U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Public Meeting to Discuss DG-1436 “Acceptability of ASME Code Section III Division 5 for High-Temperature Reactors”, proposed Revision 3 of Regulatory Guide 1.87

February 21, 2025

Meeting Logistics

Microsoft Team Platform

Raise hand feature

Bridge Line: *6

Meeting Type:

Observation Meeting.

- ✓ The purpose of this type of meeting is for the NRC to meet with representatives from one or more groups in an open and transparent manner to discuss regulatory and technical matters. The meeting will inform the public by providing information to help them understand the applicable regulatory issues and NRC actions.

- ✓ Attendees will have an opportunity to ask questions of the NRC staff or make comments about the issues discussed following the business portion of the meeting;.

Meeting Purpose:

- To provide an opportunity for any clarifications which may be needed related to the materials presented in or the comments submitted on DG-1436, “Acceptability of ASME Code Section III Division 5 for High-Temperature Reactors,” Proposed Revision 3 of Regulatory Guide 1.87.

Agenda

Time	Topic	Speaker
9:00 AM	Welcome and Introduction	Ramón L. Gascot
9:05 AM	Overview of NRC Regulatory Guide Purpose and Process	Meraj Rahimi Ramón L. Gascot
9:15 AM	Overview of DG-1436	Margaret Audrain Joseph Bass
9:35 AM	NEI Presentation on Public Comments on DG-1436	NEI
10: 35 AM	Open Discussion	All
10:55 AM	Closing Remarks	Meraj Rahimi
11:00 AM	Adjourn	

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Overview of DG-1436

Joseph Bass
Nuclear Regulatory Commission
2/21/2024

Public Meeting to Discuss DG-1436 “Acceptability of ASME Code Section III, Division 5 for High-Temperature Reactors,” proposed Revision 3 of Regulatory Guide 1.87

Background on DG 1436

Draft Regulatory Guide DG-1436 "Acceptability of ASME Code, Section IIII, Division 5, High Temperature Reactors"" is the proposed Revision 3 to Regulatory Guide 1.87 .

Project Manager: Ramon Gascot

Technical Leads: Margaret Audrain
Joseph Bass

RG 1.87 Contents:

- Endorsement of Section III, Division 5 of the ASME BPVC
- Endorsement of select nuclear Code Cases N-812-1, N-861-2, N-862-2, N-872, N-898-1, N-924, and N-940.
- Appendix A: High Temperature Reactor Quality Group Classification

Updates Incorporated in the Draft Guide

Changes from the 2017 to 2023 editions of III-5

- 215 tracked code changes
- 4 Major Additions/Updates in the DG
  - Composites rules added in HHB
  - Nonmandatory Appendix HBB-Z: Guidance on Constitutive Models for Design by Inelastic Analysis
  - Extension of Grade 91 properties to 500,000 hours
  - Added Code Cases N-812-1, N-924, N-940

Clarification changes were put into the DG, including Table A-1

Questions

DG-1436

"Acceptability of ASME Code Section III Division 5 for High-Temperature Reactors"

Proposed Rev 3 of RG 1.87

NRC Public Meeting
February 21, 2025

NUCLEAR ENERGY INSTITUTE

Key Discussion Topics

- Classification of NSRST SSCs
- Endorsement of Appendix HBB-Y
- Language in Table A-1
- Application of HAB-3220 and HAB
- Conditions on Code Case N-940

Classification of NSRST SSCs

Staff Regulatory Guidance 1(a)(1)

"This use would be subject to NRC review and approval in order to confirm that the risk significance of the NSRST SSC is sufficiently below that of safety-related SSCs and is consistent with the reliability and capability targets specified for the NSRST SSC."

- This statement, as written, implies the ability for the NRC to reopen and reconsider classification.
- How is this appropriate for applicants using an NRC-endorsed classification methodologies such as RG 1.233?
- Provided that an applicant used an approved methodology for classification, there should not be an additional review/acceptance of the classification of SSCs.
- Risk-significance is a critical aspect of SSC classification under NEI 18-04 and that process already considers uncertainties (NEI 18-04 Section 4.2.2) and cliff-edge effects (5.7.2).

