May 10, 2023

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U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
ATTN: Document Control Desk

Subject: Transmittal of TerraPower, LLC White Paper, "Preliminary Consensus Codes and Standards" Revision 0

This letter transmits the TerraPower, LLC (TerraPower) white paper, "Preliminary Consensus Codes and Standards" Revision 0 (enclosed). The white paper is being submitted to the U.S. Nuclear Regulatory Commission (NRC) in accordance with the NRC's Interim Staff Guidance (ISG) titled, "Review of Risk-Informed, Technology Inclusive Advanced Reactor Applications – Roadmap," dated December 2021. The ISG, Appendix C, "Pre-Application Engagement Guidance," includes the submittal of a white paper to identify any consensus codes and standards or code cases intended for use.

The enclosed white paper identifies codes, standards, and code cases currently intended for use on the Nuclear Island portion of the Natrium™ Reactor Plant[1] for safety-significant structures, systems, and components. Standards and code cases that have not been previously endorsed or accepted by the NRC are identified with a brief description for the reason they are being considered and selected. As design is currently preliminary, the codes, standards, and code cases selected for use may change as design progresses. TerraPower does not intend to update this white paper if changes are made as design progresses. This white paper is a preliminary list intended to facilitate pre-application interactions with the NRC.

[1] Natrium is a TerraPower and GE-Hitachi technology.

TerraPower is requesting NRC staff feedback on the areas where additional information may be needed in the Construction Permit Application to support the proposed approach for use of a standard or code case not previously accepted by the NRC.

This letter and enclosure make no new or revised regulatory commitments.

If you have any questions regarding this submittal, please contact Ryan Sprengel at rsprengel@terrapower.com or (425) 324-2888.

Sincerely,

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Director of Licensing, Natrium
TerraPower, LLC

Enclosure: TerraPower, LLC White Paper, "Preliminary Consensus Codes and Standards" Revision 0

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TP-LIC-LET-0073
ENCLOSURE

TerraPower, LLC White Paper
"Preliminary Consensus Codes and Standards" Revision 0

NATRIUM

Natrium is a TerraPower and GE-Hitachi technology.

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Approval

Approval signatures are captured and maintained electronically; see Electronic Approval Records in EDMS.

☐ Supplemental Signature Sheet Attached

REVISION HISTORY

Revision No.	Effective Date	Affected Section(s)	Description of Change(s)
0	04/21/2023	All	Initial issue

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1 EXECUTIVE SUMMARY

This white paper is prepared in accordance with the United States Nuclear Regulatory Commission (NRC) Review of Risk-Informed, Technology Inclusive Advanced Reactor Applications – Roadmap Interim Staff Guidance (December 2021) (Reference 1) Appendix C, "Pre-Application Engagement Guidance." This white paper identifies codes, standards, and code cases currently intended for use on the Nuclear Island (NI) portion of the Natrium™ Reactor Plant[1] for safety-significant structures, systems, and components (SSCs). Standards and code cases that have not been previously endorsed or accepted by the NRC are identified with a brief description for the reason they are being considered and selected. As design is currently preliminary, the codes, standards, and code cases selected for use may change as design progresses. TerraPower, LLC (TerraPower) does not intend to update this white paper if changes are made as design progresses. This white paper is a preliminary list intended to facilitate pre-application interactions with the NRC.

TerraPower is requesting NRC staff feedback on the areas where additional information may be needed in the Construction Permit Application (CPA) to support the proposed approach for use of a standard or code case not previously accepted by the NRC.

[1] Natrium is a TerraPower and GE-Hitachi technology.

2 ACRONYMS AND ABBREVIATIONS

ACI	American Concrete Institute
AISI	American Iron and Steel Institute
ANS	American Nuclear Society
ANSI	American National Standards Institute
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BNL	Brookhaven National Lab
BTP	Branch Technical Position
BPVC	Boiler and Pressure Vessel Code
CFR	Code of Federal Regulations
CPA	Construction Permit Application
EPRI	Electric Power Research Institute
I&C	Instrumentation and Control
IBC	International Building Code
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
FEMA	Federal Emergency Management Agency
FPGA	Field Programmable Gate Array
ISA	International Society of Automation
ISO	International Organization for Standardization
LWR	Light Water Reactor
MSS	Manufacturers Standardization Society
NBSIR	National Bureau of Standards Information Report
NEI	Nuclear Energy Institute
NI	Nuclear Island
NFPA	National Fire Protection Association
NRC	United States Nuclear Regulatory Commission
NSRST	Non-Safety Related with Special Treatment
NST	Non-Safety Related with No Special Treatment
NUMARC	Nuclear Management and Resources Council
ORNL	Oak Ridge National Laboratory
PRA	Probabilistic Risk Assessment
QA	Quality Assurance
RDT	Reactor Development and Technology
RG	Regulatory Guide
RIPB	Risk Informed, Performance Based
SR	Safety-Related
SRP	Standard Review Plan
SSC	Structure, System, and Component
Std	Standard
TEMA	Tubular Exchanger Manufacturers Association
UFC	Unified Facilities Criteria
UL	Underwriters Laboratories
V&V	Verification and Validation
VRLA	Valve-Regulated Lead-Acid

3 BACKGROUND

This white paper identifies codes, standards, and code cases currently intended for use in the Natrium Reactor Plant. Standards and code cases that have not been previously endorsed or accepted by the NRC are identified with a brief description for the reason they are being considered and selected. As design is currently preliminary, the codes, standards, and code cases selected for use may change as design progresses. TerraPower does not intend to update this white paper if changes are made as design progresses. This white paper is a preliminary list intended to facilitate pre-application interactions with the NRC.

4 CODES, STANDARDS, AND CODE CASES INTENDED FOR USE

Standards and code cases currently intended for use that have not been previously endorsed or accepted by the NRC are listed in Tables 1-8. Codes, standards, and code cases currently intended for use that are currently approved by the NRC are listed in Table 9.

As shown in Table 1, one standard with a previous version approved for incorporation by reference in 10 CFR 50.55a is currently intended for use. Institute of Electrical and Electronics Engineers (IEEE) Std 603-2018 is selected because it improves alignment with the NRC Instrumentation and Control (I&C) Design Review Guide, is needed to support use of Field Programmable Gate Arrays (FPGAs), and is consistent with the NRC staff's 2019 review of Regulatory Guide (RG) 1.152 Revision 3, "Criteria for Use of Computers in Safety Systems of Nuclear Power Plants." The NRC staff review recommended changes to "address programmable digital devices to encompass technologies, such as [FPGAs]". Per the 2017 Staff Review of RG 1.153, "Criteria for Safety Systems, the Staff recommended a later edition of IEEE Std 603 (then 2009), but the Commission disapproved and directed the Staff to develop an integrated strategy to modernize the NRC's digital I&C regulatory infrastructure.

