

Advisory Committee on Reactor Safeguards Future Plant Designs Subcommittee

10 CFR Parts 50 and 52
Emergency Preparedness for Small Modular
Reactors and Other New Technologies

September 21, 2021

Agenda

9:30am – 9:35am	Opening Remarks
9:35am – 11:00am	<ul style="list-style-type: none">• Background• Technical Basis/Regulatory Analysis• Final Rule Language
11:00am – 11:15am	Break
11:15am – 12:30pm	<ul style="list-style-type: none">• Final Rule Language (Continued)• Draft Regulatory Guidance
12:30pm – 12:40pm	Comments on Draft Final Rule (Marc Nichol, NEI)
12:40pm – 12:50pm	Comments on Draft Final Rule (Ed Lyman, UCS)
12:50 – 1:00pm	Opportunity for Public Comment

NRC Staff Presenters

- Soly Soto Lugo, NMSS – Rulemaking PM
- Arlon Costa, NRR – Business Line Lead
- Eric Schrader, NSIR – Technical Lead
- Charles Murray, NSIR – RG 1.242 Lead

Background

Background

- Regulatory Basis
 - Published the draft regulatory basis with a 75-day public comment period on April 13, 2017 (82 FR 17768)
 - Received comments from 57 individuals and organizations with 223 individual comments
 - Published the final regulatory basis on November 15, 2017 (82 FR 52862)

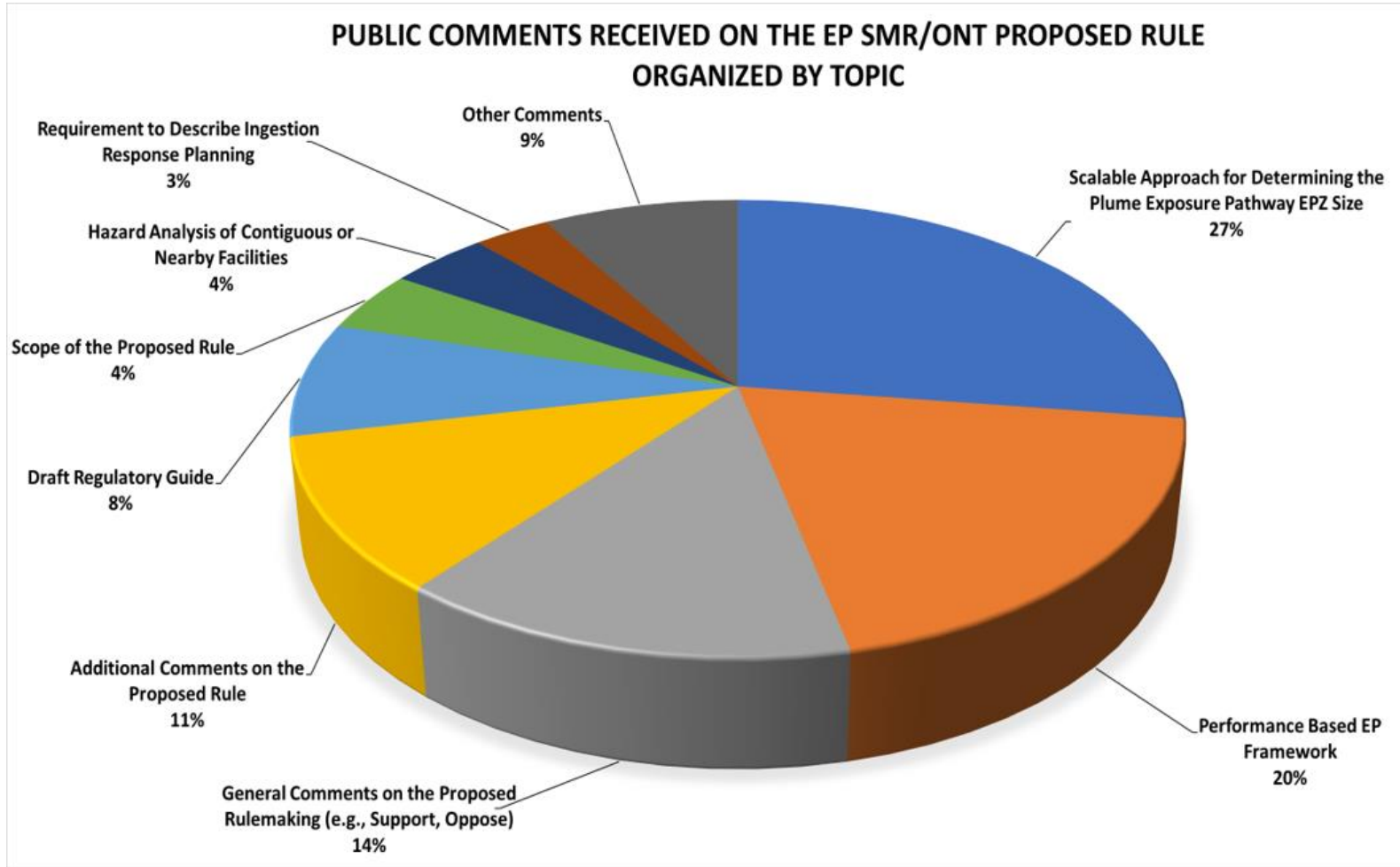
Background (cont.)

