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

ACRS Full Committee Briefing

Proposed 10 CFR Part 57
"Licensing Requirements for Microreactors and Other Reactors with Comparable Risk Profiles"

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Agenda

- Purpose
- Overarching Principles
- Rule Structure
- § 57.25 “Applicability Criteria”
- Part 57 Licensing Pathways
- Implementation Guidance
- Schedule

Purpose

- Current licensing frameworks are not optimized for high-volume, rapid deployment of microreactors and other reactors with comparable risk profiles.
- Establish a streamlined regulatory framework, supported by multiple licensing pathways, that leverages design standardization to efficiently license microreactors and other reactors with comparable risk profiles.
- The licensing process would complete, as much as possible, the safety, security, and environmental reviews with public engagement at one time, by leveraging a joint application for a construction permit (CP) and the associated operating license(s) (OL).
- Site reviews would verify that the site characteristics are within the reactor design envelope where pre-existing generic data can be leveraged as much as possible.
- The reactor design envelope would need to meet two entry criteria to justify an alternative risk-informed and performance-based regulatory framework for various requirements and operational programs (e.g., safety, security, environmental).

Overarching Principles of Developing Part 57

Laws

~ Atomic Energy Act of 1954, as amended, section 103

~ Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy (ADVANCE) Act

~ Nuclear Energy Innovation and Modernization (NEIMA) Act

Executive Order 14300

~ Sec. 5(e) Establish a process for high-volume licensing of microreactors and modular reactors, including by allowing for standardized applications and approvals and by considering to what extent such reactors or components thereof should be regulated through general licenses.

Commission Policy Statement and Staff Requirements Memoranda

~ SRM-SECY-98-144, "White Paper on Risk-Informed and Performance-Based Regulations" (ML003753601)

~ Commission's Policy Statement on the Regulation of Advanced Reactors (73 FR 60612, October 14, 2008)

~ SRM-SECY-24-0008, "Micro-Reactor Licensing and Deployment Considerations: Fuel Loading and Operational Testing at a Factory" (ML25168A133)

~ SRM-SECY-25-0052, "Nth-of-a-Kind Microreactor Licensing and Deployment Considerations" (ML25317A650)

Rule Structure

Focused Part 50 technical requirements and Parts 50 and 52 licensing and approval frameworks.

- Subpart A – General Provisions
- **Subpart B – Eligibility**
- **Subpart C – Construction Permits and Operating Licenses**
- **Subpart D – Manufacturing Licenses**
- **Subpart E – Standard Design Approvals**
- Subpart F – Reporting of Defects and Noncompliance
- **Subpart G – Irradiated Fuel Storage, Decommissioning, and License Termination Requirements**
- Subpart H – Maintaining and Revising Licensing-Basis Information
- **Subpart I – Transportation Package Design Certification**
- Subpart J – Physical Security Requirements
- Subpart K – Categorial Exclusion
- Subpart L – Inspections
- Subpart M – Material Control and Accounting
- Subpart N – [Reserved]
- Subpart O – Enforcement
- **Subpart P – Operator Licensing and Human Factors**
- Subpart Q –Reporting and Other Administrative Requirements
- **Part 26, Subpart P – Fitness For Duty**

Part 57 Subpart B - Eligibility

- **Intent: Attract reactor designs with high thermal and shutdown margin for rapid, high-volume licensing.**
- Utilizes two “Entry Criterion” and six “Design Criteria Attributes,” which describe attributes of microreactors and other reactors with comparable risk profiles.
- Not defining microreactors and other reactors with comparable risk profiles by power level.
- Given the wide range of reactor types and their functional characteristics, this proposed rule would emphasize these “attributes.”
- Attribute-based approach describes the capability to prevent or mitigate accidents without active systems or operator intervention.
- Recognizes certain reactors with inherently safe and passive design features with favorable safety profiles may appropriately be designed with higher power levels than other reactor designs.

Part 57 Subpart B - Eligibility (cont.)

Accident Consequence Criterion
10 CFR 57.25(a)

- ≤ 1 rem TEDE in the unrestricted area following the onset of a broad range of design basis accidents for their duration.

Fuel Mass Limit
10 CFR 57.25(b)

- ≤ 10 metric tons of heavy metal per reactor.

Design Criteria Attributes
10 CFR 57.30(a)-(f)

- Reactivity control
- Heat removal
- Fission product retention
- Shielding
- Radioactive effluent control
- Security-by-design

Section 57.25(a) Dose-based Entry Criterion

- A 1 rem TEDE dose-based entry criterion, based on 10 CFR 50.34(a)(1)(i), under accident conditions would be used to inform the analysis of postulated accidents and the development of safety measures so that, in the unlikely event of an accident, the NRC has reasonable assurance that no acute radiation-related harm will result to any member of the public.

- An applicant would be required to demonstrate their reactor design meets the 1 rem TEDE dose-based entry criterion in proposed § 57.25(a) using either maximum hypothetical or maximum creditable accident methodologies.

- **Bases**: The Commission has found the use of an accident dose-based acceptance criterion to be adequate for siting and design purposes based on decades of extensive experience in the criterion's application and in recognition of the conservatism applied within the radiological consequence analyses.

- **Purpose**: Site characterization and mitigative safety-related SSC sizing.

Section 57.25(b) Fuel Mass Limit Entry Criterion

- The total inventory of thorium, uranium, and plutonium contained in the nuclear reactor or any individual nuclear reactor that is part of the nuclear plant must not exceed 10 metric tons.
- **Bases**: experience gained from previous reactor reviews.
- **Purpose**: Deterministically screens reactor designs without additional performance-based acceptance criterion or severe accident analysis to assess events beyond which SSCs could be challenged.
- **FRN Question**: NRC has proposed a question in this proposed rule, asking whether, in lieu of applying a deterministic material limit on the quantity of SNM, the NRC should apply an alternative performance-based acceptance criterion (e.g., adiabatic heat rate threshold, or severe accident analyses).

Section 57.30(a)-(f) Design Criteria Attributes

Bases: leveraging concepts from the Commission's Policy Statement on the Regulation of Advanced Reactors (73 FR 60612; October 14, 2008) and experience gained from previous reactor reviews.

The applicant for a license or design approval under this part must provide information that demonstrates that the nuclear reactor or nuclear plant design has design criteria attributes that satisfy the following:

(a) *Reactivity control*. The design must provide for the following:

(1) Control of the power level during normal operations;

(2) Rapid insertion of reactivity control devices to immediately shut down the reactor and maintain it in a safe shutdown state under accident conditions; and

(3) Net negative reactivity feedback as a result of increased reactor power.

(b) *Heat removal*. The design must provide for highly reliable passive decay heat removal to limit core coolant and fuel temperatures during accident conditions to within design limits to protect the fuel and, as appropriate, the reactor coolant and fission product boundaries.

(c) *Fission product retention*. The design must provide for the protection of engineered fission-product boundaries to limit the fission product release of radionuclides during normal and accident conditions.

…

Section 57.30(a)-(f) Design Criteria Attributes (cont.)

(d) *Shielding*. The design must provide the following:

(1) Adequate permanent and temporary shielding to comply with 10 CFR part 20 for the protection of workers and the public from direct radiation exposure from the reactor and radioactive sources during operation, shutdown, and transport, including during abnormal conditions; and

(2) Sufficient robustness and heat removal to prevent loss of shielding integrity during normal and accident conditions.

(e) *Radioactive effluents control.* The design must meet the requirements of part 20 of this chapter for control, monitoring, and release of radioactive materials to the environment.

(f) *Security by design.* Safety and security must be considered together in the design process such that, where possible, security issues are effectively resolved through design and engineered security features.

Subpart C - Construction Permits and Operating Licenses

- Front-loaded review:
  - Require final design information and operational programs in a joint application for a CP and associated OL(s).
  - One opportunity for contested hearing on the joint application.
  - One ACRS review of the joint application.

- § 57.60(a) Contents of applications; technical information – *Final safety analysis report*. An applicant must:
  - Include a comprehensive safety analysis covering site characteristics, reactor design and safety features, remote monitoring/autonomous operation, accident evaluations, and assessments of safety-related systems, structures, and components.
  - Describe the details of operational programs, security, emergency, quality assurance, fire protection, and organizational programs necessary for safe construction, operation, and decommissioning of the facility.
  - Provide supporting technical information, including design bases, codes and standards used, risk analyses, effluent and radiation controls, criticality safety, and applicant technical qualifications.

Subpart C - Construction Permits and Operating Licenses (Cont.)

