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United States Nuclear Regulatory Commission
Protecting People and the Environment

ACRS Future Plants Subcommittee

10 CFR Part 53
"Licensing and Regulation of Advanced Nuclear Reactors"

July 20, 2020

Background

- Advance Notice of Proposed Rulemaking, “Approaches to Risk-Informed and Performance-Based Requirements for Nuclear Power Reactors,” dated May 4, 2006 (71 FR 26267)

- NRC’s Vision and Strategy report (12/16) for non-light-water reactors and related implementation action plans identified a potential rulemaking to establish a regulatory framework

- Nuclear Energy Innovation and Modernization Act (NEIMA; Public Law 115-439) signed into law in January 2019 requires the NRC to complete a rulemaking to establish a technology-inclusive, regulatory framework for optional use for commercial advanced nuclear reactors no later than December 2027

Background - NEIMA

(1) ADVANCED NUCLEAR REACTOR—The term “advanced nuclear reactor” means a nuclear fission or fusion reactor, including a prototype plant… with significant improvements compared to commercial nuclear reactors under construction as of the date of enactment of this Act, …

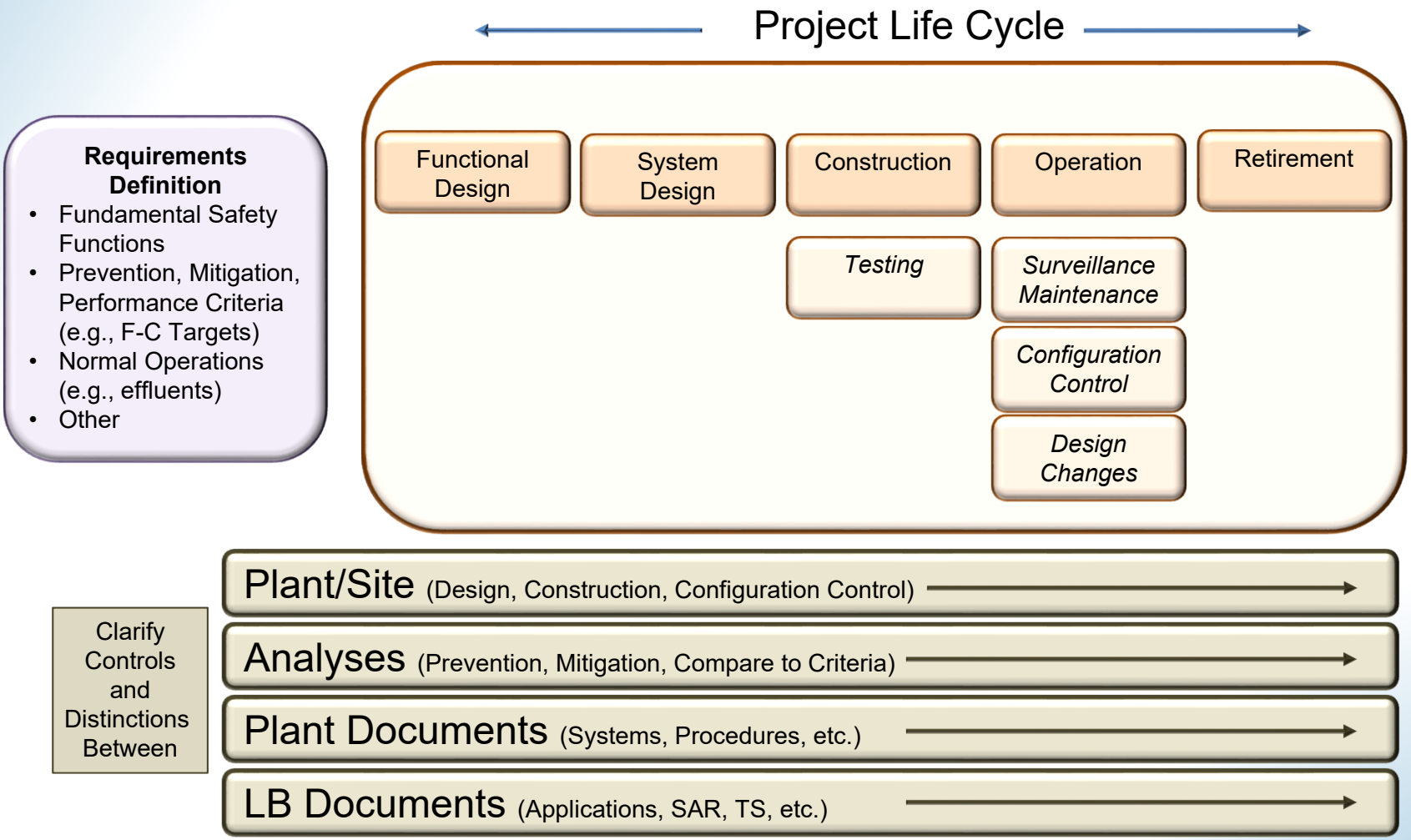
(9) REGULATORY FRAMEWORK—The term “regulatory framework” means the framework for reviewing requests for certifications, permits, approvals, and licenses for nuclear reactors.

