risk-informed standards without direct involvement by SCoRA. A third project team is following ASME's NQA Committee regarding risk-informing QA requirements. SCoRA also made contact with several other ANS working groups, including the ANS Shielding Subcommittee (ANS-6) and Emergency Planning and Response Subcommittee. Finally, several SCoRA members serve on the ANS Standards Committee'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) Dennis Henneke (Vice Chair)	Paul Amico (Chair) Andrea Maioli (Vice Chair) Gareth Parry (Vice Chair)
SCoRA does not develop standards.	ANS/ASME-58.22, Low Power and Shutdown PRA	ASME/ANS RA-S, Level 1 PRA Including LERF (Part 1)
	ASME/ANS RA S-1.2, Level 2 PRA (previously ANS-58.24)	ASME/ANS RA-S, Internal Events At-Power PRA (Part 2)
	ASME/ANS RA-S-1.3, Level 3 PRA (previously ANS-58.25)	ASME/ANS RA-S, Internal Flood At-Power PRA (Part 3)
	ASME/ANS RA-S-1.4, Non-LWR PRA	ASME/ANS RA-S, Fires At-Power PRA (Part 4)
	ASME/ANS RA-S-1.5, Advanced LWR PRA	ASME/ANS RA-S, External Hazards 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
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

American Nuclear Society – American National Standards

Sales List (*All standards listed are available as individual publications in print or electronic format.)*

CURRENT STANDARDS

ANS Designation	Order #	Price
ANS-1-2000 (R2012) Conduct of Critical Experiments (Revision of ANS-1-1987; R1992)	240242	$40.00
ANS-2.2-2016 Earthquake Instrumentation Criteria for Nuclear Power Plants (Revision of ANS-2.2-2002)	240315	$141.00
ANS-2.3-2011 (R2016) Estimating Tornado, Hurricane, and Extreme Straight Line Wind Characteristics at Nuclear Facility Sites (Supersedes ANS-2.3-1983)	240283	$70.00
ANS-2.15-2013 Criteria for Modeling and Calculating Atmospheric Dispersion of Routine Radiological Releases from Nuclear Facilities	240293	$171.00
ANS-2.17-2010 (R2016) Evaluation of Subsurface Radionuclide Transport at Commercial Nuclear Power Plants (Supersedes ANS-2.17-1980; R1989)	240281	$138.00
ANS-2.21-2012 (R2016) Criteria for Assessing Atmospheric Effects On the Ultimate Heat Sink	240290	$55.00
ANS-2.23-2016 Nuclear Power Plant Response to an Earthquake (Revision of ANS-2.23-2002; R2009)	240312	$164.00
ANS-2.26-2004 (R2010) Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design	240255	$119.00
ANS-2.27-2008 (R2016) Criteria for Investigations of Nuclear Facility Sites for Seismic Hazard Assessments	240274	$121.00
ANS-2.29-2008 (R2016) Probabilistic Seismic Hazard Analysis	240275	$138.00
ANS-2.30-2015 Criteria for Assessing Tectonic Surface Fault Rupture and Deformation at Nuclear Facilities	240307	$227.00
ANS-3.1-2014 Selection, Qualification and Training of Personnel for Nuclear Power Plants (Supersedes ANS-3.1-1993; R1999)	240303	$128.00
ANS-3.2-2012 Managerial, Administrative, and Quality Assurance Controls for the Operational Phase of Nuclear Power Plants (Revision of ANS-3.2-2006)	240287	$125.00
ANS-3.4-2013 Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants (Supersedes ANS-3.4-1996; R2002)	240294	$138.00
ANS-3.5-2009 Nuclear Power Plant Simulators for Use in Operator Training and Examination (Supersedes ANS-3.5-1998)	240271	$121.00
ANS-3.11-2015 Determining Meteorological Information at Nuclear Facilities (Revision of ANS-3.11-2005; R2010)	240308	$220.00
ANS-5.1-2014 Decay Heat Power in Light Water Reactors (Revision of ANS-5.1-2005)	240302	$167.00