- § 57.60(b) *Environmental information.* An applicant must:
  - Provide information justifying application of a categorical exclusion, or if a categorical exclusion is not applicable, an environmental report or applicant-prepared environmental assessment

- § 57.60(c) *Request for generic finality.* An applicant may:
  - Include in its joint application a request that the Commission afford generic finality, in accordance with § 57.142(e), to the construction permit, associated operating license(s), or both.

- § 57.60(d) *Large designated areas.* Provides the information that must be included in a joint application for a CP and associated OL(s) that designates large geographical areas for construction and operation.

Subpart D - Manufacturing Licenses

- A manufacturing license (ML) provides authorization to manufacture and possess reactors and affords finality to the design for the purpose of referencing in a joint application for a CP and OL(s).
  - Requires final design information for the manufactured reactor and information related to the manufacturing processes, organization, controls, and inspections.
  - One opportunity for contested hearing on the application.
  - One ACRS review of the application.

- § 57.155 *Contents of applications; technical information in final safety analysis report.* An applicant must:
  - Include a final safety analysis report covering the design of the manufactured reactor and specifying the site parameters postulated for the design.
  - Propose technical specifications applicable to the manufactured reactor.
  - Provide interface requirements between the manufactured reactor and the remaining portions of the nuclear plant *or* include all non-site-specific information on the remaining portions of the nuclear plant that would be included in a joint application for a CP and associated OL(s).

Subpart D - Manufacturing Licenses (Cont.)

- § 57.160 *Contents of applications; additional information.* An application:
  - Must include information related to the manufacturing processes, organization, controls, and inspection.
  - May include standard operational programs
  - May include information related to loading fuel and the required features to prevent criticality

- § 57.197(d) *Fuel loading.* A holder of a manufacturing license may load fuel into a manufactured reactor pursuant to a license issued under part 70 only if the manufactured reactor is configured before its fuel loading and during storage and transport with features to prevent criticality that are specified in the manufacturing license

Subpart G - Irradiated Fuel Storage, Decommissioning, and License Termination Requirements

- Relies on the regulations in 10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste," which would provide a general license for fuel storage to Part 57 OL holders (the same as for Part 50 OL holders and Part 52 combined license holders).
- Clarifies the need for a specific license under Part 72 for storage of irradiated fuel at a location other than the site of a power reactor (e.g., a manufacturing facility).
- Allows for in-reactor storage of irradiated fuel, subject to the conditions of a Part 57 OL or a Part 70 license that would ensure safety of the fuel during storage.
- The provisions in proposed Part 57 related to decommissioning are generally consistent with the framework in § 50.82(b) for non-power production or utilization facility licensees.
- Applicants can submit decommissioning plans with the initial joint application for a CP and associated OL(s).
- Provides flexibility for the variety of decommissioning strategies that may be included in deployment models, including site-specific decommissioning cost estimates, dismantling the reactor at a location other than the deployment site, and refurbishment and redeployment of reactors.

Subpart I – Transportation Package Design Certification

- Relies on the regulations in 10 CFR Part 71, “Packaging and Transportation of Radioactive Material,” for transportation package certification.
- Allows for the use of a risk methodology or other risk-informed approach for evaluating normal and/or accident conditions that has been endorsed or otherwise approved by the Commission to evaluate a package for certification (e.g., SECY-24-0062, “Risk-Informed Methodology for a Future Transportable Triso-Based Micro-Reactor Package Application” (ML23320A124))
- Includes provisions for the fueled reactor as the transportation package
- Includes provisions for the fueled reactor as the contents of a transportation package
- Requires that features to prevent criticality are in place during transportation

Subpart P – Operator Licensing and Human Factors

Generally Licensed Reactor Operators (GLRO)

- If no reliance on operator action to maintain the reactor below 1 rem dose-based entry criterion (10 CFR 57.25(a)), then a general license approach is permitted.
- Defined in Part 57 as an operator-independent facility.
- A general license is required to:
  - Manipulate reactor controls.
  - Direct the activities of other licensed operators.
  - Monitor plant conditions during reactivity or power level changes.
- Licensee Responsibilities
  - Incorporate human-system interface requirements into the plant design.
  - Develop and maintain a staffing plan.
  - Develop, implement, and maintain training, examination and proficiency programs for initial and continuous training using a systems approach to training.
- Designation of GLROs
  - Upon successful completion of an initial training and examination program, licensee may designate individuals to perform GLRO activities for a specific facility.
- Annual Reporting to the NRC
  - Submit list of GLROs to the NRC annually, including new additions and deletions since last report.
  - Supports inspection oversight.

Subpart P – Operator Licensing and Human Factors

Specifically Licensed Reactor Operators Requirements

- If operator action is required to maintain the reactor below 1 rem dose-based entry criterion (10 CFR 57.25(a)), then a more focused operating licensing process is required.

- Defined in Part 57 as an operator-dependent facility.

- Key requirements include:
  - Individually licensed by the NRC (submission of applications)
  - Medical exams
  - NRC-approved licensing examination
  - Part 26 – “Fitness for Duty Programs”
  - NRC-approved training and proficiency/requalification
  - Subject to individual license conditions

Part 26 – Subpart P, Fitness for Duty

- If operator action is not relied upon to maintain the reactor below the 1 rem radiological dose criterion (10 CFR 57.25(a)) or a credible operator or maintenance error cannot result in exceeding the dose criterion:
  - The licensee can develop a fitness for duty (FFD) program of its own specification.
  - Otherwise, the licensee needs to implement proposed Subpart P of 10 CFR Part 26 (designed for Part 57 entities) *or* all of 10 CFR Part 26 except Subparts K and P (what the currently operating power reactor licensees implement).

- NRC will provide guidance on the essential elements that should be included as part of a licensee-developed FFD program.

- FFD program information is required to be included in the license application.

- Proposed Subpart P of 10 CFR Part 26 is structured after FFD program in 10 CFR Part 53 (Subpart M of Part 26) using the lowest tier FFD requirements.

- The requirements in proposed Subpart P of 10 CFR Part 26 are essentially equivalent to those requirements in 10 CFR Part 26, Subpart K, “FFD Program for Construction,” but have been supplemented by requirements from 10 CFR Part 26, Subparts A, “Administrative Provisions,” E, “Collecting Specimens for Testing,” I, “Managing Fatigue,” and O, “Inspection, Violations, and Penalties.”

Part 26 – Subpart P, Fitness for Duty

- 10 CFR Part 26, Subpart P would enable the use of:
  - Oral fluid, hair, or blood specimens for drug testing/screening
  - Split specimen collections
  - Virtual collection of specimens
  - Portable screening instruments
  - Live or captured video and audio for behavior observational monitoring
  - Offsite collection facilities

Part 57 Licensing Pathways

- Proposed Part 57 would provide applicants with several licensing options to fit their deployment models:
  - A joint application for a CP and associated OL(s) for deployment of nuclear reactors and nuclear plants.
  - An ML for approval and manufacture of nuclear reactors of standardized designs.
  - A standard design approval (SDA) for approval of entire reactor designs or major portions thereof.
  - Applicants would be able to combine requests for these types of licenses and approvals with requests for licenses, approvals, and certifications under other regulations (e.g., 10 CFR Parts 70, 71, and 72) in a single application to holistically address their deployment strategies.

