NRC Public Meeting
Licensing Requirements for Microreactors and Other Low Consequence Reactors Rulemaking

July 17-18, 2025
10:00am-5:00pm
Microsoft Teams and
Commission Hearing Room

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

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Purpose

- Continue the prior discussion on entry criteria and design attributes
- Discuss technical topics and concepts that the rule would address
- Looking for public feedback on these concepts and topics

Agenda

July 17, 2025

10:00-10:10am	Welcome, Introductions, Logistics
10:10-11:00am	Entry Criteria
11:00-12:00pm	Design Criteria Attributes
12:00-1:00pm	BREAK
1:00-1:30pm	Price-Anderson Coverage; Financial Qualifications and Decommissioning Financial Assurance
1:30-2:00pm	Environmental Review Considerations
2:00-3:00pm	Plant Parameter Envelopes
3:00-3:15pm	BREAK
3:15-4:45pm	Fuel Possession, Storage, MC&A, Transportation, Decommissioning
4:45-5:00pm	Closing Remarks

July 18, 2025

10:00-10:10am	Welcome, Logistics
10:10-11:00am	Manufacturing, Construction, ITAAC/Pre-Op Testing
11:00-11:30am	Operational Programs: Security, EP, HP
11:30-12:00pm	Oversight, Inspection
12:00-1:00pm	BREAK
1:00-1:30pm	Risk Analysis
1:30-2:00pm	General License Considerations
2:00-2:30pm	Open Discussion
2:30-2:45pm	Closing Remarks

Logistics

- This meeting is being recorded
- When prompted for questions and discussion, please indicate your desire to speak by using the “Raise Hand” button in Teams (or press “*5” if participating by phone)
- Once your name has been called, you will need to unmute yourself (press “*6” if participating by phone)
- Chat feature is also enabled
- Presentation slides will be shown on the Microsoft Teams screen
- Phone attendees should e-mail george.tartal@nrc.gov for attendance record

Entry Criteria

1. **Dose-Acceptance Criteria:**
   - Ensures adequate protection of the public in the event of credible accidents.
   - Establishes a technology-neutral baseline for comparing different reactor designs and sites.
2. **Maximum Hypothetical Accident Approach (Consequence Analysis):**
   - A siting analysis to assess whether a generic or specific site can accommodate a reactor design while meeting the dose-acceptance criteria.
   - Not necessarily the most severe physically possible accident but chosen to bound the radiological consequences of a broad range of design basis accidents.
   - Can be leveraged, with the dose-acceptance criteria, to establish alternative risk-informed regulatory frameworks.
3. **Special Nuclear Material Limit (Metric Tons Uranium and Plutonium):**
   - Assessing amounts of SNM at other low consequence nuclear facilities and stakeholder recommendations.

Design Criteria Attributes

- Design criteria attributes ensures safety throughout the proposed operating and handling regimes, as well as being resilient to potential accidents or upsets, whether they are caused by internal or external hazards.
  - Reactivity control – controls the power level during normal operations and provides instantaneous, and maintained, reactor shutdown under upset or accident conditions. Ensures subcriticality during transportation.
  - Provide heat removal – provides adequate cooling for fission and decay heat removal to limit core coolant and fuel temperatures.
  - Retain fission products – protection of engineered fission-product boundaries to limit the release of radionuclides during normal and accident conditions.
  - Provide shielding (Part 20) – protects workers and the public from exposure to radiation resulting from operations using the existing requirements in 10 CFR Part 20. Staff recognize that prescriptive requirements in 10 CFR Part 20 changes may be forthcoming.
  - Radioactive effluents control (Part 20) – ensures the safe control, monitoring, and release of radioactive materials to protect public health and safety and for the benefit of the environment. Staff recognize that prescriptive requirements in 10 CFR Part 20 changes may be forthcoming.
- Elements of the design criteria attributes would be used to demonstrate compliance with the Entry Criteria.

Price-Anderson Coverage

- Price-Anderson Act covers liability claims from the public caused by commercial nuclear reactor accidents
  - 10 CFR 140.11 and 140.12 identify the amounts of required Financial Protection to be carried by a licensee.
- 10 CFR 140.11, “Amounts of Financial Protection for Certain Reactors”
- 10 CFR 140.12, “Amounts of Financial Protection Required for Other Reactors”

Path Forward –

Information gathered through the licensing process for specific designs and facilities, together with other analyses and information gathered at meetings like these, will inform future decision-making relating to Price-Anderson Act coverage of these facilities.

What are your thoughts?

Financial Qualifications and Decommissioning Financial Assurance

Applicant to meet Financial Qualification Requirements for Construction and for Operations

Applicant to provide Certification of Financial Assurance for Decommissioning

- Current Minimum Formula Approach in 10 CFR 50.75 likely will not apply based on anticipated reactor size;
- What is envisioned: Site specific decommissioning cost estimate and plan for funding at time of application;
  - Both the level of funding and the funding mechanism to meet NRC requirements.
- Reactor deployment models may involve transport of reactor away from an original deployment site to a facility at a different location for end-of-life decommissioning.