(14) TECHNOLOGY-INCLUSIVE REGULATORY FRAMEWORK—The term “technology-inclusive regulatory framework” means a regulatory framework developed using methods of evaluation that are flexible and practicable for application to a variety of reactor technologies, including, where appropriate, the use of risk-informed and performance-based techniques and other tools and methods.

SECY-20-0032, Rulemaking Plan

- SECY-20-0032, “Rulemaking Plan on “Risk-Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors,” dated April 13, 2020
- Proposing a new 10 CFR part that could address performance requirements, design features, and programmatic controls for a wide variety of advanced nuclear reactors throughout the life of a facility.
- Focus the rulemaking on risk-informed functional requirements, building on existing NRC requirements, Commission policy statements, and recent activities (e.g., SECY-19-0117)
- Expect extensive interactions with external stakeholders and the Advisory Committee on Reactor Safeguards (ACRS) on the content of the rule.

Technology Inclusive Regulatory Framework



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Example – Possible Layout

- General Provisions
- Technology-Inclusive Safety Objectives
  - Regulatory limits, safety goals
- Design Requirements
- Siting
- Construction and Manufacturing Requirements
- Requirements for Operation
- Decommissioning Requirements
- Applications for Licenses, Certifications and Approvals
- Maintaining and Revising Licensing Basis Information
- Reporting and Administrative Requirements

NRC Staff White Paper

- The NRC staff developed a white paper (ADAMS ML20195A270) to support discussions with ACRS and other stakeholders

- Soliciting information that:
  1) Defines the scope of stakeholder interest in a rulemaking to develop a technology inclusive framework for advanced nuclear reactors,
  2) Identifies major issues and challenges related to technology-inclusive approaches to licensing and regulating a wide variety of advanced nuclear reactor designs,
  3) Supports prioritizing and developing plans to resolve identified issues within the rulemaking for the wide variety of advanced nuclear reactor designs, and
  4) Supports the development of the proposed rule and related guidance.

- Staff receptive to feedback on any aspect of developing a technology-inclusive regulatory framework to support the regulatory objective, whether or not in response to a question listed in this white paper or future solicitations.

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Part 53 Rulemaking Objectives

1) Provide reasonable assurance of adequate protection of the public health and safety and common defense and security at reactor sites at which advanced nuclear reactor designs are deployed, to at least the same degree of protection as required for current-generation light water reactors;
2) Protect health and minimize danger to life or property to at least the same degree of protection as required for current-generation light water reactors;
3) Provide greater operational flexibilities where supported by enhanced margins of safety that may be provided in advanced nuclear reactor designs;
4) Ensure that the requirements for licensing and regulating advanced nuclear reactors are clear and appropriate; and
5) Identify, define, and resolve additional areas of concern related to the licensing and regulation of advanced nuclear reactors.

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Questions for Public Feedback

1. Regulatory Objectives: Are the regulatory objectives, as articulated above, understandable and achievable? If not, why not? Should there be additional objectives? If so, please describe the additional objectives and explain the reasons for including them.

2. Scope and Types of Advanced Nuclear Reactors: Should the scope of the rulemaking be limited to advanced nuclear reactors as defined in NEIMA or should the scope include all future applications for licenses, certifications, or approvals for commercial nuclear reactors regardless of design?

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Questions for Public Feedback

3. Technical Requirements versus Licensing Process: Should the framework focus only on those regulations related to technical standards (i.e., design, operational and programmatic requirements) and rely on the existing licensing processes in Parts 50 (e.g., construction permit and operating license) and 52 (e.g., early site permit, combined license, etc.) or should the framework develop a new alternative licensing process that looks different than the existing processes? If the latter, what should this new licensing process look like? Should this new process be "self-contained," such that it would provide its own licensing, procedural, administrative, and reporting requirements?