Part 57 Licensing Pathways

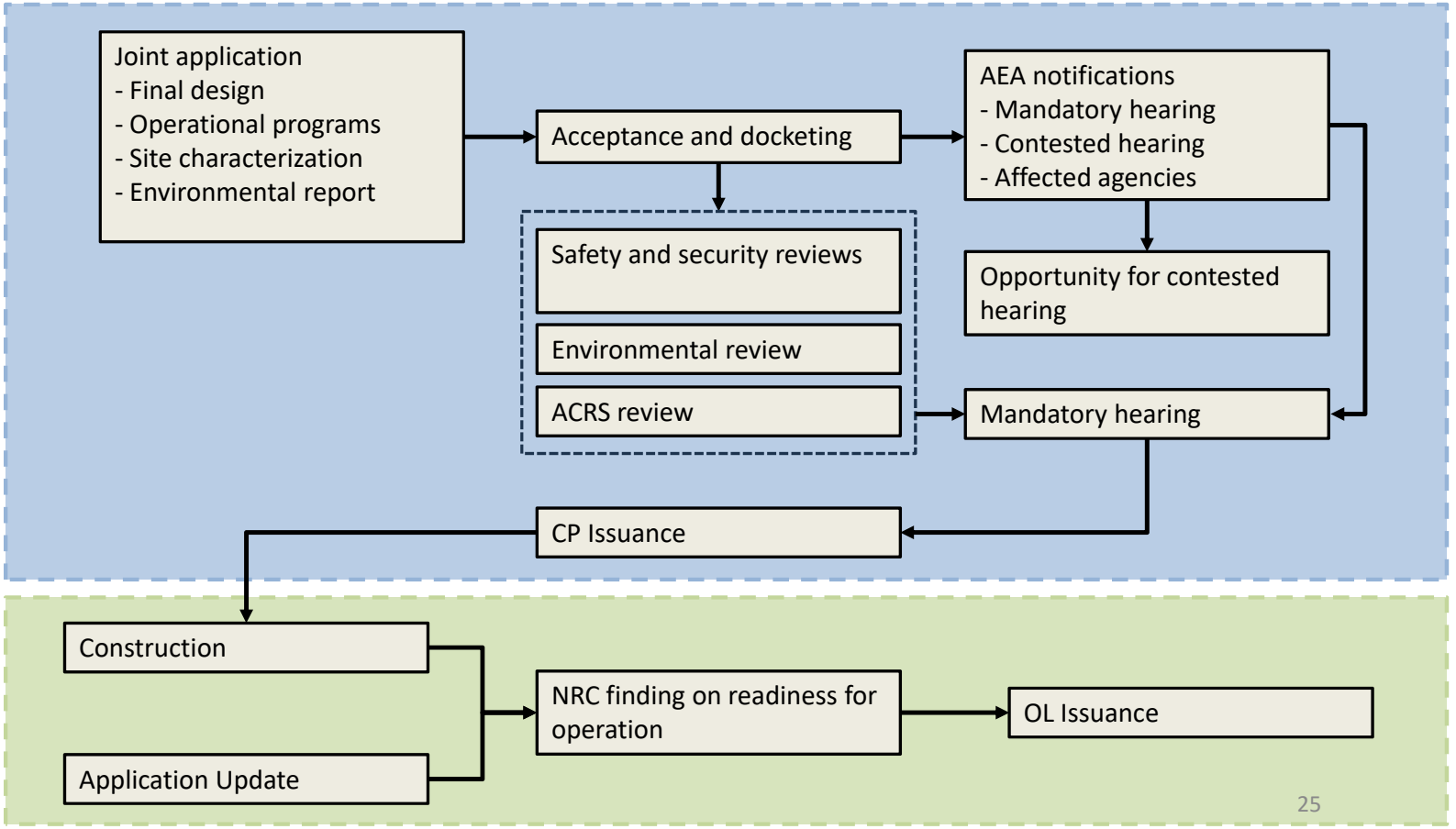
- Proposed Part 57 would include expanded finality provisions to focus “nth-of-a-kind” licensing on applicant- and site-specific information.
  - Standard reactor and plant designs approved through a CP and OL or ML.
  - Standard operational programs approved through a CP and OL or ML.
  - Postulated site parameters for reactor and plant designs.
- Proposed Part 57 would increase flexibility for making changes.
  - ML holders could make changes without prior NRC approval (similar to 10 CFR 50.59).
  - OL holders for manufactured reactors could implement approved license amendments to the ML without filing their own amendment requests.
  - ML holders and OL holders that reference the ML could combine license amendment applications.
  - Analysis of each departure, both individually and cumulatively, from the design characteristics, site parameters, terms and conditions, or approved design of the nuclear reactor, nuclear plant, or manufactured reactor would not require special circumstances justifications.

Part 57 Licensing Pathways

- Proposed Part 57 would include options for reactor site approvals in a CP
  - Approval of one site for a single reactor
  - Approval of multiple sites for a single reactor
  - Approval of multiple sites for multiple reactors
  - Approval of a large geographical area for one or more reactors
- Proposed Part 57 would establish a general license for construction
  - The general licensee must have a docketed joint application that references a Part 57 ML and a Part 57 CP and OL that were afforded generic finality.
  - The general licensee must have notified the NRC that all applicable permits, licenses, approvals, and other entitlements have been obtained, and all applicable Federal environmental consultations must have been completed.
  - The general licensee must not allow radioactive material, special nuclear material, or a manufactured reactor to be brought to the site of construction.
  - The activities undertaken by the general licensee are at its own risk.

