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

Role of Appendix B to 10 CFR Part 50 in the NRC licensing process and pathways for meeting Appendix B

December 5-6, 2024

Washington, DC

Kerri Kavanagh
Quality Assurance & Vendor Inspection Branch
Office of Nuclear Reactor Regulation

Source of Quality

"Without a standard there is no logical basis for making a decision or taking action"

-Joseph M. Juran

- Quality starts at initial design.
- Designers determine classification of components.
- Appropriate quality measures are then applied based on the classification of structures, systems, and components.

General Design Criteria (GDC) Appendix A to 10 CFR Part 50

- Criterion 1 of Appendix A, "Quality Standards and Records," contains three fundamental quality assurance requirements, as follows:
  a) Structures, systems, and components important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed.
  b) A quality assurance program shall be established and implemented in order to provide adequate assurance that these structures, systems, and components will satisfactorily perform their safety functions.
  c) Appropriate records of the design, fabrication, erection, and testing of structures, systems, and components important to safety shall be maintained by or under the control of the nuclear power unit licensee throughout the life of the unit.

Principle Design Criteria (PDC) – Design Criteria for Non-Light Water Reactors

- GDC not applicable to non-light water reactors
- RG 1.232, "Developing Principal Design Criteria for Non-Light Water Reactors"
- Staff regulatory guidance Table 1, Non-Light Water Reactor Crosswalk provides guidance between GDC and PDC
- Regulatory position – GDC 1 should be used for PDC 1 for all designs
- Nothing has changed for QA

Guidance on Classification of Structures, Systems, & Components

- Part 50 or 52 applications - LWR
  - RG 1.26 "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants"
- 10 CFR 50.69, "Risk-informed categorization and treatment of structures, systems and components for nuclear power plants"
  - RG 1.201 "Guidelines for Categorizing Structures, Systems, and Components in Nuclear Power Plants According to Their Safety Significance.

Guidance on Classification of Structures, Systems, & Components

- Licensing Modernization Project (LMP)
  - Nuclear Energy Institute (NEI) 18-04,"Risk-Informed Performance-Based Guidance for Non-Light Water Reactor Licensing Basis Development," Revision 1
  - RG 1.233 "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"

Classifications

- Safety-Related – those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:
  1. The integrity of the reactor coolant pressure boundary
  2. The capability to shut down the reactor and maintain it in a safe shutdown condition; or
  3. The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the applicable guideline exposures set forth in § 50.34(a)(1) or § 100.11 of this chapter, as applicable.
- 10 CFR 50.69:
  - RISC 1 – Safety-Related SSCs that perform safety significant functions
  - RISC 2 – Nonsafety-Related SSCs that perform safety significant functions
  - RISC 3 – Safety-Related SSCs that perform low safety significant functions
  - RISC 4 – Nonsafety-Related SSCs that perform low safety significant functions
- Nonsafety-Related Special Treatment (NSRST) - SSCs relied on to perform risk-significant functions. Risk-significant SSCs are those that perform functions that prevent or mitigate any LBE from exceeding the F-C Target or make significant contributions to the cumulative risk metrics selected for evaluating the total risk from all analyzed LBEs

Graded Approach to Nuclear QA (Appendix B)

- Criterion II, "Quality Assurance Program," states in part:
  - "[…]This program shall be documented by written policies, procedures, or instructions and shall be carried out throughout plant life in accordance with those policies, procedures, or instructions.
  - The applicant shall identify the structures, systems, and components to be covered by the quality assurance program and the major organizations participating in the program, together with the designated functions of these organizations.
  - The quality assurance program shall provide control over activities affecting the quality of the identified structures, systems, and components, ***to an extent consistent with their importance to safety.[…]"***

Guidance for Implementing QA Programs

- NUREG 0800 "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition"
  - Chapter 17.5 "Quality Assurance Program Description - Design Certification, Early Site Permit and New License Applicants"
- RG 1.28 "Quality Assurance Program Criteria (Design and Construction)"
- RG 1.33 "Quality Assurance Program Requirements (Operation)"

State and Jurisdiction Requirements

Reminder –

- States and Jurisdictions have their own requirement for ASME code components with regards to quality.
- Applicants should be aware of those requirements for the location of the reactor site.
- In some cases, the State and Jurisdiction requirements maybe more limiting than the federal.

Kerri Kavanagh
Branch Chief
(301) 415-3743
Kerri.Kavanagh@nrc.gov

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