- Proposed Rule
 - Published the proposed rule with a 75-day public comment period on May 12, 2020 (85 FR 28436)
 - Public meeting was held on June 24, 2020
 - Extended the public comment period by 60 days on July 21, 2020 (85 FR 44025)
 - Public comment period ended Sept 25, 2020

Background (cont.)

- Public comments
 - Received comments from 2,212 individuals and organizations, including 2,087 form letters
 - Identified 649 unique comments on the proposed rule
 - Responses to public comments will be published upon Commission approval of the final rule

Background (cont.)



Background (cont.)

- Draft final rule schedule
 - Currently in concurrence
 - Presentation to ACRS full committee during the week of November 1, 2021
 - Due to the Commission by December 30, 2021

Technical Basis and Regulatory Analysis

Technical Basis

- Graded approach to emergency preparedness:
 - Performance-Based
 - Technology-Inclusive
 - Consequence-Oriented and Risk-Informed

Regulatory Analysis

- Cost and Benefits/Averted Costs (7% Net Present Value)

	Industry	NRC
Costs	(\$110,000)	(\$70,000)
Benefits/Averted Costs	\$5,730,000	\$2,430,000
Net Benefits (Benefits - Costs)	\$5,620,000	\$2,360,000

- Total Net Benefit (Undiscounted): \$31,700,000
 - 3% Net Present Value: \$14,900,000
 - 7% Net Present Value: \$7,980,000