Table 1. Standards with Previous Versions Approved for Incorporation By Reference in 10 CFR 50.55a

Standard	Title
IEEE Std 603-2018	IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations

Table 2 lists standards currently intended for use that are endorsed in Trial RG 1.247. RG 1.247, "Trial - Acceptability of Probabilistic Risk Assessment Results for Non-Light Water Reactor Risk-Informed Activities," provides guidance for trial use of RA-S-1.4-2021 with exceptions and clarifications. Use of the standards in Table 2 supports use of the Licensing Modernization Project methodology described in Nuclear Energy Institute (NEI) 18-04, Revision 1, and endorsed with exceptions and clarifications by RG 1.233 Revision 0, "Guidance for a Technology-Inclusive Risk-Informed, And Performance-Based Methodology to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-Light-Water Reactors." RG 1.233 Section C.1.e, states:

"The methodology in NEI 18-04 includes an expanded role for PRA beyond that currently required by 10 CFR Part 52 and policies related to new applications under 10 CFR Part 50. The staff's review of the PRA prepared by a reactor designer could be facilitated by the designer's use of NRC-endorsed consensus codes and standards (e.g., potential NRC endorsement of the American Society of Mechanical Engineers/American Nuclear Society RA-S-1.4, "Probabilistic Risk Assessment Standard for Advanced Non-LWR Nuclear Power Plants"). However, the NRC has not yet endorsed a consensus

code or standard for non-LWR PRAs. In the absence of such an endorsed standard, the NRC staff will develop review strategies to address the performance and use of PRAs for specific applications."

Table 2. Standards Endorsed in Trial RG 1.247

Standard	Title
RA-S-1.4-2021	Probabilistic Risk Standard for Advanced Non-LWR Nuclear Power Plants
NEI 20-09, Revision 1	Performance of PRA Peer Reviews Using the ASME/ANS Advanced Non-LWR PRA Standard

Table 3 lists standards currently intended for use that are planned for NRC endorsement as noted in the NRC staff's April 15, 2020 letter, "Plan for Review and Endorsement of Institute of Electrical and Electronics Engineers Standards and Nomination of NRC Staff to the Energy Storage and Stationary Battery Committee," (ML19309E048).

Table 3. Standards Planned for NRC Endorsement in ML19309E048

Standard	Title
IEEE 1187 -2013	Recommended Practice for Installation Design and Installation of Valve-Regulated Lead-Acid (VRLA) Batteries for Stationary Applications
IEEE 1188 -2020	Recommended Practice for Maintenance, Testing, and Replacement and Installation of Valve-Regulated Lead-Acid Batteries for stationary Applications
IEEE 1375 -1998	IEEE Guide for the Protection of Stationary Battery Systems
IEEE 1635 -2018	IEEE Guide for the Ventilation and Thermal Management of Batteries for Stationary Applications
IEEE 2405 -2020	Standard for the Design of Chargers Used in Stationary Battery Applications
IEEE 946 -2020	Recommended Practice for the Design of DC Power Systems for Stationary Applications

Table 4 lists standards currently intended for use that have Previous Versions Accepted in RG 1.138 Revision 3. Some standards listed in Table 4 have not yet been determined to be applicable based on the preliminary state of the design and were listed preemptively.

Table 4. Standards with Previous Versions Accepted in RG 1.138 Revision 3

Standard	Title	Reason for Consideration
Procedure PBRCTS-1	University of Texas at Austin Geotechnical Engineering Center, "Technical Procedures for Resonant Column and Torsional Shear (RCTS) Testing of Soil and Rock Samples," Procedure PBRCTS-1, Austin, TX, October 2000.	ASTM D3999-91 has been withdrawn. Modulus and damping for backfill will be evaluated with RCTS methods, Reference 33 of Appendix A of RG 1.138 Revision 3.
ASTM D4186/D4186M-20e1	Standard Test Method for One-Dimensional Consolidation Properties of Soils Using Controlled-Strain Loading	Particle size analysis is conducted using ASTM D6913, ASTM D422, ASTM D7928 or ASTM D1140.
ASTM D422-63(2007)e2	Standard Test Method for Particle-Size Analysis of Soils	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions. There are editorial changes only since 63 version.
ASTM D4318-17e1	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils	ASTM D421 is withdrawn. Particle size analysis is conducted using ASTM D6913, ASTM D422, ASTM D7928 or ASTM D1140.
ASTM D4452/D4552M-22	Standard Methods for X-Ray Radiography of Soil Samples	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions.
ASTM D4643-17	Standard Test Method for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions.
ASTM D4644-16	Standard Test Method for Slake Durability of Shales and Similar Weak Rocks	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions.

Standard	Title	Reason for Consideration
ASTM D4959-16	Standard Test Method for Determination of Water (Moisture) Content of Soil by Direct Heating	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions.
ASTM D5080-20	Standard Test Method for Rapid Determination of Percent Compaction	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions.
ASTM D5607-16	Standard Test Method for Performing Laboratory Direct Shear Strength Tests of Rock Specimens Under Constant Normal Force	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions.
ASTM D6572-21	Standard Test Methods for Determining Dispersive Characteristics of Clay Soils by the Crumb Test	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions.
ASTM D6913/D6913M-17	Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis	Particle size is conducted using ASTM D6913 and D422.
ASTM D698-12 (2021)	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions.
ASTM D7012-14e1	Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens under Varying States of Stress and Temperatures	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions.
ASTM D7181-20	Standard Test Method for Consolidated Drained Triaxial Compression Test for Soils	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions.