CURRENT STANDARDS

ANS Designation	Order #	Price
ANS-5.4-2011 Method for Calculating the Fractional Release of Volatile Fission Products from Oxide Fuel (Revision of ANS-5.4-1982)	240285	$78.00
ANS-5.10-1998 (R2013) Airborne Release Fractions at Non-Reactor Nuclear Facilities	240233	$132.00
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 ANS-6.1.2-1999; R2009)	240295	$55.00
ANS-6.3.1-1987 (R2015) Program for Testing Radiation Shields in Light Water Reactors (LWR) (Revision of ANS-6.3.1-1980)	240158	$78.00
ANS-6.4-2006 (R2016) Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants (Revision of ANS-6.4-1997; R2004)	240264	$208.00
ANS-6.4.2-2006 (R2016) Specification for Radiation Shielding Materials (Revision of ANS-6.4-1985; R1997; R2004)	240263	$78.00
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)	240309	$144.00
ANS-8.1-2014 Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors (Revision of ANS-8.1-1998; R2007)	240297	$95.00
ANS-8.3-1997 (R2012) Criticality Accident Alarm System (Revision of ANS-8.3-1986)	240224	$102.00
ANS-8.5-1996 (R2012) Use of Borosilicate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material (Revision of ANS-8.5-1986)	240220	$64.00
ANS-8.6-1983 (R2010) Safety in Conducting Subcritical Neutron-Multiplication Measurements in Situ (Revision of N16.3-1975)	240119	$32.00
ANS-8.7-1998 (R2012) Nuclear Criticality Safety in the Storage of Fissile Materials (Revision of N16.5-1975; R1982; R1987)	240235	$87.00
ANS-8.10-2015 Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement (Revision of ANS-8.10-1983; R2005)	240306	$55.00
ANS-8.12-1987 (R2016) Nuclear Criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors (Revision of ANS-8.12-1978)	240163	$95.00
ANS 8.14-2004 (R2016) Use of Soluble Neutron Absorbers in Nuclear Facilities Outside Reactors	240253	$47.00
ANS-8.15-2014 Nuclear Criticality Control of Selected Actinide Nuclides (Revision of ANS-8.15-1981; R2005)	240301	$110.00

CURRENT STANDARDS

ANS Designation	Order #	Price
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)	240254	$47.00
ANS-8.19-2014 Administrative Practices for Nuclear Criticality Safety (Revision of ANS-8.19-2005)	240298	$51.00
ANS-8.20-1991 (R2015) Nuclear Criticality Safety Training	240178	$47.00
ANS-8.21-1995 (R2011) Use of Fixed Neutron Absorbers in Nuclear Facilities Outside Reactors	240204	$47.00
ANS-8.22-1997 (R2016) Nuclear Criticality Safety Based on Limiting and Controlling Moderators	240227	$56.00
ANS-8.23-2007 (R2012) Nuclear Criticality Accident Emergency Planning and Response (Revision of ANS-8.23-1997)	240269	$119.00
ANS-8.24-2007 (R2012) Validation of Neutron Transport Methods for Nuclear Criticality Safety Calculations	240266	$110.00
ANS-8.26-2007 (R2016) Criticality Safety Engineer Training and Qualification Program	240268	$40.00
ANS-8.27-2015 Burnup Credit for LWR Fuel (Revision of ANS-8.27-2008)	240310	$94.00
ANS-10.2-2000 (R2009) Portability of Scientific and Engineering Software (Revision of ANS-10.2-1988)	240243	$47.00
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)	240277	$130.00
ANS-10.5-2006 (R2016) Accommodating User Needs in Scientific and Engineering Computer Software Development (Supersedes ANS-10.5-1994)	240261	$56.00
ANS-10.7-2013 Non-Real Time, High-Integrity Software for the Nuclear Industry—Developer Requirements	240292	$110.00
ANS-10.8-2015 Non-Real-Time, High-Integrity Software for the Nuclear Industry—User Requirements	240311	$121.00
ANS-14.1-2004 (R2014) Operation of Fast Pulse Reactors (Revision of ANS-14.1-1975; R2000)	240252	$47.00
ANS-15.1-2007 (R2013) The Development of Technical Specifications for Research Reactors (Revision of ANS-15.1-1990; R1999)	240267	$95.00
ANS-15.2-1999 (R2016) Quality Control for Plate-Type Uranium-Aluminum Fuel Elements (Revision of ANS-15.2-1990)	240237	$64.00
ANS-15.4-2016 Selection and Training of Personnel for Research Reactors (Revision of ANS-15.4-2007)	240313	$94.00

