

RIC 2024 Hybrid

U.S. Nuclear Regulatory Commission
36th Annual Regulatory Information Conference

MARCH 12-14, 2024

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Optimizing the Regulatory Landscape for Licensing and Deployment of Factory-Fabricated Micro-Reactors

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<https://www.nrc.gov/reactors/new-reactors/advanced.html>

**ADAPTING TO A
CHANGING LANDSCAPE**

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The NRC staff is proactively enhancing clarity, reliability, and efficiency for licensing and regulation of factory-fabricated micro-reactors

Clear

Coherent, logical, and practical regulatory approaches that will allow for safe and secure deployment

Reliable

Prompt, fair, and decisive regulation that lends stability to licensing and deployment

Efficient

Risk-informed and performance-based regulation that delivers timely results and uses resources effectively

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Fabrication, Fueling, and Testing at a Factory



Fabricate the module, load fuel, and potentially operate the module for functional testing

Transportation to the Deployment Site



Factory-fabricated modules may contain fresh or irradiated fuel



Power Operation at a Deployment Site



Stand-alone, self-contained micro-reactor design



Core module with onsite reactor building and power conversion equipment

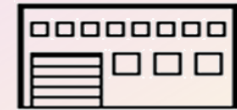
Transportation from the Deployment Site



Modules may contain spent or irradiated fuel



Decommissioning or Refurbishment for Redeployment



Remove fuel and decommission the module or refurbish and refuel the module for redeployment

Deployment Life Cycle

Redeployment

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The NRC staff is taking actions to prioritize and address licensing and deployment considerations related to factory-fabricated micro-reactors

- SECY-24-0008, “Micro-Reactor Licensing and Deployment Considerations: Fuel Loading and Operational Testing at a Factory” (ML23207A252), seeks Commission policy direction on regulatory approaches related to three topics:
 - (1) Features to preclude criticality
 - (2) Fuel loading at a factory
 - (3) Operational testing at a factory

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SECY-24-0008 recommends the following:

- An approach in which a factory-fabricated module that included features to preclude criticality would not be “in operation” when loaded with fuel and operation would begin with the removal of those features
- An approach for authorizing only fuel loading into a utilization facility that includes features to preclude criticality under a manufacturing license for the utilization facility and a special nuclear material license for the fuel
- An approach that would apply most of the safety (and possibly the environmental) regulations for nonpower reactors to authorize fuel loading and operational testing at a factory

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- SECY-23-0021, “Proposed Rule: Risk-Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors (RIN 3150-AK31)” ([ML21162A093](#)), also proposes questions to ask stakeholders about the desirability of addressing authorization of fuel loading at a factory under a manufacturing license

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Factory-fabricated micro-reactor licensing and deployment models involve numerous regulatory considerations and policy topics

- Loading fuel at a factory
- Operational testing at a factory
- Timeframe for authorization to operate at the deployment site
- Licensing replacement reactors
- Autonomous operation and remote operation
- Transportation of fueled reactors
- Storage of fuel after irradiation in a power reactor
- Siting in densely populated areas
- Decommissioning process and decommissioning funding assurance
- Commercial maritime applications
- Commercial space applications
- Commercial mobile micro-reactors
- Staffing, training, and qualification requirements
- Standardization of operational programs
- Physical security
- Cybersecurity
- Environmental review

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Success Strategies

Optimizing Licensing Reviews



Proactive Stakeholder Engagement



Robust Preapplication Activities



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