Draft Final Rule Language

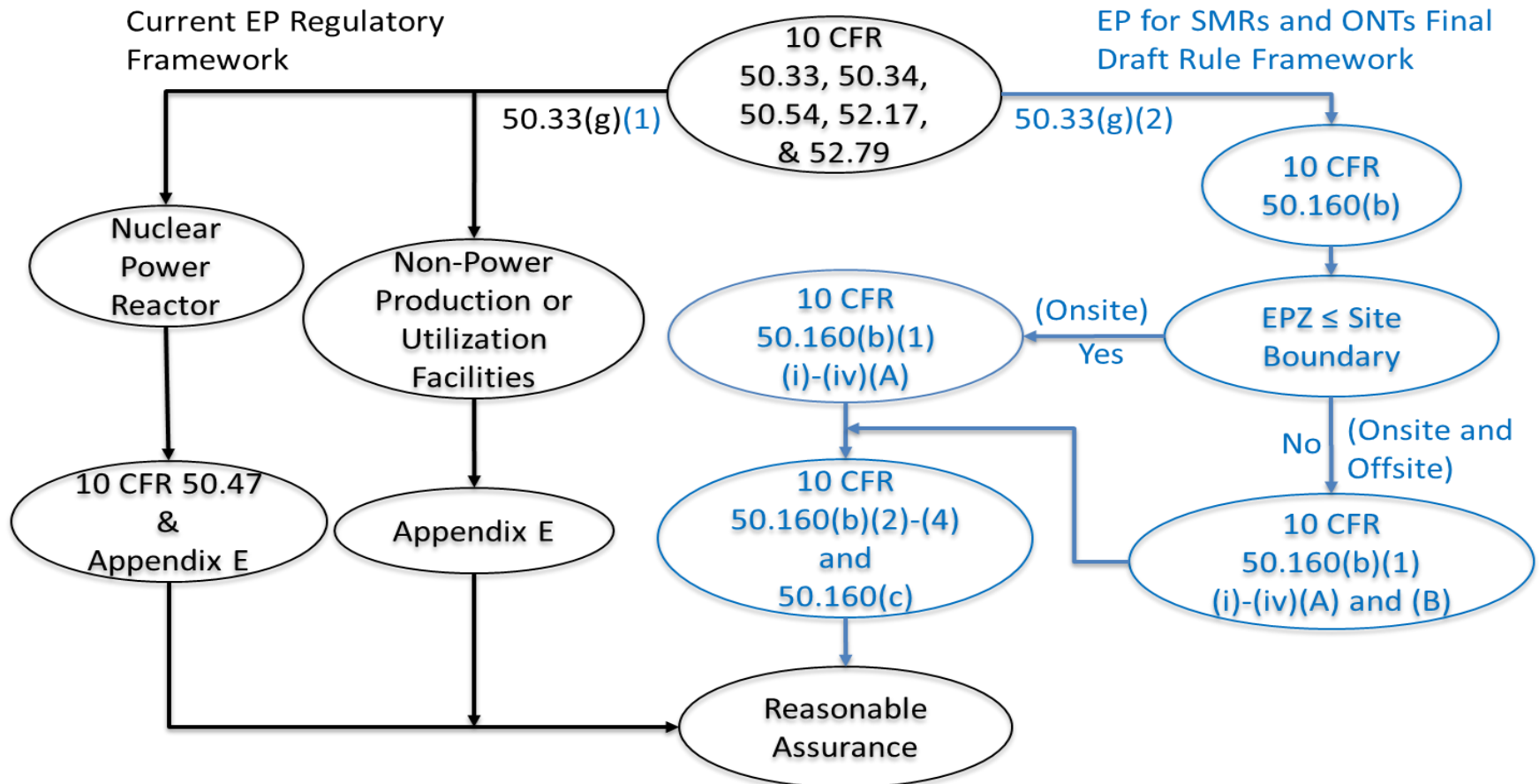
Draft Final Rule Language

Overview of Major Provisions:

- New alternative performance-based emergency preparedness framework
- A graded approach to EP
- Requirement for a hazard analysis of any NRC licensed or non-NRC licensed facility
- Requirement to describe ingestion response planning in the emergency plan