Questions for Public Feedback

4. Performance Criteria: NEIMA calls for a technology-inclusive framework for advanced nuclear reactors, which encompasses a wide range of reactor technologies and power levels. To what extent should the NRC try to define a single set of performance criteria for all technologies and sizes (e.g., estimated offsite doses from postulated events), versus developing specific regulatory approaches for different categories of advanced nuclear reactors such as microreactors and fusion reactors?

Questions for Public Feedback

5. Risk Metrics: In a risk-informed performance-based regulatory regime, should risk metrics be included in the regulations? Possible examples of risk metrics include the quantitative health objectives described in the NRC's Safety Goals for the Operation of Nuclear Power Plants Policy Statement (51 FR 28004, Aug. 4, 1986, as corrected and republished, 51 FR 30028, Aug. 21, 1986) and the frequency-consequence targets described in SECY-19-0117, "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."

Questions for Public Feedback

6. Facility Life Cycle: How could the new Part 53 licensing and regulatory framework align with the design, construction, operation, and decommissioning phases of an advanced nuclear reactor facility's life cycle?

7. Definitions: Should terms in the new Part 53 have identical definitions to terms in Parts 50 and 52? For example, SECY-19-0117 proposes to accept definitions for terms such as "safety related" and "design basis event" for non-light water reactors applications that differ from the definitions provided in 10 CFR Part 50. If possible, please provide alternative terminology for non LWR technologies.

Questions for Public Feedback

8. Performance-Based Regulation: How should the requirements developed for this alternative regulatory framework incorporate performance-based concepts such as those described in NUREG/BR-0303, “Guidance for Performance-Based Regulation”?

Questions for Public Feedback

9. Identifying Levels of Protection: Regulatory requirements in Parts 50 and 52 have been imposed as either needed to: 1) ensure a facility provides adequate protection to the health and safety of the public and is in accord with the common defense and security; or 2) provide a substantial increase in the overall protection of the public health and safety or the common defense in security when the costs of implementation are justified in view of the increased protection. Should specific requirements developed in this Part 53 rulemaking be identified as either needed to provide reasonable assurance of adequate protection or justified as cost-effective safety improvements?

Questions for Public Feedback

10. Integrated Approach to Rulemaking: In developing the requirements for this alternative regulatory framework, how can an integrated approach be developed to address areas such as safety, security, emergency preparedness, and other means to prevent or mitigate the potential release of radionuclides from an advanced nuclear reactor?

Questions for Public Feedback

11. Consistency with Historical Standards: SECY-19-0117 describes a methodology that is meant to support the licensing process through identifying key safety functions, events that might challenge those functions, performance criteria for equipment and related programmatic controls, and defense in depth. The methodology uses risk-informed and performance-based criteria that are derived from existing regulations related to potential offsite doses and from the NRC's Safety Goal Policy Statement (51 FR 30028; dated August 21, 1986). Should this rulemaking use these existing criteria or should this opportunity be used to adopt or develop alternative criteria? If so, please describe possible alternatives and explain the reasons for using them within the regulatory framework being developed for advanced nuclear reactors.

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Questions for Public Feedback

12. Quality Assurance: Should quality assurance, as it is currently defined in Appendix B to Part 50, be a requirement in the new risk-informed, performance-based regulatory framework? Alternatively, should NRC regulations defer to internationally recognized, independent certification schemes for assessing quality processes at commercial nuclear facilities and at suppliers of equipment and services?

Questions for Public Feedback

13. Stakeholder Documents, Standards, Guidance: The NRC encourages active stakeholder participation through development of proposed supporting documents, standards, and guidance. In such a process, the proposed documents, standards, and guidance would be submitted to and reviewed by NRC staff, and the NRC staff could endorse them, if appropriate. Is there any interest by stakeholders to develop proposed supporting documents, standards, or guidance?

Questions for Public Feedback

14. Other Issues: Are there significant issues, possible approaches, or other topics related to the initial crafting of a regulatory framework for advanced nuclear reactors that are not addressed in the above questions? If so, please identify the subject areas and, if possible, provide a suggestion on how the new framework could resolve the issue or incorporate a proposed approach.

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Part 53 Rulemaking

QUESTIONS?

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Backup Slide – Integrated Approach