Staff Regulatory Guidance 1(a)(1)

- NEI Suggests changing the language as follows:

  "The alternate requirements in these sections should not be applied to safety-related SSCs but may be appropriate for use for SSCs categorized as NSRST under RG 1.233 (Ref. 20). The technical justification for use of alternate requirements in these sections is subject to NRC approval. The NRC may review classification of NSRST SSCs in accordance with the approved methodology."

Endorsement of Appendix HBB-Y "Guidelines for Design Data Needs for New Materials"

Nonmandatory Appendix HBB-Y

- DG-1436 states

  "The NRC staff did not review Nonmandatory Appendix HBB-Y and therefore is not endorsing it."

- This decision not to review and endorse Nonmandatory Appendix HBB-Y has raised concerns among advanced reactor developers.
- This is a relatively short appendix, and this lack of review and endorsement limits material qualification pathways critical to streamlining future license applications.
- Industry strongly supports an NRC review and endorsement of this appendix to align regulatory guidance with practical material qualification needs. Endorsement of this appendix will streamline future license applications for advanced reactor developers

It is requested that NRC review and endorse this appendix as part of this Regulatory Guide.

If the staff cannot review and endorse this appendix, then specific reasons for non-endorsement should be provided to this basis to determine path forward.

Table A-1

RG 1.87 R2

Table A-1. Classification and Standards Applicable to Components in High Temperature Reactors

Classification Method	Component Classification		
Traditional	**Quality Group A**	**Quality Group B**	**Quality Group C**
Risk-Informed (10 CFR 50.69)[6]	**RISC-1**	**RISC-1**	**RISC-2, RISC-3**
Risk-Informed (RG 1.233)	**SR**	**SR**	**NSRST**
	SR Quality Design Standards		**Important to Safety Design Standards**
Components			
Pressure Vessels	ASME Code, Section III, Division 5, Class A	ASME Code, Section III, Division 5, Class B	ASME Code, Section VIII, Division 1 or Division 2[7]
Piping			ASME B31.1/B31.3[7]
Pumps			
Valves			ASME B31.1/B31.3[7]
Atmospheric Storage Tanks			
Storage Tanks (0-15 pounds per square inch gauge)			ASME Code, Section VIII, Division 1 or Division 2[7]
Metallic Core Support Structures	ASME Code, Section III, Division 5, Subsection HG	N/A	
Nonmetallic Core Support Structures	ASME Code, Section III, Division 5, Subsection HH	N/A	

7 These standards address design in high temperature environments and may be acceptable with appropriate justification. Applicants may propose alternate standards with appropriate justification.

DG-1436

Table A-1. Classification and Standards Applicable to Components in High Temperature Reactors

Classification Method	Component Classification		
Traditional	**Quality Group A**	**Quality Group B**	**Quality Group C**
Risk-Informed (10 CFR 50.69)[6]	**RISC-1**	**RISC-1**	**RISC-2, RISC-3**
Risk-Informed (RG 1.233)	**SR**	**SR**	**NSRST**
	SR Quality Design Standards		**Important to Safety Design Standards**
Components			
Pressure Vessels	ASME Code, Section III, Division 5, Class A	ASME Code, Section III, Division 5, Class B	ASME Code, Section III, Division 5 or Industrial Codes with appropriate justification[7]
Piping			ASME Code, Section III, Division 5 or Industrial Codes with appropriate justification[8]
Pumps			
Valves			ASME Code, Section III, Division 5 or Industrial Codes with appropriate justification[8]
Atmospheric Storage Tanks			
Storage Tanks (0-15 pounds per square inch gauge)			ASME Code, Section III, Division 5 or Industrial Codes with appropriate justification[7]
Metallic Core Support Structures	ASME Code, Section III, Division 5, Subsection HG	N/A	
Nonmetallic Core Support Structures	ASME Code, Section III, Division 5, Subsection HH	N/A	

7 These standards may include ASME Code, Section VIII, Division 1 and Division 2 with appropriate justification. Applicants may propose alternate standards with appropriate justification.

8 These standards may include ASME B31.1/B31.3 with appropriate justification. Applicants may propose alternate standards with appropriate justification.

Table A-1 Implications

- R2 seems to accept industrial codes with a qualifier in a footnote.
- Proposed R3 (DG-1436) moves “with appropriate justification” into the main body of the table and places a nuclear code in the table for NSRST.
- These changes imply an NRC preference for the nuclear code for NSRST SSCs.
- **NSRST, under LMP, is intended to rely on the use of industrial codes with special treatments, when needed, to meet reliability and capability targets.**
- No guidance provided on what meets the NRC’s expectation of “appropriate justification.” No identified gaps for where commercial codes may be insufficient are provided.