Standard	Title	Reason for Consideration
ASTM D854-14	Standard Test Methods for Specific Gravity of Soil Solids by Water Pycnometer	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions.
ASTM D4044/D4044M-15	Standard Test Method for (Field Procedure) for Instantaneous Change in Head (Slug) Tests for Determining Hydraulic Properties of Aquifers	ASTM D5084 is not relevant to the Kemmerer Power Station Unit 1 site. In-situ testing was conducted to evaluate hydraulic conductivity. ASTM D4044/D4044M-15 used in tandem with ASTM D4630.
ASTM D4630-19	Standard Test Method for Determining Transmissivity and Storage Coefficient of Low-Permeability Rocks by In Situ Measurements Using the Constant Head Injection Test	In-situ testing was conducted to evaluate hydraulic conductivity.
ASTM D2850-03a ASTM D2850-15	Standard Test Method for Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions.
ASTM D2488-09a ASTM D2488-17e1	Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions.
ASTM D2974-07a ASTM D2974-20e1	Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions.
ASTM D4767-04 ASTM D4767-11(2020)	Standard Test Method for Consolidated Undrained Triaxial Compression Test for Cohesive Soils	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions.
ASTM C535-16	Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions.

Table 5 lists standards currently intended for use that have previous versions accepted in RG 1.54 Revision 3 and the reason for considering them for use.

Table 5. Standards with Previous Versions Accepted in RG 1.54 Revision 3

Standard	Title	Reason for Consideration
ASTM D3359-22	Standard Test Methods for Measuring Adhesion by Tape Test	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions. The changes from the 2017 to 2022 version are mainly editorial to help enhance the use of the document. The evaluation scales have not changed since before 2009.
ASTM D3843-16 (2021)e1	Standard Practice for Quality Assurance for Protective Coatings Applied to Nuclear Facilities	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions.
ASTM D4228-05(2017) (or most recent version 6 months prior to CPA)	Standard Practice for Qualification of Coating Applicators for Application of Coatings to Steel Surfaces	This is the most recent version of the standard for contractor qualifications. The standard is not applicable to coating material approval.
ASTM D4286-08 (2021) (or most recent version 6 months prior to CPA)	Standard Practice for Determining Coating Contractor Qualifications for Nuclear Powered Electric Generating Facilities	This is the most recent version of a standard for contractor qualifications.
ASTM D4537-12 (2018) (or most recent version 6 months prior to CPA)	Standard Guide for Establishing Procedures to Qualify and Certify Personnel Performing Coating and Lining Work Inspection in Nuclear Facilities	This is the most recent version of a standard for contractor qualifications.
ASTM D4538-21	Standard Terminology Relating to Protective Coating and Lining Work for Power Generation Facilities	Some additions and enhancements which clarify definitions have been made. The terminology applies to work in most applications and many of the terms are not nuclear specific.

Standard	Title	Reason for Consideration
ASTM D4541-22	Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers	This document is a procedure; specific scales or acceptance criteria were never included. Enhancements from 2017 include clarification of procedures and processes which make the procedure clearer and more useable. There were editorial changes between the 2017 and 2022 versions.
ASTM D5139-19	Standard Specification for Sample Preparation for Qualification Testing of Coatings To Be Used in Nuclear Power Plants	Standard updates include reference to specific plant configuration which are appropriate to include.
ASTM D5162-21	Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates	This standard underwent extensive revision. Overall understanding and requirements have been clarified and improved.
ASTM D5498-12a (2018) (or most recent version 6 months prior to CPA)	Standard Guide for Developing a Training Program for Personnel Performing Coating Work Inspection for Nuclear Facilities	This is the most recent version of a standard for contractor qualifications.
ASTM D6677-18	Standard Test Method for Evaluating Adhesion by Knife	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions. Changes to the document are editorial in nature.
ASTM D7091-22	Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions. Changes to the document are editorial in nature.
ASTM D7108-12 (2018) (or most recent version 6 months prior to CPA)	Standard Guide for Establishing Qualifications for a Nuclear Coatings Specialist	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions. This is the most recent version of a standard for contractor qualifications.

Standard	Title	Reason for Consideration
ASTM D7234-21	Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions. Changes are mainly editorial with no significant technical changes made to the procedure. An editorial change coming in the 2022 version (recently balloted) removes the word 'adhesion' from document.
ASTM D7491-21	Standard Guide for Management of Non-Conforming Coatings in Coating Service Level I Areas of Nuclear Power Plants	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions.
ASTM D4082-10 (2017) (Last Updated: Sep 22, 2017)	Standard Test Method for Effects of Gamma Radiation on Coatings for Use in Nuclear Power Plants	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions.
ASTM D4227-05 (2017) (Note: Use latest version released 6 months prior to CPA)	Standard Practice for Qualification of Coating Applicators for Application of Coatings to Concrete Surfaces	This is the most recent version of a standard for contractor qualifications.

Table 6 lists standards currently intended for use that have previous versions accepted in other NRC RGs and the reason for considering them for use.

Table 6. Standards and Code Cases with Previous Versions Accepted in Other NRC RGs

Standard	Title	Reason for Consideration
ASTM C871-18	Test Method for Chemical Analysis of Thermal Insulation Materials for Leachable Chloride, Fluoride, Silicate and Sodium Ions	Use of this version facilitates the potential need to use third parties in these areas and potential inability of those parties to support the previously endorsed versions.

Standard	Title	Reason for Consideration
ASCE 4-16	Seismic Analysis of Safety-Related Nuclear Structures	ASCE 4-16 provides detailed guidance for seismic analysis of safety-related systems that is not available elsewhere. ASCE 4-16 was reviewed in BNL-220722-2020-INRE which was issued under NRC RIL 2021-05 "Evaluation of ASCE 4-16 and ASCE 43-18 (Draft) for Use in the Risk-Informed, Performance-Based Seismic Design of Nuclear Power Plant Structures, Systems, and Components" and was found to provide an appropriate framework for the seismic design of SSCs at nuclear power plants using a risk informed, performance based (RIPB) approach. However, some of the criteria in these standards warrant exceptions, qualifications, or clarifications." Therefore, the guidance of ASCE 4-16 will be used with reference to the Brookhaven National Lab (BNL) review and the relevant sections of the Standard Review Plan (SRP).
IEEE 344 -2020	IEEE/IEC International Standard - Nuclear Facilities - Equipment Important to Safety - Seismic Qualification	The 2020 version provides some newer seismic spectra that included new industry research and improved testing criteria.
ASME QME-1 (2023)	Qualification of Active Mechanical Equipment Used in Nuclear Power Plants	The NRC is processing a RG to endorse the 2023 version without comment.
IEEE 323 -2016	IEEE Standard for Qualifying Class IE Equipment for Nuclear Power Generating Stations	The 2016 version is needed for harsh environment qualifications.
IEEE 1012-2016	Standard for System, Software, and Hardware Verification and Validation	IEEE 1012-2016 is compatible with all life cycle models (e.g., system, software, and hardware); however, not all life cycle models use all of the processes listed in the standard. Verification and validation (V&V) processes determine whether the development of products of a given activity conform to the requirements of that activity and whether the product satisfies its intended use and user needs. The standard approaches V&V from a systems perspective which is more representative of modern development.