CURRENT STANDARDS

ANS Designation	Order #	Price
ANS-15.8-1995 (R2013) Quality Assurance Program Requirements for Research Reactors (Revision of ANS-15.8-1976; R1986)	240215	$64.00
ANS-15.11-2016 Radiation Protection at Research Reactor Facilities (Revision of ANSI/ANS-15.11-2009)	240314	$124.00
ANS-15.16-2015 Emergency Planning for Research Reactors (Revision of ANS-15.16-2008)	240305	$71.00
ANS-15.21-2012 Format and Content for Safety Analysis Reports for Research Reactors (Revision of ANS-15.21-1996; R2006)	240291	$124.00
ANS-16.1-2003 (R2008) Measurement of the Leachability of Solidified Low-Level Radioactive Wastes by a Short-Term Test Procedure (Revision of ANS-16.1-1986)	240249	$135.00
ANS-18.1-2016 Radioactive Source Term for Normal Operation of Light Water Reactors (Supersedes ANSI/ANS-18.1-1999)	240316	$TBD
ANS-19.1-2002 (R2011) Nuclear Data Sets for Reactor Design Calculations (Revision of ANSI/ANS-19.1-1983; R1989)	240250	$70.00
ANS-19.3-2011 Steady-State Neutronics Methods for Power Reactor Analysis (Revision of ANS-19.3-2005)	240286	$128.00
ANS-19.3.4-2002 (R2008) The Determination of Thermal Energy Deposition Rates in Nuclear Reactors (Revision of ANS-19.3.4-1976; R1983; R1989)	240245	$56.00
ANS-19.6.1-2011 (R2016) Reload Startup Physics Tests for Pressurized Water Reactors (Revision of ANS-19.6.1-2005)	240282	$121.00
ANS-19.10-2009 (R2016) Methods for Determining Neutron Fluence in BWR and PWR Pressure Vessel and Reactor Internals	240278	$54.00
ANS-19.11-1997 (R2011) Calculation and Measurement of the Moderator Temperature Coefficient of Reactivity for Water Moderated Power Reactors	240226	$95.00
ANS-40.37-2009 (R2016) Mobile Low Level Radioactive Waste Processing Systems (Supersedes ANS-40.37-1993)	240280	$146.00
ANS-41.5-2012 Verification and Validation of Radiological Data for Use in Waste Management and Environmental Remediation	240288	$161.00
ANS-51.10-1991 (R2008) Auxiliary Feedwater System for Pressurized Water Reactors (Revision of ANS-51.10-1979)	240177	$110.00
ANS-53.1-2011 (R2016) Nuclear Safety Design Process for Modular Helium-Cooled Reactor Plants	240289	$233.00
ANS-55.1-1992 (R2009) Solid Radioactive Waste Processing System for Light-Water-Cooled Reactor Plants (Revision of ANS-55.1-1979)	240193	$149.00

CURRENT STANDARDS

ANS Designation	Order #	Price
ANS-55.4-1993 (R2007) Gaseous Radioactive Waste Processing Systems for Light Water Reactor Plants (Revision of ANS-55.4-1979)	240194	$129.00
ANS-55.6-1993 (R2007) Liquid Radioactive Waste Processing System for Light Water Reactor Plants (Revision of ANS-55.6-1979)	240195	$132.00
ANS-56.8-2002 (R2016) Containment System Leakage Testing Requirements (Revision of ANS-56.8-1994)	240247	$135.00
ANS-57.1-1992 (R2015) Design Requirements for Light Water Reactor Fuel Handling Systems (Revision of ANS-57.1-1980)	240186	$70.00
ANS-57.8-1995 Fuel Assembly Identification (Revision of ANS-57.8-1978; R1987)	240205	$47.00
ANS-57.10-1996 (R2016) Design Criteria for Consolidation of LWR Spent Fuel (Revision of ANS-57.10-1987)	240221	$135.00
ANS-58.3-1992 (R2008) Physical Protection for Nuclear Safety-Related Systems and Components (Revision of ANS-58.3-1977)	240184	$138.00
ANS-58.8-1994 (R2008) Time Response Design Criteria for Safety-Related Operator Actions (Revision of ANS-58.8-1984)	240202	$87.00
ANS-58.9-2002 (R2015) Single Failure Criteria for Light Water Reactor Safety-Related Fluid Systems (Same as ANS-58.9-1981; R1987)	240091	$47.00
ANS-58.14-2011 Safety and Pressure Integrity Classification Criteria for Light Water Reactors (Supersedes ANS-58.14-1993)	240284	$194.00
ANS-58.16-2014 Safety Categorization and Design Criteria for Nonreactor Nuclear Facilities	240299	$154.00
ANS-59.51-1997 (R2015) Fuel Oil Systems for Safety-Related Emergency Diesel Generators (Revision of ANS-59.51-1989)	240229	$78.00
ANS-59.52-1998 (R2015) Lubricating Oil Systems for Safety-Related Emergency Diesel Generators	240232	$70.00