Table A-1 Implications

- Guidance in DG-1436 is particularly problematic in combination with the proposed Rule Language in 10 CFR 53.440(b) which requires NRC endorsed C&S for SR **and** NSRST SSCs.
- EPRI 3002023907 - "*Alternate Requirements for Construction of ASME Section III Division 5, Components Commensurate with their Contribution to Safety and Risk*" provides guidance on when ASME Section III Division 5 may be preferable to commercial C&S
- From RG 1.201
  - "…special treatment refers to those requirements that provide increased assurance **beyond normal industrial practices** that structures, systems, and components (SSCs) perform their design-basis functions."
- NRC should not imply that nuclear C&S are the expectation for NSRST SSCs. Industrial practices along with monitoring or other special treatment, as needed, are sufficient..

Intent and application of HAB-3220 and HAB

Application of HAB-3220 and HAB

- ASME Section III Division 5 Subsection HA General Requirements
  is purposely divided into
  - Subpart A for Metallic Materials
  - Subpart B for Graphite and Composite Materials
- The rules of Subsection HA and Subpart A are contained in Divisions 1 and 2, Subsection NCA, with certain exceptions and additions noted in HAA paragraphs.

- The rules of Subsection HA Subpart B were expressly developed as a stand-alone General Requirements for Graphite and Composite Materials, including only the NCA-9000 Glossary by reference.

Application of HAB-3220 and HAB

- ASME Section III Division 5 Subsection HA General Requirements is purposely divided into
  - Subpart A for Metallic Materials
  - Subpart B for Graphite and Composite Materials
- HAB-3220 addresses the Owner's responsibilities regarding Graphite and Composite Core Components and Assemblies and includes proper Code references.
- The only Owner responsibilities from HAA/NCA eliminated in HAB are not applicable to Graphite or Composite Components or Assemblies, specifically:
  - Overpressure protection
  - Division 2 requirements

Referencing the now-deleted NCA-3220 for Graphite or Composite Components or Assemblies is inappropriate

Application of HAB-3220 and HAB

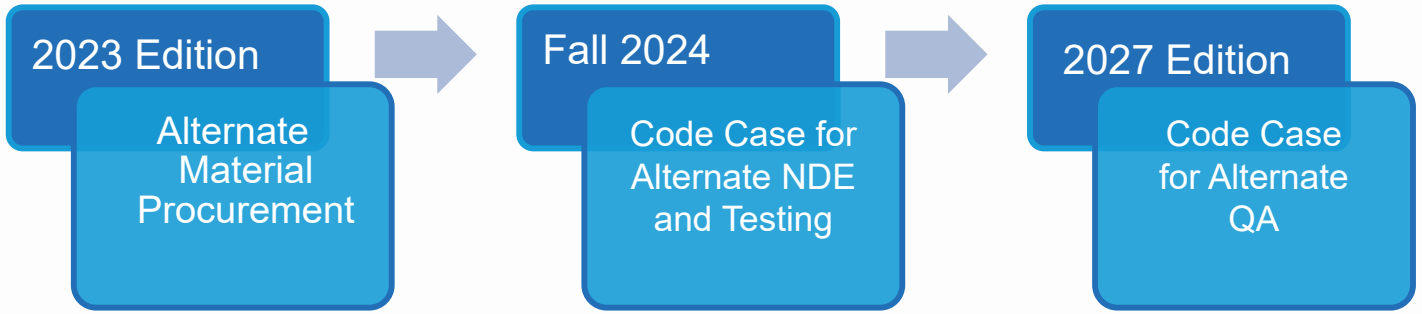
- Numerous NCA references cited apply only to the metallic portions of the reactor, which are covered in Division 5, Subsection HA, Subpart A.
- There are multiple references to provisions in NCA-3800, which was deleted from NCA in the 2023 Edition

  Notably, NCA-3842.2 (now NCA-3315.2) (h) and (i) are not appropriate or applicable to Graphite and Composite Core Components and Assemblies. Audit frequency is intentionally annual, and performance assessments are intentionally not permitted
- Division 5, Subsection HA, Subpart B has been reconciled, as appropriate, to the requirements of NCA in the 2021 Edition that are relevant to Graphite and Composite Materials.
- Those items that vary are mostly stylistic editorial differences since the 2017 Edition of NCA, or are requirements omitted because they do not apply to Graphite and Composite Core Components and Assemblies.