Standard	Title	Reason for Consideration
IEEE 338-2012	Standard for Criteria for the Periodic Surveillance Testing of Nuclear Power Generating Station Safety	This is a useful version for digital I&C systems with self-testing features to be credited in lieu of manual surveillance testing.
IEEE 379-2014	Standard Application of the Single Failure Criterion to Nuclear Power Generating Station Safety Systems	This version provides clarifications on probabilistic assessments.
IEEE 384 -2018	Standard Criteria for Independence of Class 1E Equipment and Circuits	This is a useful version for digital I&C systems using fiber optic cables.
IEEE 828 -2012	Standard for Software Configuration Management Plans	IP-65001.10 uses IEEE 828 -2012
IEEE Std 7-4.3.2-2016	IEEE Standard Criteria for Programmable Digital Devices in Safety Systems of Nuclear Power Generating Stations	Required to support use of IEEE Std 603-2018. The NRC Staff review of RG 1.152 R3, Criteria for Use of Computers in Safety Systems of Nuclear Power Plants, states: *"Based on results of the periodic review, a revision to RG 1.152, Revision 3, is warranted. The update to RG 1.152 is a high priority based on recent licensing experience and interactions with stakeholders on the IEEE Working Group that contributed to the update to IEEE Std 7-4.3.2 in 2016. RG 1.152 is one of the primary RGs used by applicants and licensees in the development of digital instrumentation and controls (I&C) license applications, reactor certifications, and digital I&C topical reports."*
IEEE/ISO/IEC 29148 -2018	ISO/IEC/IEEE International Standard - Systems and software engineering -- Life cycle processes -- Requirements Engineering	This version contains verbiage allowing for outside guidance and improved adherence to modern software cycles.
ASME AG-1 - 2019	Code on Nuclear Air and Gas Treatment	Defines code of construction for applicable mechanical plant equipment.
ASME B31.1-2022	Power Piping	Defines code of construction for applicable mechanical plant equipment.
ASME B31.3-2020	Process Piping	Defines code of construction for applicable mechanical plant equipment.
ASME BPVC Section VIII Division 1 (2021)	Rules for Construction of Pressure Vessels	Defines code of construction for applicable mechanical plant equipment.

Standard	Title	Reason for Consideration
ASME BPVC Section VIII Division 2 (2021)	Rules for Construction of Pressure Vessels	Defines code of construction for applicable mechanical plant equipment.
TEMA 10th Edition, 2019	Tubular Exchanger Manufacturers Association (TEMA)	Standards provide industry guidelines for heat exchanger design and manufacturing.

Table 7 lists standards currently intended for use that did not have previous versions accepted in other NRC RGs and the reason for considering them for use.

Table 7. Standards with No Previous NRC Acceptance Found in a RG

Standard or Code Case	Title	Reason for Consideration
ASCE 43-19	Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities	ASCE 43-19 provides guidance for aspects of seismic design and is used in conjunction with ASCE 4-16. ASCE 43-19 was reviewed in BNL-220722-2020-INRE which was issued under NRC RIL 2021-05 "Evaluation of ASCE 4-16 and ASCE 43-18 (Draft) for Use in the Risk-Informed, Performance-Based Seismic Design of Nuclear Power Plant Structures, Systems, and Components" and was found to "provide an appropriate framework for the seismic design of SSCs at nuclear power plants using an RIPB approach. However, some of the criteria in these standards warrant exceptions, qualifications, or clarifications." Therefore, the guidance of ASCE 43-19 may be used with reference to the BNL review and the relevant sections of the SRP.
IBC-2021	International Building Code	IBC-2021 is consistent with State of Wyoming building code endorsement and will be used to design and build non-safety-related with special treatment (NSRST) and non-safety-related (NST) structures except where existing NRC guidance directs otherwise. Examples of latter include RG 1.189 Revision 3, “Fire Protection for Nuclear Power Plants,” and RG 1.54 Revision 3, “Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants.”

Standard or Code Case	Title	Reason for Consideration
ASCE 7-16 w/Supplement 1	Minimum Design Loads and Associated Criteria for Structures and Other Structures	This standard is used in concert with IBC-2021 for NST SSCs. It will be used for seismic design and qualification of NSRST SSCs, consistent with the approach used in RG 1.143 R2 for Hazard Radwaste SSCs.
ACI 318-19	Building Code Requirements for Structural Concrete	This standard is used in concert with IBC-2021 for NST SSCs. It will be used for seismic design and qualification of NSRST SSCs.
AISI S100-16 w/S2-20	North American Specification for the Design of Cold-Formed Steel Structural Members with Supplement 2, 2020 Edition	This standard is used in concert with IBC-2021 for NST SSCs.
IEEE 1023-2020	IEEE Recommended Practice for the Application of Human Factors Engineering to Systems, Equipment, and Facilities of Nuclear Power Generating Stations and Other Nuclear Facilities, Institute of Electrical and Electronics Engineers	This standard is considered to have the current best practices in human engineering.
IEEE 1228-1994	Software Safety Plans	IP-65001.10 uses IEEE 1228-1994.
IEEE 577-2022	Standard Requirements for Reliability Analysis in the Design and Operation of Safety Systems for Nuclear Power Generating Stations and Other Nuclear Facilities	NRC staff noted a planned RG to endorse IEEE 577 in Regulatory Guidance Framework for IEEE Electrical Standards public meeting (ML20282A508).
IEEE 730-2002	IEEE Standard for Quality Assurance Processes	IP-65001.10 uses IEEE 730-2002.
API RP 520-10th edition 2020	Sizing, Selection, and Installation of Pressure-Relieving Devices	This standard has information not covered by American Society of Mechanical Engineers (ASME) standards that is applicable to the Natrium technology.
ASME PTC 19.2-2010 (R2020)	Pressure Measurement	Describes standards for applicable Nuclear Island plant equipment.
ASME PTC 19.1-2018	Test Uncertainty	Describes standards for applicable Nuclear Island plant equipment.

