

**U.S. NRC**

UNITED STATES NUCLEAR REGULATORY COMMISSION

*Protecting People and the Environment*

# **NRC Participation and Perspectives on Codes and Standards for Nuclear Construction**

***Emerging Technologies in Civil Infrastructure***

***ACI Fall 2014 Convention – October 26, 2014***

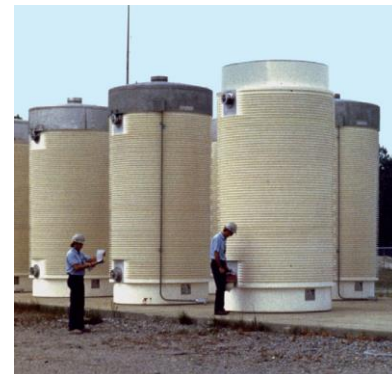
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*The views expressed herein are those of the author. They do not constitute an official position of the USNRC.*

- **The Energy Reorganization Act of 1974 established the independent U.S. Nuclear Regulatory Commission to regulate commercial uses of nuclear material; other duties of the former Atomic Energy Commission were assigned to the Department of Energy.**
- **The NRC is headed by four Commissioners and a Chairman, all appointed by the President and confirmed by the Senate for staggered five-year terms. No more than three can be from the same political party.**
- **The NRC has about 4000 staff members, at headquarters, 4 regional offices, and at power plant sites and fuel cycle facilities.**

**To license and regulate the nation's civilian use of byproduct, source and special nuclear materials to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment.**



# NRC Primary Functions

- **Establish rules and regulations**
- **Issue licenses**
- **Provide oversight through inspection, enforcement and evaluation of operational experience**
- **Conduct research to provide technical bases for regulatory decisions**
- **Respond to emergencies**



# Construction Inspection Program Objectives

- **Ensure that plants are constructed in accordance with approved designs and safety regulations**
- **Determine operational readiness**
- **Communicate results to all stakeholders**
- **Ensure effective transition to operating facility oversight program**

- **NRC inspects vendor performance for compliance with regulations**
- **NRC oversees licensee audits of vendors**
- **NRC does not certify, accredit, or endorse any vendor**
- **Focus on ensuring the integrity of the worldwide supply chain**
  - **Global supply chain**
  - **New reactor projects in the U.S. may employ multinational modular construction techniques**
  - **Concerns continue to arise regarding counterfeit items**
  - **Resources and access to oversee the global marketplace are critical**

# **NRC's Policies on Consensus Codes and Standards**

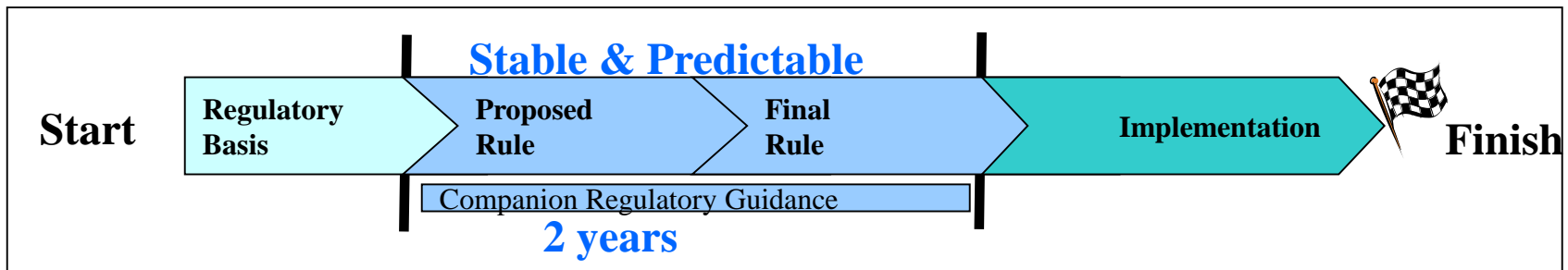
- **Integral to the regulatory process**
- **Promote safe operation of nuclear power plants, and improve effectiveness & efficiency of regulatory oversight**
- **Federal law requires Government staff to use consensus standards where possible**
  - **National Technology Transfer and Advancement Act of 1995**
  - **The Office of Management and Budget OMB Circular A-119**

- **The voluntary consensus standards process helps NRC to maintain and enhance:**
  - **Efficient rulemaking**
  - **Safe plant operation**
  - **Practical technical requirements**
  - **Cost-effective technology**



# NRC Endorsement Process: Rulemaking

- Most formal of NRC endorsement processes
- Standards endorsed in rulemaking process become licensee requirements
- Backfit Rule considered
- Includes public comment and rigorous reviews
- Takes 2-3 years to complete