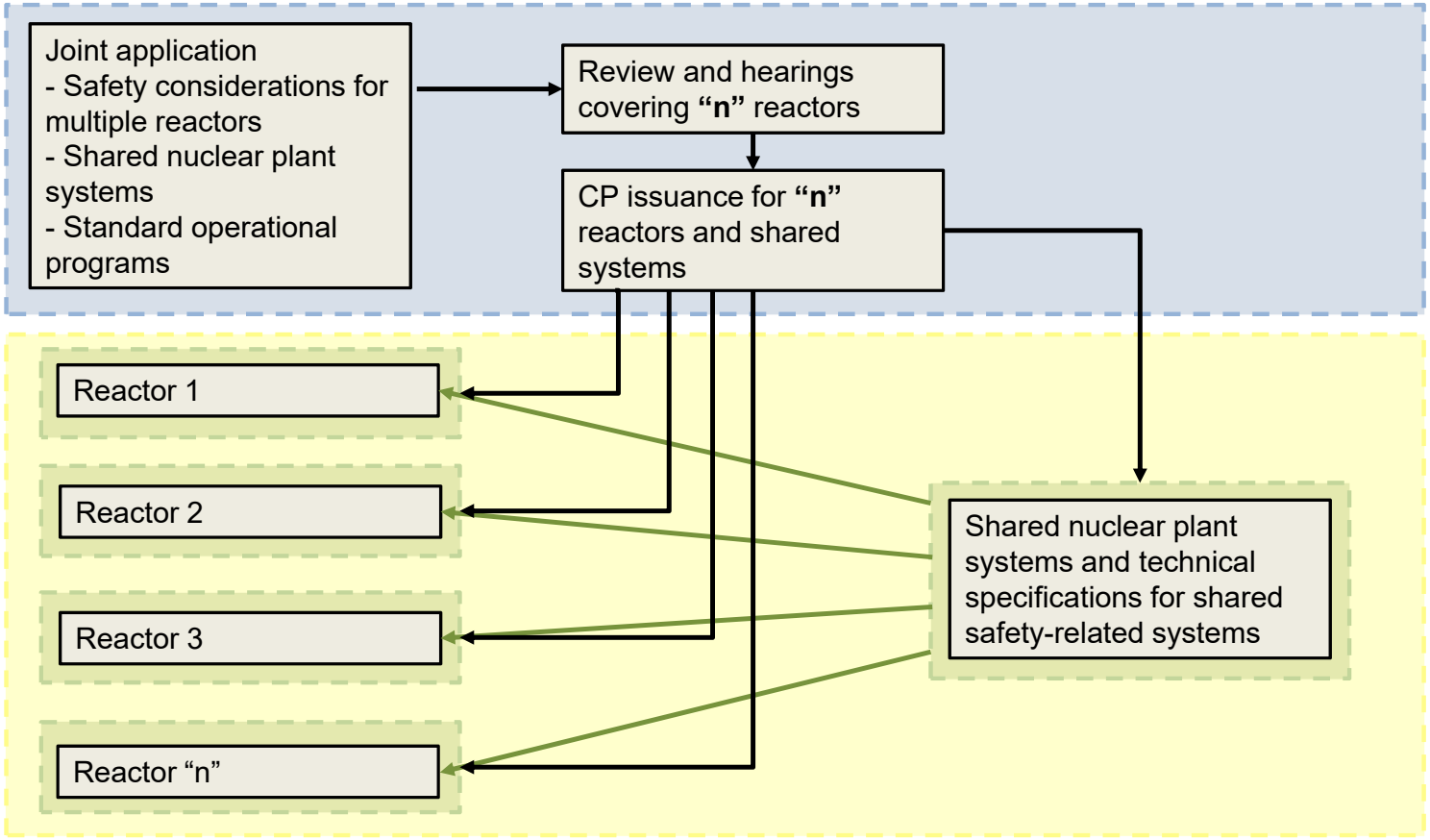
Part 57 Licensing Pathways

Example 1: Joint Application for a CP and OL for a Single Reactor



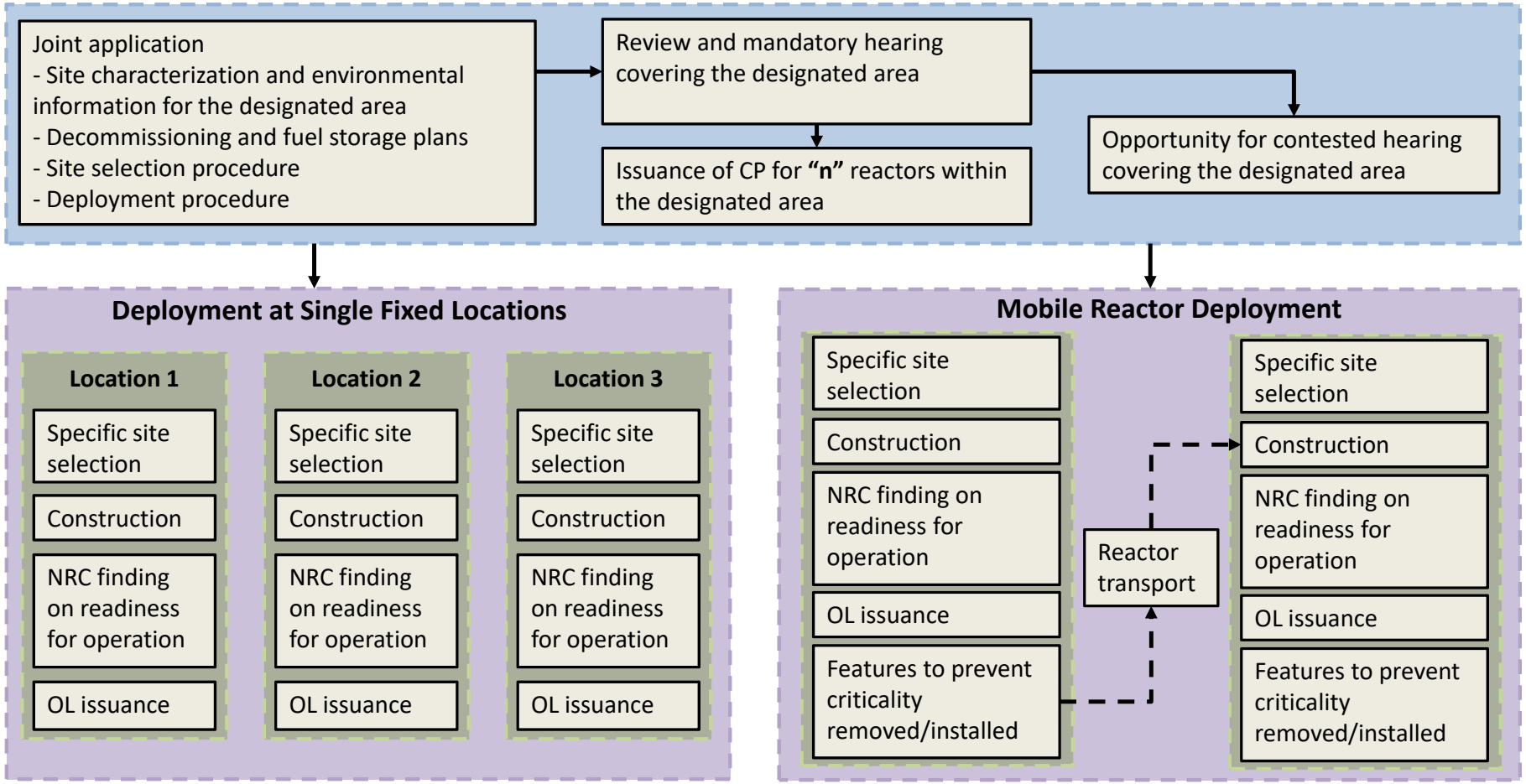
Part 57 Licensing Pathways

Example 2: Joint Application for a CP and Associated OLs for Multiple Reactors at a Single Nuclear Plant



Part 57 Licensing Pathways

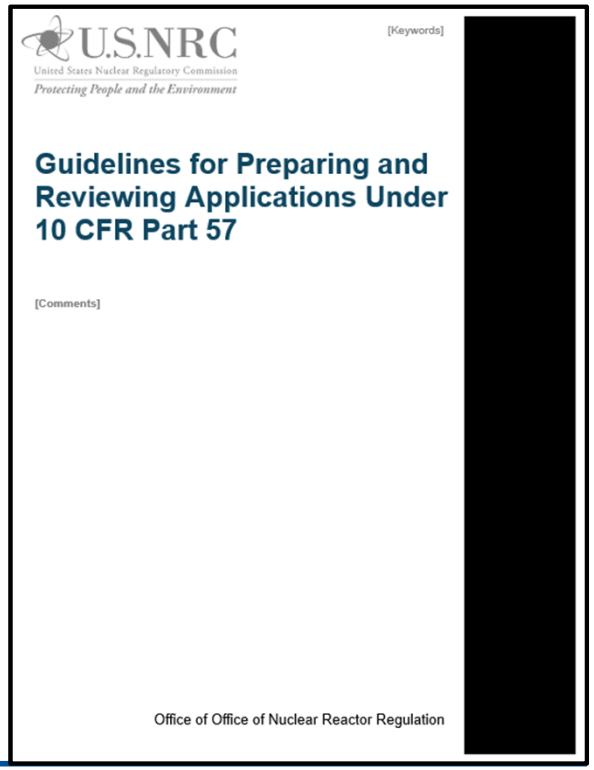
Example 3: Joint Application for a CP and Associated OLs for Reactors to be Deployed in a Large Designated Area



Part 57 Implementation Guidance

Draft NUREG-2271, "Guidelines for Preparing and Reviewing Applications Under 10 CFR Part 57"

- Supports meeting the Atomic Energy Act of 1954, as amended, for issuing a Section 103 commercial license
- Patterned from existing licensing practices (e.g., non-power production and utilization facilities) and guidance (NUREG-1537).
- Combines applicant and staff guidance into one document for developing and reviewing submittals under Part 57.
- Provides a flexible, graded hazard analysis approach consistent with DOE authorization methodologies.



Part 57 Implementation Guidance (cont.)

1. Facility Introduction
2. Site Characterization
3. **Design of Structures, Systems, and Components**
4. Reactor Description
5. Reactor Coolant and Cooling System
6. Engineered Safety Features
7. Instrumentation and Control Systems
8. Electrical Power Systems
9. Auxiliary Systems
10. Radiation Protection and Waste Management
11. Conduct of Operation and Operational Programs
12. **Accident Analysis**
13. Technical Specifications
14. Financial Qualifications
15. Decommissioning and Possession-Only License
16. Environmental Review
17. Part 57 Licensing Pathways
18. Operator Licensing and Human Factors Engineering

Appendix A: Safety-Related Terms for Advanced Nuclear Plants
Appendix B: Deterministic SSC Classification
Appendix C: Guidance and Information for Developing Advanced Reactor Source Terms
Appendix D: Format and Content of Decommissioning Plans for Facilities Licensed Under 10 CFR Part 57
Appendix E: Environmental Plant and Site Parameter Envelope Values
Appendix F: Graded Approach to Site Characterization for Part 57 Applications

Part 57 Guidance, Chapter 3, Design of Structures, Systems and Components

- **Safety-Focused Nuclear Design** - Emphasizes defense-in-depth, robust safety margins, and SSC features that prevent and mitigate uncontrolled radiological release for bounding design-basis accidents.
- **Advanced Reactor Expectations** - Incorporates passive and inherent safety characteristics, simplified systems, enhanced reliability, and extended operator grace periods.
- **Consistent Safety Terminology** - Uses Commission and internationally aligned terms—such as inherent safety characteristics, passive/active systems, fail-safe, and simplified safety systems—to improve clarity across technical and regulatory communities.
- **Comprehensive Principal Design Criteria (PDC)** - Classifies SSCs by safety significance and integrates the six required design attributes: reactivity control, heat removal, fission-product retention, shielding, effluent control, and security-by-design.
- **Hazard-Resilient Facility Design** - Ensures SSC performance under meteorological, hydrological, and seismic events through appropriate codes, standards, redundancy, and performance-based criteria.
- **Site Parameter Envelope (SPE)** - Establishes bounding environmental and geologic parameters to support standardized review, multi-site deployment, and predictable licensing outcomes.

Part 57 Guidance, Chapter 12, Accident Analysis

Consequence-Oriented Framework: Part 57 emphasizes outcomes by requiring applicants to establish the licensing basis through Chapter 12, Accident Analysis, ensuring safety performance is demonstrated rather than prescribing specific design features. (SRM-SECY-98-144 desire for risk-informed and performance-based regulation)

Graded Systematic Risk Evaluation: The rule adopts a risk-informed, graded approach, allowing the depth and rigor of analysis to scale with the potential consequences of accidents, promoting efficiency while maintaining safety. (Hazards Anaysis → Design-Basis Events → Design Basis Accidents → MHA or MCA)

Flexible Risk Analysis Methods: Applicants have the discretion to select the risk analysis methodology that best aligns with their design and business case, enabling innovation while meeting regulatory objectives. (10 CFR 57.60(a)(12) requires description of selected risk-analysis method)

Traditional Nuclear Safety Framework: Defense-in-depth and safety margins remain integral, focusing on safety-related SSCs required to manage design basis accidents and achieve safe shutdown conditions. This approach supports both prevention and mitigation strategies and informs the development of Technical Specifications. (10 CFR 57.3, "Definitions," provides definitions of these terms)

Part 57 Guidance, Chapter 12, Accident Analysis (Cont.)