TRIAL USE STANDARDS

ANS Designation	Order #	Price
ANS/ASME-58.22-2014 Requirements for Low Power and Shutdown Probabilistic Risk Assessment	240304	$400.00
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)	240300	$195.00
ASME/ANS RA-S-1.4-2013 Probabilistic Risk Assessment Standard for Advanced Non-LWR Nuclear Power Plants	240296	$500.00

HISTORICAL STANDARDS

ANS Designation	Order #	Price
ANS-1-1987 (R1992) Safety Guide for the Performance of Critical Experiments	240159	$40.00
ANS-2.2-2002 Earthquake Instrumentation Criteria for Nuclear Power Plants	240246	$56.00
ANS-2.3-1983 Standard for Estimating Tornado and Extreme Wind Characteristics at Nuclear Power Sites	240122	$78.00
ANS-2.7-1982 Criteria and Guidelines for Assessing Capability for Surface Faulting at Nuclear Power Plant Sites	240105	$56.00
ANS-2.8-1992 Determining Design Basis Flooding at Power Reactor Sites	240183	$172.00
ANS-2.9-1980 (R1989) Evaluation of Ground Water Supply for Nuclear Power Sites	240005	$95.00
ANS-2.10-2003 Criteria for the Handling and Initial Evaluation of Records from Nuclear Power Plant Seismic Instrumentation	240251	$47.00
ANS-2.11-1978 (R1989) Guidelines for Evaluating Site-Related Geotechnical Parameters at Nuclear Power Sites	240007	$132.00
ANS-2.12-1978 Guidelines for Combining Natural and External Man-Made Hazards at Power Reactor Sites	240008	$162.00
ANS-2.13-1979 (R1988) Evaluation of Surface-Water Supplies for Nuclear Power Sites	240009	$119.00
ANS-2.17-1980 (R1989) Evaluation of Radionuclide Transport in Ground Water for Nuclear Power Sites	240010	$110.00
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)	240094	$142.00
ANS-2.23-2009 Nuclear Plant Response to an Earthquake	240244	$129.00
ANS-2.25-1982 (R1989) Surveys of Terrestrial Ecology Needed to License Thermal Power Plants (Formerly known as ANS-18.5)	240110	$121.00
ANS-3.1-1993 (R1999) Selection, Qualification, and Training of Personnel for Nuclear Power Plants	240188	$87.00
ANS-3.2-2006 Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants	240262	$145.00
ANS-3.3-1988 Security for Nuclear Power Plants	240169	$78.00
ANS-3.4-1996 (R2002) Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants	240218	$56.00