# 10 CFR§50.55a

## Codes and Standards

- **Incorporates by reference and requires use of ASME Codes:**
  - ASME BPV Code, Section III, Div. 1 for nuclear design**
  - ASME BPV Code, Section XI , Div. 1 for in-service inspection**
  - ASME OM Code for in-service testing**
  - Specific Code Cases related to dissimilar-metal welds**
- **Approves, conditions, or disapproves use of ASME Code Cases, via 3 referenced Regulatory Guides**
  - Regulatory Guide 1.84 (Section III)**
  - Regulatory Guide 1.147 (Section XI)**
  - Regulatory Guide 1.192 (OM Code)**
- **Incorporates by reference two IEEE Standards for Nuclear Power Generating Stations:**
  - Standard 279 – Criteria for Protection Systems**
  - Standard 603-1991 – Criteria for Safety Systems**

# **NRC Endorsement Process: Regulatory Guides**

- **Describe methods that the staff considers acceptable for use in implementing specific parts of the agency's regulations**
- **Not substitutes for regulations; compliance with RGs is not required**
- **Typically have forward-fit applicability**
- **Best repository of the current staff position**
- **Includes advisory committee reviews and opportunities for public comment**
- **Takes 1-2 years to complete**
- **Majority of cited standards**

- **ACI 349, “Code Requirements for Nuclear Safety-Related Concrete Structures.”**
  - Endorsed for use by licensees in NRC RG 1.69, “Concrete Radiation Shields and Generic Shield Testing for Nuclear Power Plants”
  - Endorsed for use by licensees in NRC RG 1.142, “Safety-Related Concrete Structures for Nuclear Power Plants (Other than Reactor Vessels and Containments)”
  - Endorsed (in part) in NRC RG 1.199, “Anchoring Components and Structural Supports in Concrete”
- **ACI 359, “Code for Concrete Containments”**
  - Endorsed in RG 1.136, “Design Limits, Loading Combinations, Materials, Construction, and Testing of Concrete Containments”
  - Joint development committee with ASME Boiler & Pressure Vessel Code, Section III, Division 2

- **American Society of Civil Engineers (ASCE) 43-05, “Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities”**
  - Referenced in NRC Regulatory Guide 1.208, “A Performance-Based Approach to Define the Site-Specific Earthquake Ground Motion”
- **ANSI/AISC N690 (1994), “Specification for Design, Fabrication and Erection of Structural Steel for Building”**
  - Endorsed in RG 1.206, “Combined License Applications for Nuclear Power Plants”

- **Standard Review Plans**
  - Explain how NRC reviews applications for licenses and license amendments
  - Endorsed standards are not requirements
  - Generally have forward-fit applicability
  - Includes ACRS, CRGR and public comment reviews
  - Major update recently completed
- **Inspection Procedures**
- **Standard Design Certifications**
- **Individual Licenses**

# Perspectives on Reactor Codes and Standards

- **Use of standards is the preferred approach from a design, licensing, and safety perspective.**
  - Advantages include reduced resources, reduced costs, faster reviews, greater predictability, wider acceptance
- **Considerations when developing and using new standards**
  - Licensees/vendors may prefer to use standards previously accepted by NRC to enhance predictability of reviews
  - NRC reviews standards when proposed by licensees/vendors; NRC is resource-constrained to review standards without industry users
- **So, how do we gauge the demand from industry users for new and revised standards?**

# Obtaining NRC Review of Standards

- **Identify the potential application of the standard for users (e.g., SMR vendors, utilities, NRC), and the value added of the standard**
- **Get an NRC representative to participate in developing the standard**
- **Engage an NRC representative to consider approving the standard in a regulation or guidance**
- **Present the standard at an NESCC meeting**
- **Send a letter to the NRC Standards Executive**



- **NESCC established in 2009 as a forum for Standards Developing Org's (SDOs) to collaborate to accelerate the development and adoption of significant new and revised standards for nuclear power plants**
- **Sponsored by DOE and NRC, in coordination with the National Institute of Standards and Technology (NIST) and the American National Standard Institute (ANSI)**
- **Goals:**
  - **Prevent gaps and overlaps between standards**
  - **Encourage collaborative development of priority standards**
    - **SDOs are invited to communicate their priorities**
- **ACI is a regular participant in NESCC**

- **Concrete Report**
  - AISC N690, Appendix N9, steel concrete composite for modular construction, currently in development
  - NRC plans to review/endorse N9 in a new RG 1.225
- **Concrete Repair Report**
  - Many recommendations to update standards and regulatory documents
- **High Density Polyethylene (HDPE) piping**
  - Significant interest to industry; precedent from gas pipelines
  - NESCC initiated a “Roadmap” to prioritize issues and coordinate development efforts; report on NESCC site

- **The NRC makes extensive and effective use of C&S as part of its regulatory process**
  - Regulations, regulatory guides, standard review plans
  - C&S written by numerous standards developing org's (SDOs)
  - NRC staff participate in writing C&S and have influence in setting the priorities of SDOs
- **The NRC is actively revitalizing its processes used to endorse codes & standards**
  - Proper endorsement of codes & standards creates durable regulatory guidance that is key to improved safety performance
  - Coordination and collaboration between standards development and endorsement activities will further improve effectiveness



***Thanks for your kind  
attention***