12.1 Background

12.2 Accident Analyses Methodology

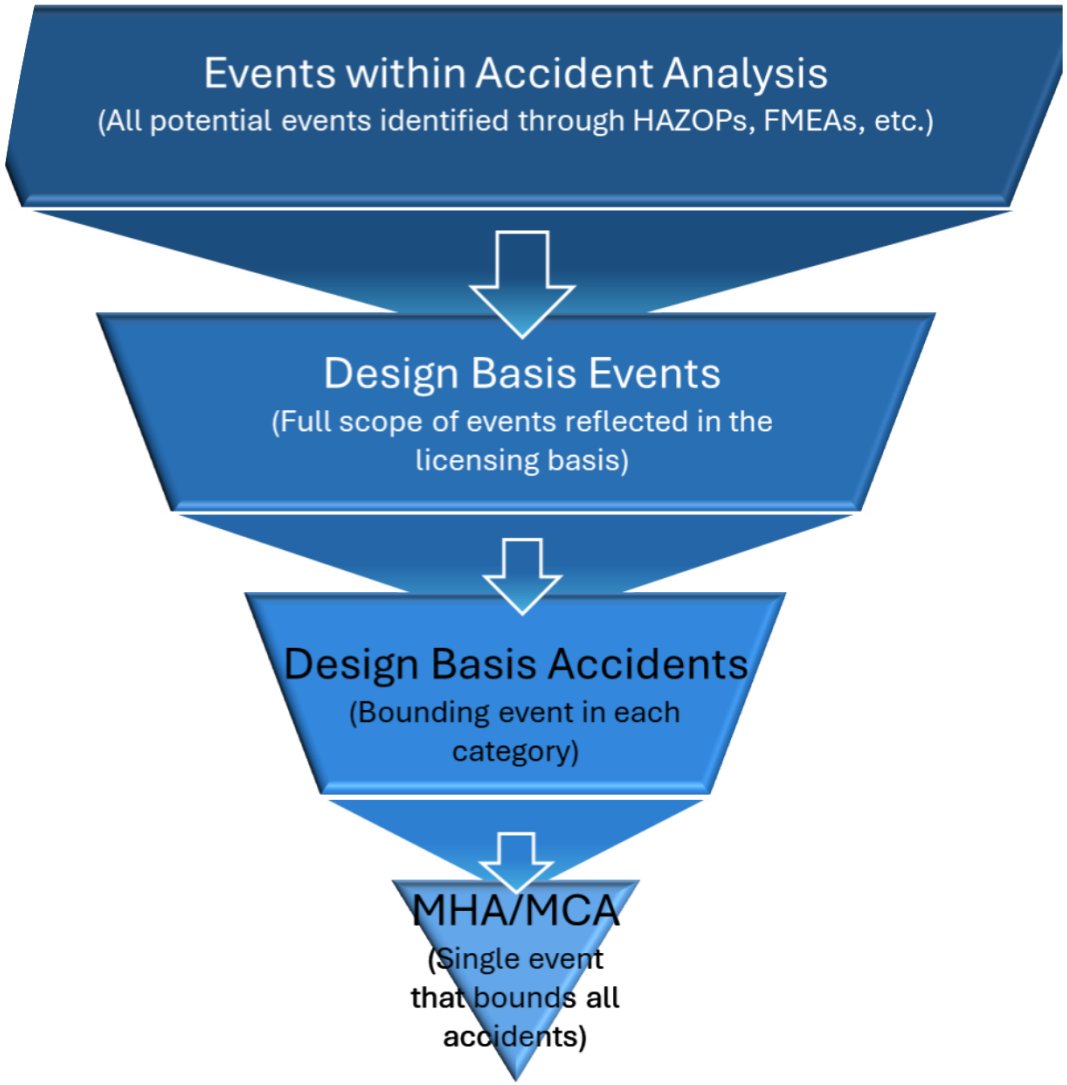
12.3 Credible Design-Basis Event Categorization

12.4 Design-Basis Accident Analyses and Consequences

12.5 Maximum Hypothetical Accident or Maximum Credible Accident

12.6 Defense-in-Depth Evaluation

12.7 Summary and Conclusions



From Figure 12-1 Relationship Between Event Groupings Within the Accident Analysis

Part 57 Guidance, Chapter 12, Accident Analysis (Cont.)

MHA and MCA

- Purpose: Siting the nuclear reactor or plant and sizing the site area boundary.
- Accident Dose Criterion: Applicants must show their reactor design meets the 1 rem TEDE limit using MHA or MCA methodologies.
- Bounding Consequence Analysis Assumptions: Bounds credible DBAs, assume a large source term from core damage, maximum leak rates, adverse dispersion, and an individual at the plume centerline without protection.
- Source Term Definition: Per 10 CFR 57.3, the source term includes radionuclide mix, physical/chemical form, release timing, and inventory fractions.

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Descriptions of the MHA and MCA are as follows

Maximum Hypothetical Accident:

- A postulated accident scenario, often highly conservative, that assumes a severe release of radioactive material consistent with physical laws, regardless of probability.
- Does not necessarily reflect a realistic or credible sequence of events but instead represents a bounding case.
- Useful in cases to accept the uncertainty in system performance.

Maximum Credible Accident:

- A postulated accident scenario, often highly conservative, that assumes the most severe release of a source term composed of fission products consistent with physical laws, under credible accident conditions.
- Unlike the MHA, the MCA does not rely on physically unrealistic or excessively conservative assumptions, focusing instead on events that are credible given the technology, safety systems, and plant operating conditions.
- Used in facility-specific safety analyses to demonstrate that SSCs can perform their intended safety functions without exceeding accident dose acceptance criteria.

Part 57 Guidance, Chapter 12, Accident Analysis (Cont.)

More on ***Establishing the Site Boundary (12.5.1.1)***

- Site Boundary Complexity: Number of units, layout, and integration level drive safety analysis complexity.
- Per-Reactor Boundary: Define boundaries individually for MHA/MCA unless shared SSCs create credible multi-unit events.
- Multi-Unit Considerations: Maximize operational margin relative to the 1 rem TEDE criterion; additional flexibilities may be needed beyond initial siting assumptions.
- Provides several reactor and nuclear plant arrangement site boundary examples.

The Part 57 1-rem eligibility criterion is applied at the site level. From a careful reading of § 57.25(a) (see bold text):

> ”To be eligible for a construction permit and operating license or a manufacturing license under this part, an applicant must demonstrate that its **nuclear reactor or nuclear plant design and operation** meets the following entry criteria:
>
> (a) An evaluation of the applicable radiological consequences shows with reasonable assurance that any individual located in the unrestricted area following the onset of a postulated accident that bounds a broad range of design basis **accidents would not exceed 1 rem** (0.01 Sv) TEDE for the duration of the accident; …”

Therefore, a **nuclear plant** with several reactors is required to size the site boundary at a location that would not exceed 1 rem (0.01 Sv).

Part 57 Guidance, Chapter 12, Accident Analysis (Cont.)

- Single-Unit Configuration with Radial Simplification.
  - Site boundary is typically defined by a simple radial distance from the reactor center or the most conservative release point.
  - Licensee has total authority over all activities.