Standard or Code Case	Title	Reason for Consideration
ASME PTC 19.5-2004 (R2013)	Flow Measurement	Describes standards for applicable Nuclear Island plant equipment.
MSS SP-42-2013	Corrosion-Resistant Gate, Globe, Angle, and Check Valves with Flanged and Butt Weld Ends	Describes standards for applicable Nuclear Island plant equipment.
MSS SP-61-2019	Pressure Testing of Valves	Describes standards for applicable Nuclear Island plant equipment.
NEI 20-07 (Latest draft version is May 2021)	Guidance for Addressing Software Common Cause Failure in High Safety-Significant-Related Digital I&C Systems	This version is required for PRA analysis of Reactor Protection System.
N-924	Design Rules and Limits for Load-Controlled Stresses for Class A Components at Elevated Temperature Service Using Elastic-Perfectly Plastic and Simplified Inelastic Analyses Section III, Division 5	Code case to be used for component stress analysis.

Table 8 lists standards currently intended for use that did not have previous versions accepted in other NRC RGs and are related to sodium applications. The scope of the standards are also listed in Table 8.

Table 8. Standards with No Previous NRC Acceptance Found - Sodium Related

Standard	Title	Scope of Standard
NFPA 484	Standard for Combustible Metals (for guidance only)	This standard is applicable for guidance. It is not in RG 1.189 Revision 4, but it will be used for guidance in sodium areas.
ASTM C1055-20	Standard Guide for Heated System Surface Conditions that Produce Contact Burn Injuries	This standard is required for high temperature sodium containing systems.
RDT-A-1-5T (Amendment 1, 2-12-1990)	Purity Requirements for Operating Sodium Reactors	This standard establishes the minimum purity requirements for sodium and cover gas that shall be maintained in operating sodium reactor systems. The standard also specifies the purity control procedures and methods of sampling and analysis to meet these requirements.

Standard	Title	Scope of Standard
RDT-C-12-1T (11-1973)	Gas Chromatograph System for Sodium Cover Gas Service	This standard establishes the requirements for the application engineering, materials, quality assurance, fabrication, examination, acceptance testing and delivery of a gas chromatograph system (including analyzer section and control and readout section) for the continuous on-line measurement of trace impurities in the inert gas used as a cover for liquid sodium.
RDT-C-8-8T (7-1-1977)	Specimen Equilibration Device	This standard establishes the requirements for the design, materials, fabrication, quality assurance, examination, and acceptance testing of an equilibration and sampling device and auxiliary equipment for service in radioactive or nonradioactive liquid sodium. The device can be used alone as a step in the analysis for nonmetallic impurities in sodium, or it can be used for calibration, in parallel with meters monitoring the activities in sodium of oxygen (RDT C 8-5), hydrogen (RDT C 8-6), and carbon (RDT C 8-7).
RDT-E-1-11T (7-1-1973)	Rupture Disk Devices for Liquid Metal Systems	This standard delineates the requirements for rupture disk devices for installation in inert gas or liquid metal systems and related facilities for protection against overpressure or leakage.
RDT-E-11-2T (1-1-1973)	Filters for Sodium Service	This standard establishes the requirements for either filter or strainer assemblies to remove solids from liquid sodium. These assemblies may consist of a filter or strainer element only or a housing element and appurtenances. If an assembly component functions as a pressure-retaining boundary, the requirements of this standard are met by construction in accordance with Class 1 or 2 of the ASME Boiler and Pressure Vessel Code, Section III, Nuclear Power Plant Components, as supplemented by RDT E 15-2.

Standard	Title	Scope of Standard
RDT-E-1-18T (1-1-1976)	Class 1 Valves for Liquid Metal Service	This standard establishes the requirements for throttle, isolation, and check valve assemblies for liquid metal service constructed in accordance with the Class 1 requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 1, Nuclear Power Plant Components, and special requirements that are additive or more restrictive. These valves are for applications in which the valve passes or stops the flow of liquid metal coolant in a nuclear reactor primary or secondary heat transfer system, or for other applications in which the valve is subject to severe operating conditions and where loss of function may impair the safety of the system in which the valve is installed.
RDT-E-1-19T (6-1-1974)	Class 2 Valves for Liquid Metal Service	This standard establishes the requirements for performance, design, fabrication, handling, marking, cleaning, packaging, shipping, testing, inspection, and quality assurance of austenitic stainless steel valves for use in high-temperature liquid metal systems. Class 2 valves specified in this standard are in accordance with the ASME Boiler and Pressure Vessel Code, Section III.
RDT-E-4-14T (1-1-1972)	Vapor Trap Assemblies for Sodium Service	This standard delineates the requirements for the design, fabrication, quality assurance and shipment of vapor trap assemblies for use where removal of sodium vapor, fog and other aerosols from an inert gas cover stream is required to prevent plugging of downstream lines by solid sodium and to protect downstream equipment from its effects.
RDT-E-4-5T (1-1-1976)	Forced-Circulation Cold Trap Assemble for Removal of Sodium Impurities	This standard delineates the requirements for the design, materials, fabrication, examination, acceptance testing, and delivery of a cold trap assembly to remove impurities from liquid sodium by crystallization.

Standard	Title	Scope of Standard
RDT-F-3-40T (1-1-1973)	Method for Analysis of Sodium and Cover Gas	This standard provides the sampling and analytical procedures that are to be used in implementing operating and purchase purity specifications for sodium and cover gas. It provides procedures for the following: 1. Analysis of sodium and cover gas from reactor primary, secondary, and auxiliary loop systems and from large and small test and experimental system. 2. Analysis of purchased sodium. 3. Analysis of purchased cover gas. 4. Treatment of data. 5. Packaging of samples for shipment or storage.
RDT-M-13-1T (1-1-1973)	Sodium Purchase Specifications	This standard establishes purity, quality assurance, and delivery requirements for the procurement of bulk sodium intended for use in sodium cooled fast breeder reactors and for use in nonreactor test and experimental systems in the Fast Breeder Reactor (FBR) program.
RDT-M-14-2T (1-1-1972)	Fuel and Control Assembly Tag Gas	This standard establishes the requirements for tag gas to be used for locating failed driver fuel pins and control rod absorber pins in the reactor by the failure monitoring system.

Table 9 lists codes, standards, and code cases currently intended for use that are currently approved by the NRC.