HISTORICAL STANDARDS

ANS Designation	Order #	Price
ANS-3.5-1998	240231	$110.00
Nuclear Power Plant Simulators for Use in Operator Training and Examination		
ANS-3.7.1-1995	240213	$64.00
Facilities and Medical Care for On-Site Nuclear Power Plant Radiological Emergencies		
ANS-3.8.1-1995	240208	$110.00
Criteria for Radiological Emergency Response Functions and Organizations		
ANS-3.8.2-1995	240209	$64.00
Criteria for Functional and Physical Characteristics of Radiological Emergency Response Facilities		
ANS-3.8.3-1995	240210	$64.00
Criteria for Radiological Emergency Response Plans and Implementing Procedures		
ANS-3.8.4-1995	240211	$47.00
Criteria for Maintaining Radiological Emergency Response Capability		
ANS-3.8.5-1992	240190	$56.00
Criteria for Emergency Radiological Field Monitoring, Sampling, and Analysis		
ANS-3.8.6-1995	240212	$64.00
Criteria for the Conduct of Offsite Radiological Assessment for Emergency Response for Nuclear Power Plants		
ANS-3.8.7-1998	240230	$64.00
Criteria for Planning, Development, Conduct, and Evaluation of Drills and Exercises for Emergency Preparedness		
ANS-3.11-2005 (R2010)	240260	$135.00
Determining Meteorological Information at Nuclear Facilities (Revision of ANS-3.11-2000)		
ANS-4.5-1980 (R1986)	240020	$70.00
Criteria for Accident Monitoring Functions in Light-Water-Cooled Reactors		
ANS-5.1-2005	240256	$152.00
Decay Heat Power in Light Water Reactors		
ANS-5.4-1982	240107	$47.00
Method for Calculating the Fractional Release of Volatile Fission Products from Oxide Fuel		
ANS-6.1.1-1991	240179	$102.00
Neutron and Gamma-Ray Fluence-to-Dose Factors		
ANS-6.1.2-1999 (R2009)	240236	$36.00
Neutron and Gamma-Ray Cross Sections for Nuclear Radiation Protection Calculations for Nuclear Power Plants		
ANS-6.4-1997 (R2004)	240223	$197.00
Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants		
ANS-6.4.2-1985 (R2004)	240136	$190.00
Specifications for Radiation Shielding Materials		
ANS-6.4.3-1991	240180	$233.00
Gamma-Ray Attenuation Coefficients and Buildup Factors for Engineering Materials		
ANS-6.6.1-1987 (R2007)	240153	$142.00
Calculation and Measurement of Direct and Scattered Gamma Radiation from LWR Nuclear Power Plants		

HISTORICAL STANDARDS

ANS Designation	Order #	Price
ANS/HPSSC-6.8.1-1981	240089	$70.00
Location and Design Criteria for Area Radiation Monitoring Systems for Light Water Nuclear Reactors		
ANS/IEEE-7.4.3.2 (R2009)	240106	$64.00
Application Criteria for Programmable Digital Computer in Safety Systems of Nuclear Power Generating Stations		
ANS-8.1-1998 (R2007)	240234	$95.00
Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors		
ANS-8.3-1986	240147	$70.00
Criticality Accident Alarm System		
ANS-8.5-1986	240142	$64.00
Use of Borosilicate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material		
ANS-8.7-1975 (R1987)	240031	$87.00
Guide for Nuclear Criticality Safety in the Storage of Fissile Materials (Formerly known as N16.5)		
ANS-8.9-1987 (R1995)	240149	$56.00
Nuclear Criticality Safety Criteria for Steel-Pipe Intersections Containing Aqueous Solutions of Fissile Material		
ANS-8.10-1983 (R2005)	240123	$47.00
Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement		
ANS-8.15-1981 (R2005)	240102	$87.00
Nuclear Criticality Control of Special Actinide Elements		
ANS-8.17-1984 (R1997)	240126	$40.00
Criticality Safety Criteria for the Handling, Storage and Transportation of LWR Fuel Outside Reactors		
ANS-8.19-2005	240257	$40.00
Administrative Practices for Nuclear Criticality Safety		
ANS-8.23-1997	240228	$47.00
Nuclear Criticality Accident Emergency Planning and Response		
ANS-8.27-2008	240273	$47.00
Burnup Credit for Light Water Reactor Fuel		
ANS-10.2-1988	240164	$47.00
Recommended Programming Practices to Facilitate the Portability of Scientific and Engineering Computer Programs		
ANS-10.3-1995	240201	$56.00
Documentation of Computer Software		
ANS-10.4-1987 (R1998)	240150	$138.00
Guidelines for the Verification and Validation of Scientific and Engineering Computer Programs for the Nuclear Industry		
ANS-10.5-1994	240196	$55.00
Accommodating User Needs in Computer Program Development		
ANS-14.1-1975 (R2000)	240040	$32.00
Operation of Fast Pulse Reactors (Formerly known as N394)		
ANS-15.1-1990 (R1999)	240176	$70.00
The Development of Technical Specifications for Research Reactors		