Environmental Review Considerations

- **Several ongoing initiatives to streamline environmental reviews for microreactors**
- **Implementing the Environmental Alternatives in Enclosure 2 of the NOAK SECY (SECY-25-0052)**
  - Creation of an online portal consistent with CEQ's NEPA and Permitting Data and Technology Standard
  - New Reactor GEIS Plant Parameter and Site Parameter Envelop (PPE/SPE) values as a first step
- **Consider design-specific PPE/SPE values for the online portal once a standard microreactor design has been licensed**
  - More accurate PPE/SPE values for a microreactor site selection process
  - Should eliminate New Reactor GEIS Category 2 issues (detailed analysis)
  - Some New Reactor GEIS Category 1 issues may also be eliminated
- **Consider early site permit equivalent for microreactors**
- **Part 51 environmental regulations and guidance update, which would:**
  - Reduce unnecessary regulatory burdens
  - Add new efficiencies
  - Add new licensing approaches and flexibilities
  - Development will include benchmarking with other Federal agencies

Plant Parameter Envelopes

- Used to establish a set of bounding values for both key reactor design and site characteristics.
  - Technology-Neutral: supports a range of nuclear reactor designs or technologies.
  - Licensing Flexibility: enables flexibility for staged licensing site and design choices.
  - Public and Stakeholder Confidence: creates certainty, informed by stakeholder interaction.

Fuel Possession, Storage, Material Control & Accounting (MC&A)

Fuel Possession

Fuel related activities associated with storage, movement, and loading at the manufacturing and operation sites will be subject to the requirements of 10 CFR Part 70.

- The requirements of Subpart H (i.e., integrated safety analysis) would ONLY be applicable if fuel is manufactured/fabricated at the microreactor factory.

MC&A

Requirements are generally subject to 10 CFR Part 74 requirements as Nuclear Power Plants assuming the fuel is in a discreet form. HALEU may increase required physical inventory periodicity. Early engagement encouraged.

Storage - Demonstrate meeting Part 72 regulations

Storage of spent fuel or other irradiated contents at the operating site or other defueling site, other than within the microreactor itself, may require a Part 72 license for an Independent Spent Fuel Storage Installation, which includes the use of an NRC certified storage cask.

- Note: NRC currently only considering storage requirements when fuel is removed from the reactor.
- Are there areas where Part 72 regulations cannot be met by design or operational characteristics of transportable microreactors?
- For potential exceptions to Part 72 regulations, are there risk informed approaches that can be used to meet safety requirements (e.g. Accident Conditions)?
- What supplemental storage regulations, if any, would be recommended for this rule that would be used in conjunction with Part 72 as written? Expect harmonization with Part 72 at later date.
- What guidance would be needed for crosswalk issues?

  Example: definition of spent fuel

Transportation

Current State - Demonstrate meeting 10 CFR Part 71 regulations

- Transport of unirradiated fuel from a manufacturing site or irradiated fuel or other irradiated contents from the operating site would require the applicant to request NRC's review with the goal of the NRC issuing a Certificate of Compliance, as appropriate consistent with 10 CFR Part 71, "Packaging and Transportation of Radioactive Material"

- The NRC recognizes the unique characteristics of microreactors and has developed a risk-informed framework that may be applied for those areas where meeting Part 71 regulations may not be feasible

- Are there areas where Part 71 regulations cannot be met by design or operational characteristics of transportable microreactors?
    - For potential exceptions to Part 71 regulations, are there other risk informed approaches that can be used to meet safety requirements (Hypothetical Accident Conditions)?
    - What supplemental transportation regulations would be recommended for this rule that would be used in conjunction with Part 71 as written. Expect harmonization with Part 71 at later date.
    - What guidance would be needed for crosswalk issues. Example: definition of spent fuel: 1 year aging/cooling time
    - What harmonization would be needed with DOT and IAEA (5-year CoC Renewal period)

Decommissioning

- The NRC staff intends to use the existing regulatory framework to review applications for licenses related to decommissioning and refurbishment and refueling activities for factory-fabricated transportable microreactors.
- The requirements of 10 CFR 50.82 or 10 CFR 52.110 would apply after permanent cessation of operations of each microreactor until there were special considerations via a license amendments or exemptions. After the permanent cessation of operations, the inspection program changes to the decommissioning program.
- The NRC staff will continue to engage stakeholders on considerations related to decommissioning and refurbishment and refueling of factory-fabricated transportable microreactors to better understand the range of options under consideration. If the NRC staff identifies issues that involve policy decisions or potential rulemaking, the NRC staff will seek Commission direction through an additional options paper.

Manufacturing, Construction, ITAAC/Pre-Op Testing

Manufacturing

- Use of qualified contractors or sub-contractors for the fabrication, assembly, fueling, and operational testing of the reactor by the ML holder.
- Ensure any reactor components credited in transportation safety analyses receive the proper quality controls

Construction

- Authorizing certain construction activities concurrent with acceptance and docketing of deployment site license application.

ITAAC/Pre-Op Testing

- Considering conducting preoperational inspections, similar to NPUFs, to confirm completion of facility construction and test programs to support power operations.

Operational Programs: Security, EP, HP

- Graded approach to Emergency Preparedness and Security
  - Planning standards are technology-inclusive
  - Aligns response capabilities with characteristics
  - NRC embraces the whole community approach
- Operational programs interface with local law enforcement, fire, EMS, medical
- HP - Part 20 regulations govern occupational exposure

Oversight, Inspection

- Oversight - Graded approach to oversight and inspection, similar to NPUFs
  - Considering use of existing NPUF IMCs and IPs for construction and operation.
  - Minimal direct inspection at site.
  - For transportation packaging CoC holder oversight, considering use of existing IMC and IPs as necessary considering reactor manufacturing and operational oversight.
  - For spent fuel storage oversight, considering use of existing IMCs and IPs for construction, loading, and operation.
- Inspection – similar to NPUFs
  - For transportation package CoC holder inspections, coordinate with reactor inspections to preclude overlap.
  - For spent fuel storage inspections, similar to current ISFSIs as it accounts for the concurrent reactor inspection program.

Risk Analysis

- Risk Analysis – leverage graded hazard analysis techniques suitable for the complexity of the design.

General License Considerations

- Staff are assessing EO 14300, Sec. (e), to consider to what extent high-volume licensing of microreactors and modular reactors or components should be regulated through general licenses.

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