Conditions on Code Case N-940

Section III Alternate Requirements

- Scope: Items with minimum contribution to safety or risk
- Materials, Fabrication, and Examination Requirements
  - Code revisions for alternate material procurement
  - Code Case to permit alternate methods for NDE and testing
- Quality Requirements
  - Code Case for alternate quality requirements to Subsection NCA



Code Case N-940 Scope

- Alternate Non-destructive Examination (NDE) and Testing Requirements for Piping and Valves
  - Allow ultrasonic inspection for piping as an alternative to radiography
  - Allow random and progressive sampling for NDE of moderate energy piping
  - Allow system leak test as an alternative to hydrostatic leak test for moderate energy piping
  - Allow shorter hold times for valve pressure testing

DG-1436 Conditions on N-940

- Six conditions on the use of Code Case N-940 in DG-1436
- Possible enhancements to the Code Case identified through conditions
  1) Clarification on use of encoded UT
  2) Definition of moderate energy piping for non-light water applications
  3) Limitation on upper temperature limit for progressive random sampling

DG-1436 Conditions on N-940

- Six conditions on the use of Code Case N-940 in DG-1436
- Items with differing technical basis
  4) Use of Section V, Article 14
     - NRC justification is for safety significant items opposed to items with minimal contribution to safety or risk
     - No technical basis for imposing Article 14 of Section V instead of generalized performance demonstration requirements in industrial and nuclear codes
     - Condition is inconsistent with nuclear and industrial construction codes

DG-1436 Conditions on N-940

- Six conditions on the use of Code Case N-940 in DG-1436
- Items with differing technical basis
  5) 5% vs 50% sampling
     - NRC justification states “increased assurance” is needed; the special treatment is use of Section III design
     - No technical basis provided for 50% sample size
     - Requirement for statistical sampling to demonstrate acceptable sample size is beyond requirements in B31.3
     - Condition is inconsistent with industrial codes

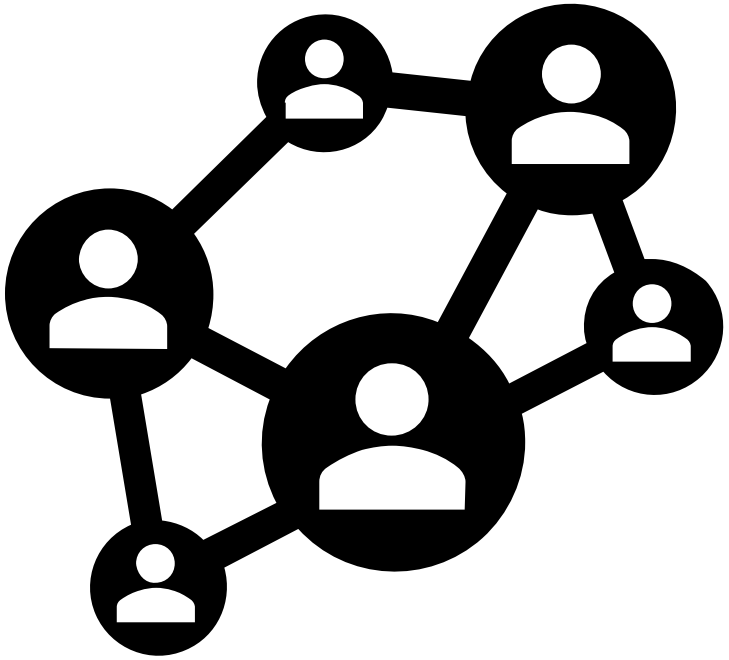
DG-1436 Conditions on N-940

- Six conditions on the use of Code Case N-940 in DG-1436
- Items with differing technical basis
  6) Use of system leak test “when other types of tests are not practical or when leak tightness is demonstrable due to the nature of the service.”
     - NRC justification states B31.1 as basis
     - Technical basis is inconsistent with B31.3, which is the likely code for NSRST piping systems

Questions and Discussion

Thank you

Open Discussion



Closing Remarks