HISTORICAL STANDARDS

ANS Designation	Order #	Price
ANS-15.2-1990	240175	$56.00
Quality Control for Plate-Type Uranium-Aluminum Fuel Elements		
ANS-15.4-2007	240272	$70.00
Selection and Training of Personnel for Research Reactors (Revision of ANS-15.4-1988; R1999)		
ANS-15.7-1977 (R1986)	240046	$64.00
Research Reactor Site Evaluation		
ANS-15.8-1976 (R1986)	240047	$40.00
Quality Assurance Program Requirements for Research Reactors (Formerly known as N402)		
ANS-15.10-1994	240199	$119.00
Decommissioning of Research Reactors		
ANS-15.11-2009	240279	$124.00
Radiation Protection at Research Reactor Facilities		
ANS-15.12-1977	240049	$32.00
Design Objectives for and Monitoring of Systems Controlling Research Reactor Effluents		
ANS-15.15-1978 (R1986)	240050	$64.00
Criteria for the Reactor Safety Systems of Research Reactors		
ANS-15.16-2008	240276	$64.00
Emergency Planning for Research Reactors		
ANS-15.17-1981 (R2000)	240096	$47.00
Fire Protection Program Criteria for Research Reactors		
ANS-15.19-1991	240181	$95.00
Shipment and Receipt of Special Nuclear Material (SNM) by Research Reactor Facilities		
ANS-15.21-1996 (R2006)	240222	$145.00
Format and Content for Safety Analysis Reports for Research Reactors		
ANS-16.1-1986	240148	$144.00
Measurement of the Leachability of Solidified Low-Level Radioactive Wastes by a Short-Term Test Procedure		
ANS-18.1-1999	240238	$95.00
Radioactive Source Term for Normal Operation of Light Water Reactors		
ANS-19.1-1983 (R1989)	240121	$64.00
Nuclear Data Sets for Reactor Design Calculations		
ANS-19.3-2005	240258	$121.00
Determination of Steady-State Neutron Reaction-Rate Distributions and Reactivity of Nuclear Power Reactors		
ANS-19.3.4-1976 (R1989)	240056	$56.00
The Determination of Thermal Energy Deposition Rates in Nuclear Reactors (Formerly N676)		
ANS-19.4-1976 (R2000)	240057	$78.00
A Guide for Acquisition and Documentation of Reference Power Reactor Physics Measurements for Nuclear Analysis Verification (Formerly known as N652-1976)		
ANS-19.5-1995	240206	$32.00
Requirements for Reference Reactor Physics Measurements		
ANS-19.6.1-2005	240259	$119.00
Reload Startup Physics Tests for Pressurized Water Reactors		

HISTORICAL STANDARDS

ANS Designation	Order #	Price
ANS-40.35-1991	240182	$110.00
Volume Reduction of Low-Level Radioactive Waste or Mixed Waste		
ANS-40.37-1993	240192	$142.00
Mobile Radioactive Waste Processing Systems		
ANS-51.1-1983 (R1988)	240116	$210.00
Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants		
ANS-51.10-1979	240062	$110.00
Auxiliary Feedwater System for Pressurized Water Reactors		
ANS-52.1-1983 (R1988)	240117	$208.00
Nuclear Safety Criteria for the Design of Stationary Boiling Water Reactor Plants		
ANS-54.1-1989	240171	$87.00
General Safety Design Criteria for a Liquid Metal Reactor Nuclear Power Plant		
ANS-54.2-1985	240138	$70.00
Design Bases for Facilities for LMFBR Spent Fuel Storage in Liquid Metal Outside the Primary Coolant Boundary		
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Containment Isolation Provisions for Fluid Systems after a LOCA		
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Light Water Reactors Fuel Assembly Mechanical Design and Evaluation (Revision of ANS-57.5-1981)		
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Design Criteria for an Independent Spent Fuel Storage Installation (Water Pool Type)		
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Fuel Assembly Identification		
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