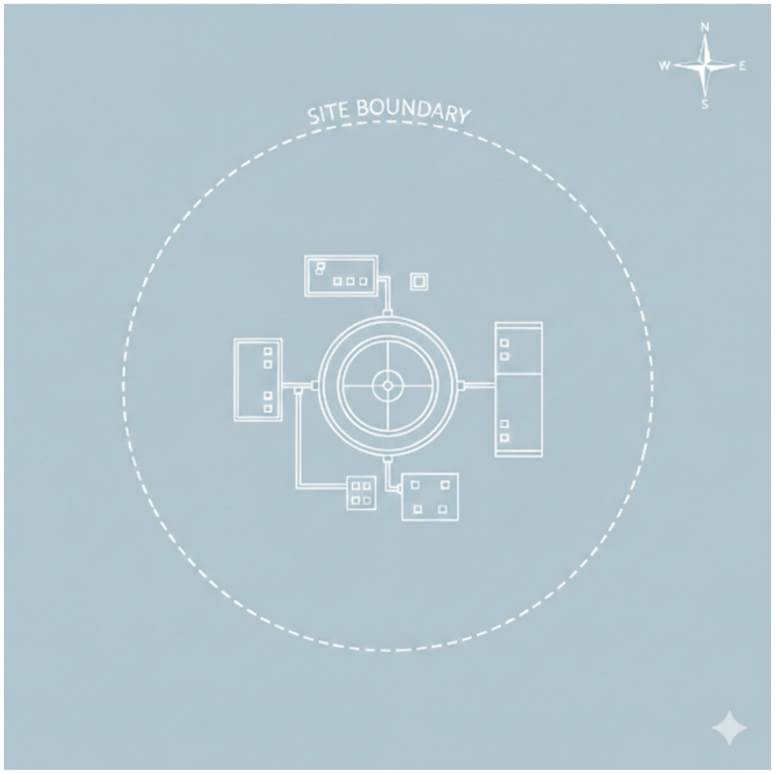


Figure 12-4 Schematic Representation of Single-Unit Configuration Relative to Site Boundary

Part 57 Guidance, Chapter 12, Accident Analysis (Cont.)

- Large Area with Multiple Reactors and Independent SSCs
  - Reactors may be treated as independent radiological sources.
  - Each reactor may have its own individual site boundary; however, these boundaries may be nested within a larger, licensee-controlled perimeter.
  - **Spatial Separation**: Units are sited far enough apart that the site boundary of "Unit A" does not overlap with the site boundary of "Unit B."
  - **Operational Control**: While the reactors are physically separate, the licensee may manage the entire perimeter to simplify security and emergency planning.

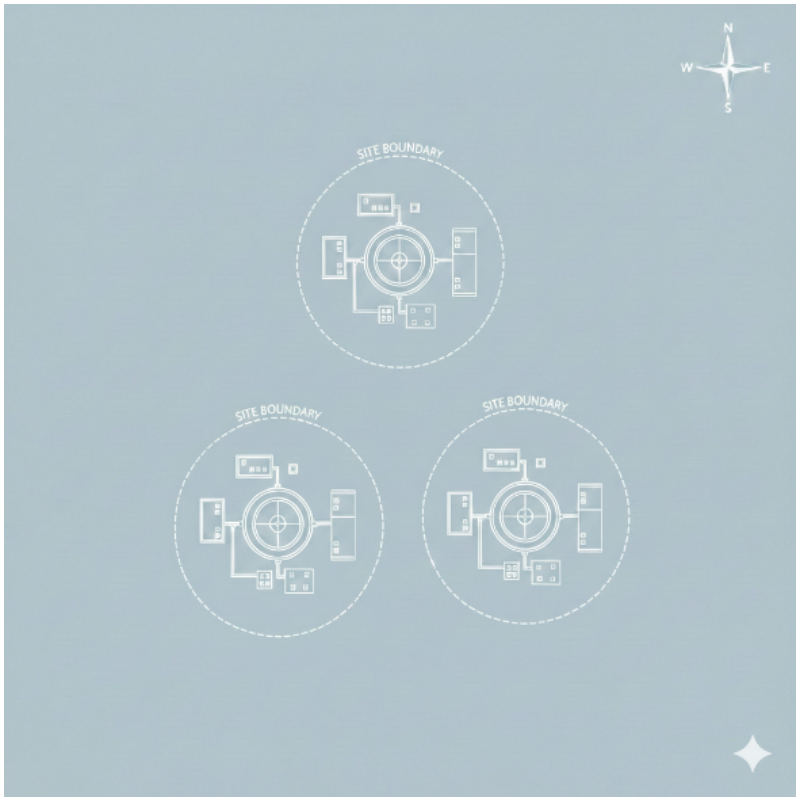


Figure 12-5 Schematic Representation of a Large Area Configuration with Independent SSCs Relative to Site Boundaries

Part 57 Guidance, Chapter 12, Accident Analysis (Cont.)

- Multi-Unit Nuclear Plant with Shared SSCs Meeting 1-rem Site Boundary
  - Reactors share safety-related SSCs-such as a common control room, shared emergency power, or a collective ultimate heat sink-the site boundary analysis becomes more rigorous.
  - **Bounding Source Term**: Because a failure in a shared system could potentially impact multiple reactors simultaneously, the applicant must establish a bounding MHC/MCA source term. This would involve calculating the credible DBA release from all affected units (see subsection 12.4.11) to ensure the site boundary.
  - **Integrated Boundary**: In this scenario, the site boundary is typically not a series of individual circles, but a single, contiguous perimeter encompassing all nuclear reactor units and their shared infrastructure.

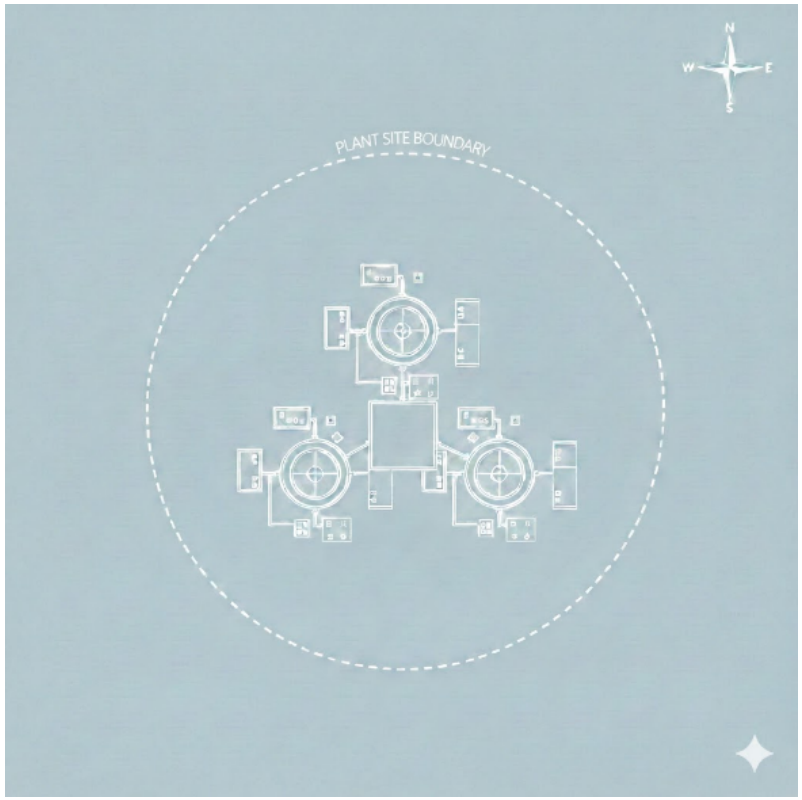


Figure 12-6 Schematic Representation of Multi-Unit Site with Shared SSCs Relative to Site Boundary

Part 57 Guidance, Chapter 12, Accident Analysis (Cont.)

- Multi-Unit Nuclear Plant Meeting 1-rem Site Boundary:
  - Assess the bounding credible DBA for each reactor that can impact all reactors regardless of safety-related SSCs being shared or not. The likely credible DBA that impacts all reactors may be a seismic event.
  - Develop a nuclear **plant-based MHA/MCA source term** that bounds the nuclear plant credible DBA impacting all reactors at the nuclear plant.
  - Treat the MHA/MCA release as a point release near or at the geometric center of the nuclear plant.