Draft Final Rule Language

New Alternative Performance-Based Framework

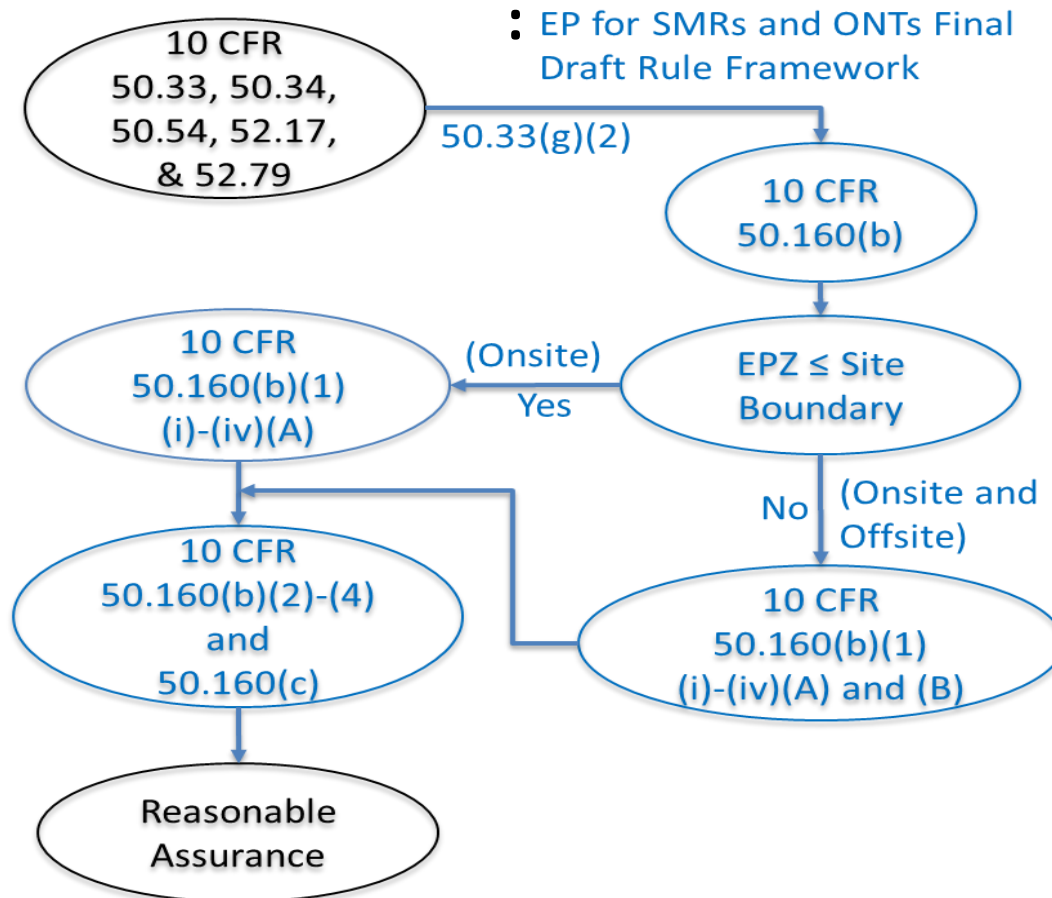


Draft Final Rule Language (cont.)

- **New Alternative Performance-Based Framework (cont.)**
 - Section 50.160(b)(1) establishes a new alternative performance-based EP framework
 - (i) Maintenance of Performance
 - (ii) Performance Objectives
 - (iii) Emergency Response Performance
 - (iv) Planning Activities

Draft Final Rule Language (cont.)

Scalable Approach to EP



Draft Final Rule Language (cont.)

- **Section 50.33(g)(2) - Scalable approach for determining plume exposure pathway EPZ size**
 - An analysis describing the area within which:
 - Public dose, as defined in section 20.1003, is projected to exceed 10 mSv (1 rem) TEDE over 96 hours from the release of radioactive materials from the facility considering accident likelihood and source term, timing of the accident sequence, and meteorology; and
 - Predetermined, prompt protective measures are necessary

Draft Final Rule Language (cont.)

- **EPZ Boundary and Physical Characteristics**
 - Under section 50.33(g)(2) applicants must propose their EPZ
 - Section 50.160(b)(3) requires applicants to describe in their emergency plans the boundary and physical characteristics of the EPZ

Draft Final Rule Language (cont.)

- **Requirement to Describe Ingestion Response Planning**
 - Section 50.160(b)(4) establishes ingestion response planning requirements
 - Applicants' and licensees' emergency plan would describe:
 - Ingestion response planning
 - Capabilities and resources available to prevent contaminated food and water from entering the ingestion pathway
 - Facilities with a site boundary EPZ must reference capabilities of Federal, State, and local authorities

Draft Final Rule Language (cont.)

- **Onsite and Offsite Planning Activities**
 - Section 50.160(b)(1)(iv)(A) contains required onsite and offsite planning activities for all applicants and licensees:
 - Public information
 - Coordination with the licensee safeguards contingency plan
 - Communications with the NRC
 - Emergency facility or facilities
 - Site familiarization training
 - Emergency plan maintenance

Draft Final Rule Language (cont.)