Table 9. Codes, Standards, and Code Cases Currently Approved by the NRC

Standard or Code Case	Title
ACI 349.1-R-07	Reinforced Concrete Design for Thermal Effects on Nuclear Power Plant Structures
ACI 349-13	Code Requirements for Nuclear Safety-Related Concrete Structures and Commentary
ANSI/AISC 360-16	Specification for Structural Steel Buildings
ASCE 37-14	Design Loads on Structures During Construction
ASTM D5163-16 (2021)	Standard Guide for Establishing a Program for Condition Assessment of Coating Service Level I Coating Systems in Nuclear Power Plants

Standard or Code Case	Title
ASTM D3911-16 (2021)	Standard Test Method for Evaluating Coatings Used in Light-Water Nuclear Power Plants at Simulated Design-Basis Accident Conditions
ASTM D3912-10 (2017)	Standard Test Method for Chemical Resistance of Coatings and Linings for Use in Nuclear Power Plants
ASTM D4082-10 (2017)	Standard Test Method for Effects of Gamma Radiation on Coatings for Use in Nuclear Power Plants
ASTM D5144-08 (2021) Last current: Feb 26, 2021	Standard Guide for Use of Protective Coating Standards in Nuclear Power Plants
ASTM D7167-12 (2018)	Standard Guide for Establishing Procedures to Monitor the Performance of Safety-Related Coatings Service Level III Lining Systems in an Operating Nuclear Power Plant
ASTM D7230-06 (2021)	Standard Guide for Evaluating Polymeric Lining Systems for Water Immersion in Coating Service Level III Safety-Related Applications on Metal Substrates
NEI 07-13 Rev. 8	Methodology for Performing Aircraft Impact Assessments for New Plant Designs
UFC 3-340-02 (12/5/2008)	Structures to Resist the Effects of Accidental Explosions
ANSI/AISC N690-18	Specification for Safety-Related Steel Structures for Nuclear Facilities
IEEE 1050-2004	Guide for Instrumentation and Control Equipment Grounding in Generating Stations
IEEE 308 -2001	Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations
IEEE 338-1987	Standard Criteria for the Periodic Surveillance Testing of Nuclear Power Generating Station Safety Systems
IEEE 344 -2013	IEEE Standard for Seismic Qualification of Equipment for Nuclear Power Generating Stations
IEEE 379-2000	Standard Application of the Single Failure Criterion to Nuclear Power Generating Station Safety Systems
IEEE 384-1992	Standard Criteria for Independence of Class 1E Equipment and Circuits
IEEE 485-2010	IEEE Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications

Standard or Code Case	Title
IEEE 535-2013	IEEE Standard for Qualification of Class 1E Vented Lead Acid Storage Batteries for Nuclear Power Generating Stations (Note: (This standard is used for intent only - as applicable to Valve Regulated Lead-Acid (VRLA) batteries)
IEEE 572-2019	IEEE Standard for Qualification of Class 1E Connection Assemblies for Nuclear Power Generating Stations
IEEE 603-1991	IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations
IEEE 665-1995 (reaffirmed 2001)	Guide for Generation Station Grounding
IEEE 666-1991	IEEE Design Guide for Electric Power Service Systems for Generating Stations
IEEE 741 -2007	IEEE Standard for Criteria for the Protection of Class 1E Power Systems and Equipment in Nuclear Power Generating Stations
IEEE 80-2000	IEEE Guide for Safety in AC Substation Grounding
IEEE C62.23-1995 (reaffirmed 2001)	IEEE Application Guide for Surge Protection of Electric Generating Plants
ANSI/ANS 6.4-2006	Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants
ASTM E1005-84	Standard Test Method for Application and Analysis of Radiometric Monitors for Reactor Vessel Surveillance
ASTM E1018-95	Standard Guide for Application of ASTM Evaluated Cross Section Data File, Matrix E 706 (IIB)
ASTM E1297-89	Standard Test Method for Measuring Fast-Neutron Reaction Rates by Radioactivation of Niobium
ASTM E181-82	Standard General Methods for Detector Calibration and Analysis of Radionuclides
ASTM E482-89	Standard Guide for Application of Neutron Transport Methods for Reactor Vessel Surveillance, E 706 (IID)
ASTM E488/E488M-15	Standard Test Methods for Strength of Anchors in Concrete Elements
ASTM E523-87	Standard Test Method for Measuring Fast-Neutron Reaction Rates by Radioactivation of Copper
ASTM E526-87	Standard Test Method for Measuring Fast-Neutron Reaction Rates by Radioactivation of Titanium
ASTM E704-90	Standard Test Method for Measuring Reaction Rates by Radioactivation of Uranium-238

Standard or Code Case	Title
ASTM E705-90	Standard Test Method for Measuring Reaction Rates by Radioactivation of Neptunium-237
ASTM E844-86	Standard Guide for Sensor Design and Irradiation for Reactor Surveillance, E 706 (IIC)
ASTM E854-90	Standard Test Method for Application and Analysis of Solid State Track Recorder (SSTR) Monitors for Reactor Surveillance, E 706 (IIIB)
ASTM E910-95	Standard Test Method for Application and Analysis of Helium Accumulation Fluence Monitors for Reactor Vessel Surveillance, E 706 (IIIB)
IEEE 610.12 1990	Standard Glossary of Software Engineering Terminology
NBSIR 85-3151	Compendium of Benchmark Neutron Fields for Reactor Dosimetry
ORNL/TM-10651 (12/1987)	Pressure Vessel Fluence Analysis and Neutron Dosimetry, NUREG/CR-5049
ACI 355.2-07	Qualification of Post-Installed Mechanical Anchors in Concrete and Commentary
ANSI 45.2.4-1972/IEEE Std 336-1971	IEEE Standard Installation, Inspection, and Testing Requirements for Instrumentation and Electric Equipment During the Construction of Nuclear Power Generating Stations
ANSI/ANS 6.3.1-1987	Program for Testing Radiation Shields in Light Water Reactors
ASTM C692-13(2018)	Standard Test Method for Evaluating the Influence of Thermal Insulation on External Stress Corrosion Cracking Tendency of Austenitic Stainless Steel
ASTM E119 (Latest version within 6 months of CPA)	Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E814-13a(2017)	Standard Test Method for Fire Tests of Penetration Firestop Systems
EPRI TR-107330 (Dec. 1996)	Generic Requirements Specification for Qualifying a Commercially Available PLC for Safety-Related Applications in Nuclear Power Plants
IEEE Std. 634 (Latest version within 6 months of CPA)	IEEE Standard Cable Penetration Fire Stop Qualification Test
IEEE 323-2003	IEEE Standard for Qualifying Class IE Equipment for Nuclear Power Generating Stations (Note: to be used for mild conditions)