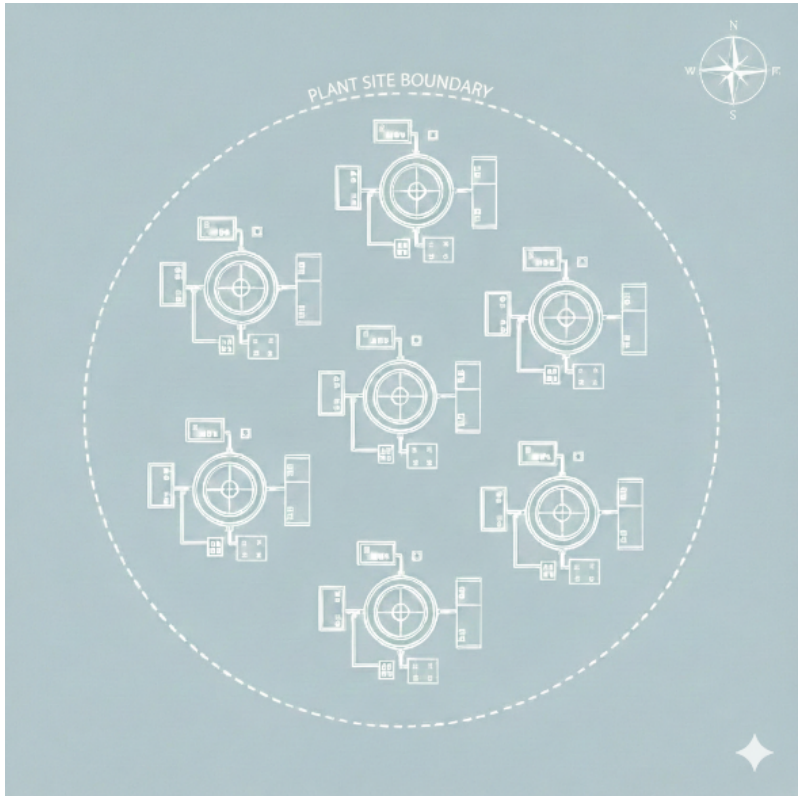


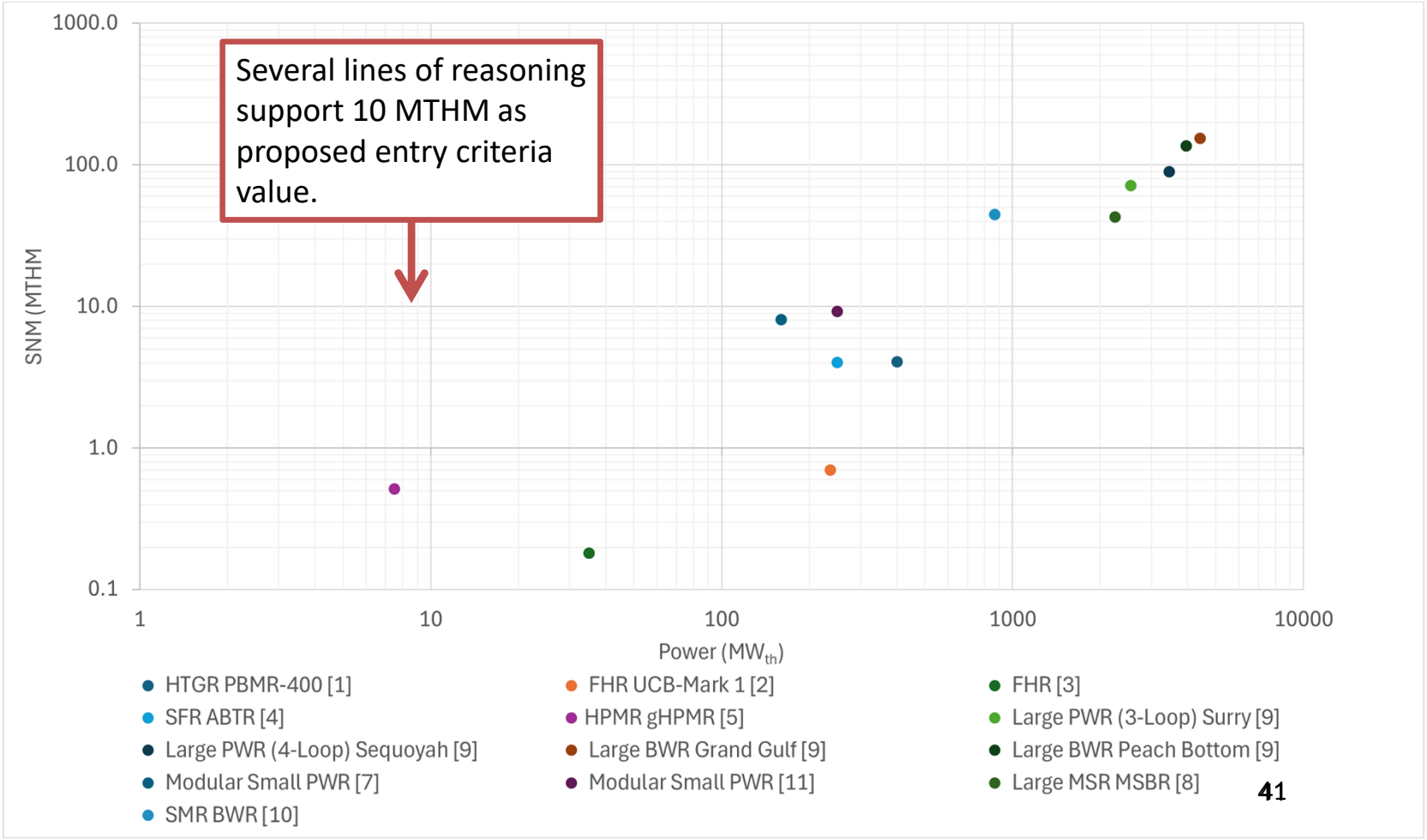
Figure 12-6 Schematic Representation of Multi-Unit Site with Shared SSCs Relative to Site Boundary

Schedule

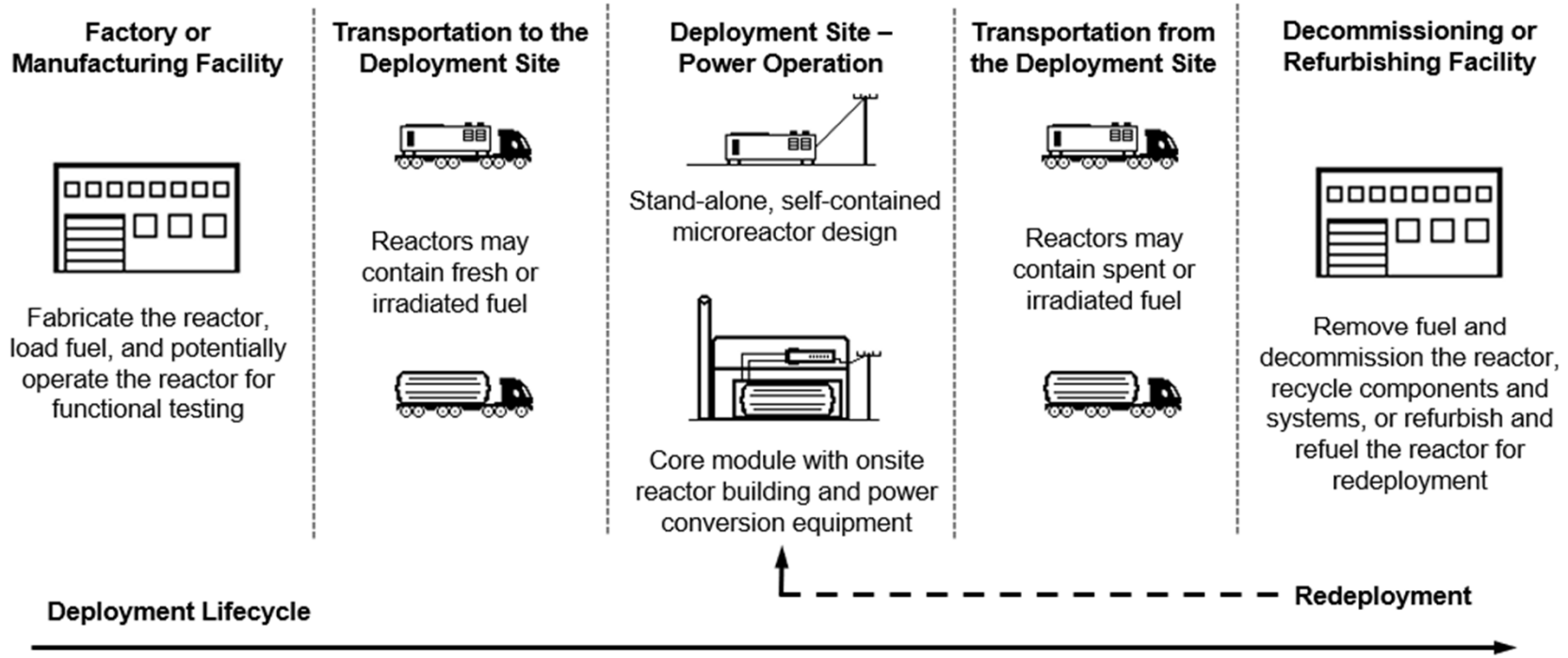
- Public comment period – 45 days (ends June 15, 2026)
- Public meeting – May 2026
- Estimated date to publish final rule in the Federal Register: December 1, 2026