- **Offsite Planning Activities**

- Section 50.160(b)(1)(iv)(B) contains required offsite planning activities for applicants with a plume exposure pathway EPZ that extends beyond the site boundary:

- Contacts and arrangements with Federal, State, Local, and Tribal governmental agencies
- Notification of offsite organizations
- Protective measures
- Evacuation time estimate
- Emergency response facility or facilities
- Offsite dose projections
- Dissemination of public information
- Reentry
- Drills and exercises

Draft Final Rule Language (cont.)

- **Requirement for Hazard Analysis**
 - Section 50.160(b)(2) requires a hazard analysis of facilities contiguous to or near an SMR or ONT facility
 - NRC licensed or other facilities

Draft Final Rule Language (cont.)

- **Consideration of Credible Hazards**

- Section 50.160(b)(2) requires a hazard analysis to include any event at a contiguous or nearby facility that would adversely impact the implementation of emergency plans
- Examples of facilities are:
 - Industrial
 - Military
 - Transportation
 - Multi modular and other nuclear units

Regulatory Oversight

- Section 50.160(b)(1)(iii) requires all applicants and licensees to use drills and exercises to demonstrate their capabilities in the required emergency response functions

Significant Changes to the Proposed Rule

- Revised section 50.33(g)(2) plume exposure pathway EPZ sizing criteria
- Revised section 50.160(b)(3) to include entry criteria
- Revised sections 50.160(c)(1)-(2) to allow licensees greater flexibility for initial exercise demonstration

Other Changes to the Proposed Rule

- Revised section 50.2 definition of “small modular reactor”
- Revised section 72.32(c) to clarify that the emergency plan that meets the requirements of sections 50.47 or 50.160 satisfies the EP requirements of section 72.32
- Revised section 50.160(b) to state the reasonable assurance finding required in section 50.47(a)(1) apply to section 50.160 applicant

Other Changes to the Proposed Rule

(cont.)

- Revised sections 50.160(b)(1)(iii)(F)(1), (3) and (4) to refer to “applicable response organizations”
- Revised section 50.160(b)(1)(iv)(B)(4) to ensure ETEs include area within the site boundary

Other Changes to the Proposed Rule

(cont.)

- Clarified that an applicant complying with section 50.160 needs to submit an emergency plan of a “participating” Tribal government
- Relocated requirements for site familiarization and maintenance of emergency plan to section 50.160(b)(1)(iv)(A) to ensure requirements are applicable to all applicants and licensees

Draft Regulatory Guidance

RG 1.242, “Performance-Based Emergency Preparedness for Small Modular Reactors, Non-Light Water Reactors, and Non-Power Production or Utilization Facilities”

Draft Regulatory Guidance

- **Conforming changes to the regulatory guide**
 - Made conforming changes based on changes to the draft final rule language
 - Included additional reference documents
 - Enhanced the guidance on accident likelihood, source term, timing of the accident sequence, and meteorology
 - Added the definition of “safe condition” to the glossary

Draft Regulatory Guidance (cont.)

- Appendix A, “General Methodology for Establishing Plume Exposure Pathway Emergency Planning Zone Size”
 - Provides a general methodology acceptable to the NRC for the analysis for establishing plume exposure pathway EPZ size
 - Added Section A-3.1, “Event Selection,” which discusses the applicant’s consideration of accident likelihood

Draft Regulatory Guidance (cont.)

- Appendix B, “Development of Information on Source Terms”
 - Provides guidance to develop source terms for plume exposure pathway EPZ size evaluations

Questions



Acronyms and Abbreviations

- ACRS – Advisory Committee on Reactor Safeguards
- CFR – Code of Federal Regulations
- EP – emergency preparedness
- EPZ – emergency planning zone
- ETE – evacuation time estimate
- FR – *Federal Register*
- mSv – millisievert
- NEI – Nuclear Energy Institute
- NMSS – Office of Nuclear Material Safety and Safeguards
- NRC – U.S. Nuclear Regulatory Commission
- NSIR – Office of Nuclear Security and Incident Response
- ONT – other new technologies
- PM – project manager
- RG – Regulatory Guide
- SMR – small modular reactor
- TEDE – total effective dose equivalent
- UCS – Union of Concerned Scientists