Standard or Code Case	Title
IEEE 382-2006 (intent only, no safety related actuators)	IEEE Standard for Qualification of Safety-Related Actuators for Nuclear Power Generating Stations and Other Nuclear Facilities
IEEE 649-2006	IEEE Standard for Qualifying Class 1E Motor Control Centers for Nuclear Power Generating Stations (Note: Intent only since Natrium is not anticipated to have safety related MCCs)
IEEE 650-2006	IEEE Standard for Qualification of Class 1E Static Battery Chargers and Inverters for Nuclear Power Generating Stations (Note: (intent only since Natrium is not expected to have safety related battery chargers and inverters)
IEEE C37.98-2013	IEEE Standard for Seismic Qualification Testing of Protective Relays and Auxiliaries for Nuclear Facilities
IEEE C62.41.1-2002	IEEE Guide on the Surge Environment in Low-Voltage AC Power Circuits
IEEE C62.41.2-2002	IEEE Recommended Practice on Characterization of Surges in Low-Voltage AC Power Circuits
IEEE C62.45-2002	IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage
IEEE Std. 1202 (Latest version within 6 months of CPA)	IEEE Standard for Flame Testing of Cables for Use in Cable Trays in Industrial and Commercial Occupancies
ANSI/IEEE C.2 (version within 6 months of CPA)	National Electrical Safety Code
IEEE Std. 242 -2001 (version within 6 months of CPA)	IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
IEEE Std. 383-2003	IEEE Standard for Type Test of Class IE Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations
IEEE Std. 835 (version within 6 months of CPA)	Standard Power Cable Ampacity Tables
ASTM D2859 (version within 6 months of CPA)	Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials
NEI 00-01 Rev. 4 (version within 6 months of CPA)	Guidance for Post-Fire Safe-Shutdown Circuit Analysis
NFPA 1 (version within 6 months of CPA)	Uniform Fire Code Handbook (for guidance only)

Standard or Code Case	Title
NFPA 10 (version within 6 months of CPA)	Standard for Portable Fire Extinguishers
NFPA 11 (version within 6 months of CPA)	Standard for Low-, Medium-, and High-Expansion Foam
NFPA 1144 (version within 6 months of CPA)	Standard for Reducing Structure Ignition Hazards from Wildland Fire
NFPA 12 (version within 6 months of CPA)	Standard on Carbon Dioxide Extinguishing Systems
NFPA 12A (version within 6 months of CPA)	Standard on Halon 1301 Fire Extinguishing Systems
NFPA 13 (version within 6 months of CPA)	Standard for the Installation of Sprinkler Systems
NFPA 14 (version within 6 months of CPA)	Standard for the Installation of Standpipe and Hose Systems
NFPA 1404 (version within 6 months of CPA)	Standard for Fire Service Respiratory Protection Training
NFPA 1410 (version within 6 months of CPA)	Standard on Training for Initial Emergency Scene Operations (for guidance only)
NFPA 15 (version within 6 months of CPA)	Standard for Water Spray Fixed Systems for Fire Protection
NFPA 1500 (version within 6 months of CPA)	Standard on Fire Department Occupational Safety and Health Program (for guidance only)
NFPA 16 (version within 6 months of CPA)	Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems
NFPA 1620 (version within 6 months of CPA)	Recommended Practice for Pre-Incident Planning (for guidance only)
NFPA 1961 (version within 6 months of CPA)	Standard on Fire Hose
NFPA 1962 (version within 6 months of CPA)	Standard for the Inspection, Care, and Use of Fire Hose, Couplings, and Nozzles and the Service Testing of Fire Hose
NFPA 20 (version within 6 months of CPA)	Standard for the Installation of Stationary Pumps for Fire Protection
NFPA 2001 (version within 6 months of CPA)	Standard for Clean Agent Fire Extinguishing Systems
NFPA 204 (version within 6 months of CPA)	Standard for Smoke and Heat Venting

Standard or Code Case	Title
NFPA 22 (version within 6 months of CPA)	Standard for Water Tanks for Private Fire Protection
NFPA 220 (version within 6 months of CPA)	Standard on Types of Building Construction
NFPA 221 (version within 6 months of CPA)	Standard for High Challenge Fire Walls and Fire Barrier Walls (for guidance only)
NFPA 24 (version within 6 months of CPA)	Standard for the Installation of Private Fire Service Mains and their Appurtenances
NFPA 25 (version within 6 months of CPA)	Standard for Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
NFPA 251 (version within 6 months of CPA)	Standard Methods of Tests of Fire Resistance of Building Construction and Materials
NFPA 253 (version within 6 months of CPA)	Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
NFPA 259 (version within 6 months of CPA)	Standard Test Method for Potential Heat of Building Material
NFPA 30 (version within 6 months of CPA)	Flammable and Combustible Liquids Code
NFPA 51B (version within 6 months of CPA)	Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
NFPA 54 (version within 6 months of CPA)	National Fuel Gas Code
NFPA 55 (version within 6 months of CPA)	Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks
NFPA 58 (version within 6 months of CPA)	Liquefied Petroleum Gas Code
NFPA 600 (version within 6 months of CPA)	Standard on Industrial Fire Brigades
NFPA 70 (version within 6 months of CPA)	National Electrical Code
NFPA 701 (version within 6 months of CPA)	Standard Methods of Fire Tests for Flame Propagation of Textiles and Films
NFPA 703 (version within 6 months of CPA)	Standard for Fire-Retardant Treated Wood and Fire-Retardant Coatings for Building Materials (for guidance only)

Standard or Code Case	Title
NFPA 72 (version within 6 months of CPA)	National Fire Alarm Code
NFPA 75 (version within 6 months of CPA)	Standard for the Protection of Information Technology Equipment (for guidance only)
NFPA 750 (version within 6 months of CPA)	Standard on Water Mist Fire Protection Systems
NFPA 80 (version within 6 months of CPA)	Standard for Fire Doors and Other Opening Protectives
NFPA 80A (version within 6 months of CPA)	Recommended Practice for Protection of Buildings from Exterior Fire Exposures (for guidance only)
NFPA 90A (version within 6 months of CPA)	Standard for the Installation of Air-Conditioning and Ventilating Systems
UL Std. 555 (version within 6 months of CPA)	Fire Dampers
ANSI/ANS 57.1, 1992	Design Requirements for Light Water Reactor Fuel Handling Systems.
ANSI/ANS 57.2, 1983	Design Requirements for Light Water Reactor Spent Fuel Storage Facilities at Nuclear Power Plants
ANSI N14.6-1993	Radioactive Materials - Special Lifting Devices for Shipping Containers Weighing 10 000 Pounds (4500 kg) or More
(ANSI) N14.5-2014	American National Standard for Radioactive Materials—Leakage Tests on Packages for Shipment
ANS 2.2-2016	Earthquake Instrumentation Criteria for Nuclear Power Plants
ANSI/ANS 2.5-1984	Determining Meteorological Information at Nuclear Power Sites
ANSI/ISA 67.04.01-2018	Setpoints for Nuclear Safety-Related Instrumentation
EPRI TR-102260 -2014	Plant Engineering: Guideline for the Acceptance of Commercial-Grade Items in Nuclear Safety-Related Applications
IEC 61000-3 (2017)	Electromagnetic Compatibility (EMC) - Part 3: Limits
IEC 61000-4 (2012)	Electromagnetic Compatibility (EMC) - Part 4: Testing and Measurement Techniques”
IEC 61000-6 (2011)	Electromagnetic Compatibility (EMC) - Part 6: Generic Standards
IEEE 1008- 1987	Standard for Software Unit Testing
IEEE 1028-2008	Standard for Software Reviews and Audits

Standard or Code Case	Title
IEEE 1050-2004	Guide for Instrumentation and Control Equipment Grounding in Generating Stations
IEEE 1074-2006	Standard for Developing Software Life Cycle Processes
IEEE 497-2016	Standard Criteria for Accident Monitoring Instrumentation for Nuclear Power Generating Stations
IEEE 829 -2008	IEEE Standard for Software and System Test Documentation
ISA 5.1 -2022	Instrumentation Symbols and Identification
ISA 67.02.01-2014	Nuclear Safety-Related Instrument Sensing Line Piping and Tubing Standard for Use in Nuclear Power Plants
MIL-STD-461G (NRC does not identify version endorsed, latest version appears to be 12-11-2015)	Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment
ANS 2.23- 2016	Nuclear Power Plant Response to an Earthquake
ANSI/ANS 3.4-2013	Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants
ANSI/ANS 3.5-2009	Nuclear Power Plant Simulators for Use in Operator Training and Examination
FEMA-REP-10 (Nov. 1985)	Guide for Evaluation of Alert and Notification Systems for Nuclear Power Plants
NEI 10-05 Rev. 0	Assessment of On-Shift Emergency Response Organization Staffing and Capabilities
NEI 97-04 Appendix B	Guidelines and Examples for Identifying 10 CFR 50.2 Design Bases
NEI 98-03 Rev. 1	Guidelines for Updating Final Safety Analysis Reports
NEI 99-01 Rev. 5	Methodology for Development of Emergency Action Levels
ASTM D3286 (Latest version within 6 months of CPA)	Standard Test Method for Gross Calorific Value of Coal and Coke by the Isoperibol Bomb Calorimeter
ASTM E84-22 (version within 6 months of CPA)	Standard Test Method for Surface Burning Characteristics of Building Materials
ANSI N271-1976	Containment Isolation Provisions for Fluid Systems
ASME BPVC Section III, Division I - 2017	BPVC Section III-Rules for Construction of Nuclear Facility Components-Division 1-Subsection NE-Class MC Components

Standard or Code Case	Title
ASME BTH-1–2017	Design of Below-the-Hook Lifting Device
ASME N509-2002	Nuclear Power Plant Air-Cleaning Units and Components
ASME NML-1-2019	Rules for the Movement of Loads Using Overhead Handling Equipment in Nuclear Facilities
ASME NOG-1-2020	Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder)
ASME OM (2020)	Operation and Maintenance of Nuclear Power Plants
ASME Section III, Division 5- 2017	ASME Boiler and Pressure Vessel Code Section III - Rules for Construction of Nuclear Facility Components - Division 5-High Temperature Reactors
ASTM C795-08 (2018)	Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel
ASTM D 5144-08 (2016)	Standard Guide For Use Of Protective Coating Standards In Nuclear Power Plants
N210-1976/ANS-57.2-1983	Design Requirements for Light Water Reactor Spent Fuel Storage Facilities at Nuclear Power Plants
NEI 99-03 Rev. 0	Control Room Habitability Assessment Guidance
Code Case N-861	Satisfaction of Strain Limits for Division 5 Class A Components at Elevated Temperature Service Using Elastic-Perfectly Plastic Analysis
Code Case N-862	Calculation of Creep-Fatigue for Division 5 Class A Components at Elevated Temperature Service Using Elastic-Perfectly Plastic Analysis
ASME BPVC Section XI Division 2- 2019	Rules for Inservice Inspection of Nuclear Power Plant Components, Division 2, Requirements for Reliability and Integrity Management (RIM) Programs for Nuclear Power Plants
ASME BPVC Section XI Division 1- 2019	Rules for Inservice Inspection of Nuclear Power Plant Components, Division 1, Requirements for Reliability and Integrity Management (RIM) Programs for Nuclear Power Plants
Revision 1 to EPRI NP-5652 and TR-102260 EPRI Product ID 3002002982	Plant Engineering: Guideline for the Acceptance of Commercial-Grade Items in Nuclear Safety-Related Applications
ANSI/ANS 2.23-2016	Criteria for Retrieval, Processing, Handling, and Storage of Records from Nuclear Facility Seismic Instrumentation
ANSI/ANS 3.1-2014	Selection, Qualification, and Training of Personnel for Nuclear Power Plants

Standard or Code Case	Title
ANSI/ANS 3.2-2012	Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants
ASME NQA-1-2015	Quality Assurance Program Requirements for Nuclear Facilities
Section C.4 of BTP CMEB 9.5-1, Rev. 2	Guidelines for Fire Protection for Nuclear Power Plants
ANSI N323D - 2002	Installed Radiation Protection Instrumentation
ANSI N42.14 - 1999	American National Standard for Calibration and Use of Germanium Spectrometers for the Measurement of Gamma-Ray Emission Rates of Radionuclides
NUMARC 91-06 Rev. 4D	Guidelines for Industry Actions to Assess Shutdown Management Note: (Intent only for safety-related (SR) and NSRST SSCs)
NUMARC 93-01 Rev. 4F	Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants Note: (Intent only for SR and NSRST SSCs)

5 REFERENCES

Reference Number	Reference
1	U.S. NRC, “Review of Risk-Informed, Technology Inclusive Advanced Reactor Applications – Roadmap Interim Staff Guidance,” December 2021.

END OF DOCUMENT