Background Slides

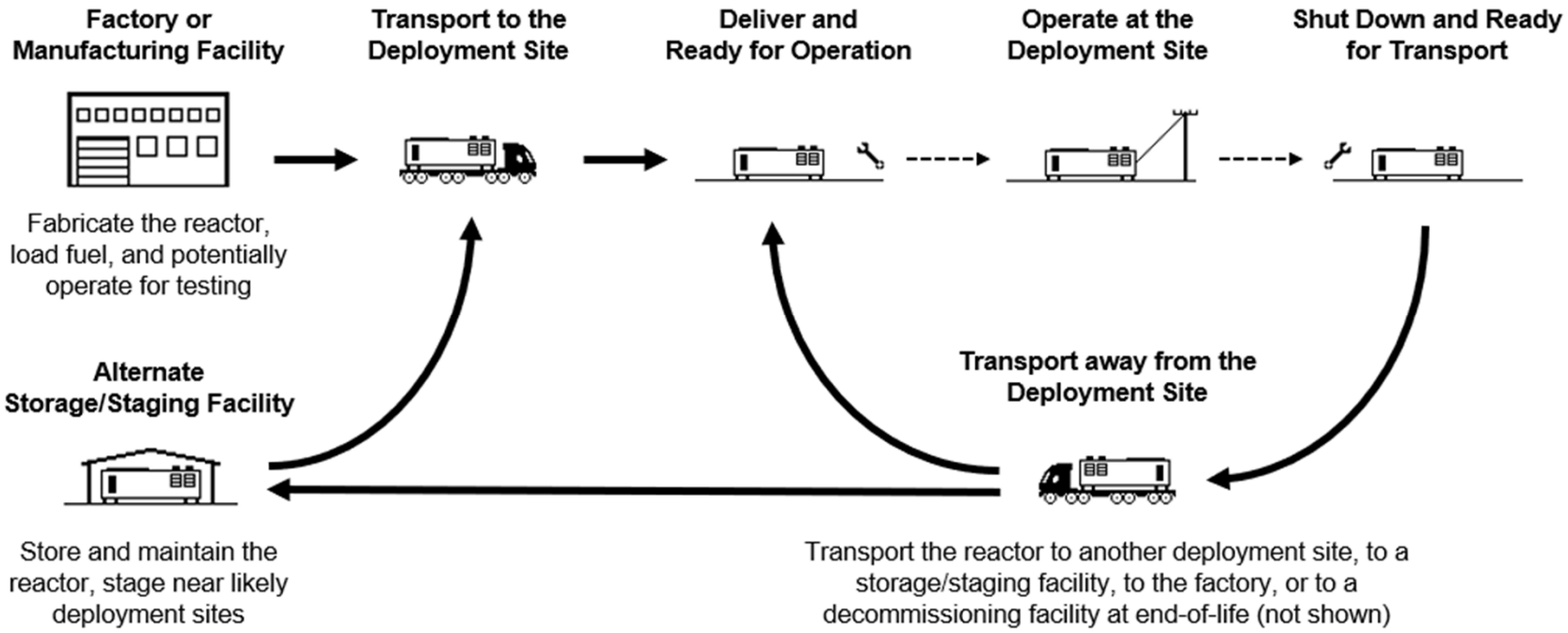
Fuel Mass Limit



Conceptual Deployment Model for Transportable Microreactors



Conceptual Deployment Model for Mobile Microreactors*



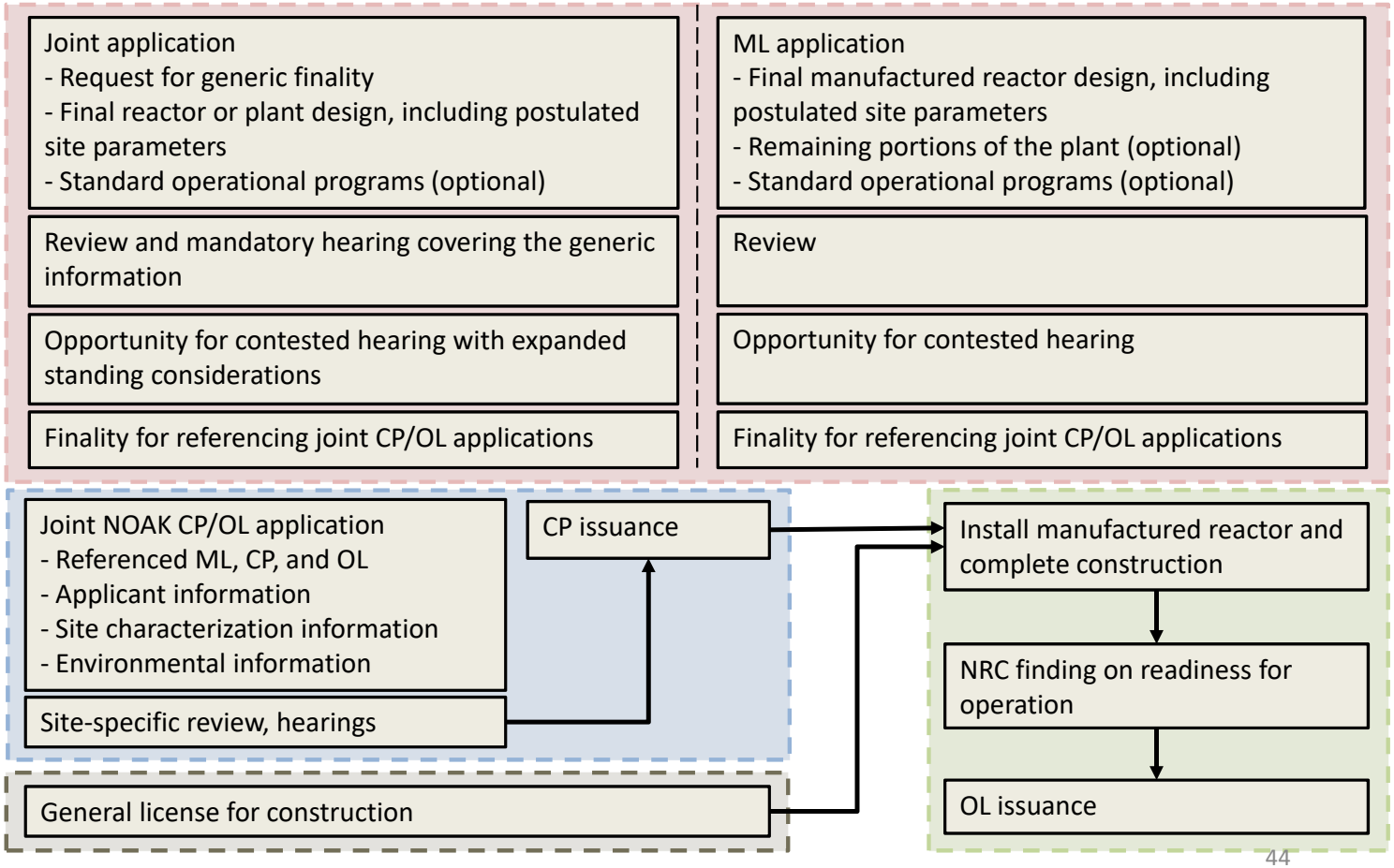
Indicates removal of features to prevent criticality

Indicates installation of features to prevent criticality

* A mobile microreactor would be a microreactor that is intended to be operated at more than one fixed location. Mobile microreactors would not be authorized to operate while in motion.

Proposed Part 57 Licensing Pathways

Example 4: Finality and "Nth-of-a-Kind" (NOAK) Licensing and Deployment



Transformative Aspects of Part 57 (cont'd)

Specific provisions include:

- Ability to provide custom definitions without requesting exemptions: § 57.3
- Redefine *construction* to just safety-related SSCs: § 57.3
- Finality of Part 50 and 52 references in Part 57 applications: § 57.16(b)(1)-(2),
- Finality of operational programs in a ML or first-of-a-kind CP/OL: § 57.16(b)(1)
- Finality of Part 57 MLs, CPs, and OLs and departures in referencing applications: § 57.16(c)
- Combining applications for all aspects of microreactor deployment: § 57.18(a)
- Reduce regulatory burden of changes affecting manufacturing licenses and manufactured reactors: §§ 57.18(a)(4), 57.175(d), 57.312(a), 57.312(b) [implement amendments to the ML without an amendment to the OL]
- Licensing multi-reactor plants, including replacement reactors and operational testing at a manufacturing facility: § 57.18(a)(5)
- Fleet deployment and rapid deployment: § 57.18(a)(2) [multiple sites] and § 57.60(d) [large areas]
- Referencing DOE and DoD authorizations: § 57.18(e)
- Joint application for CP and OL: § 57.19(f)

Transformative Aspects of Part 57 (cont'd)

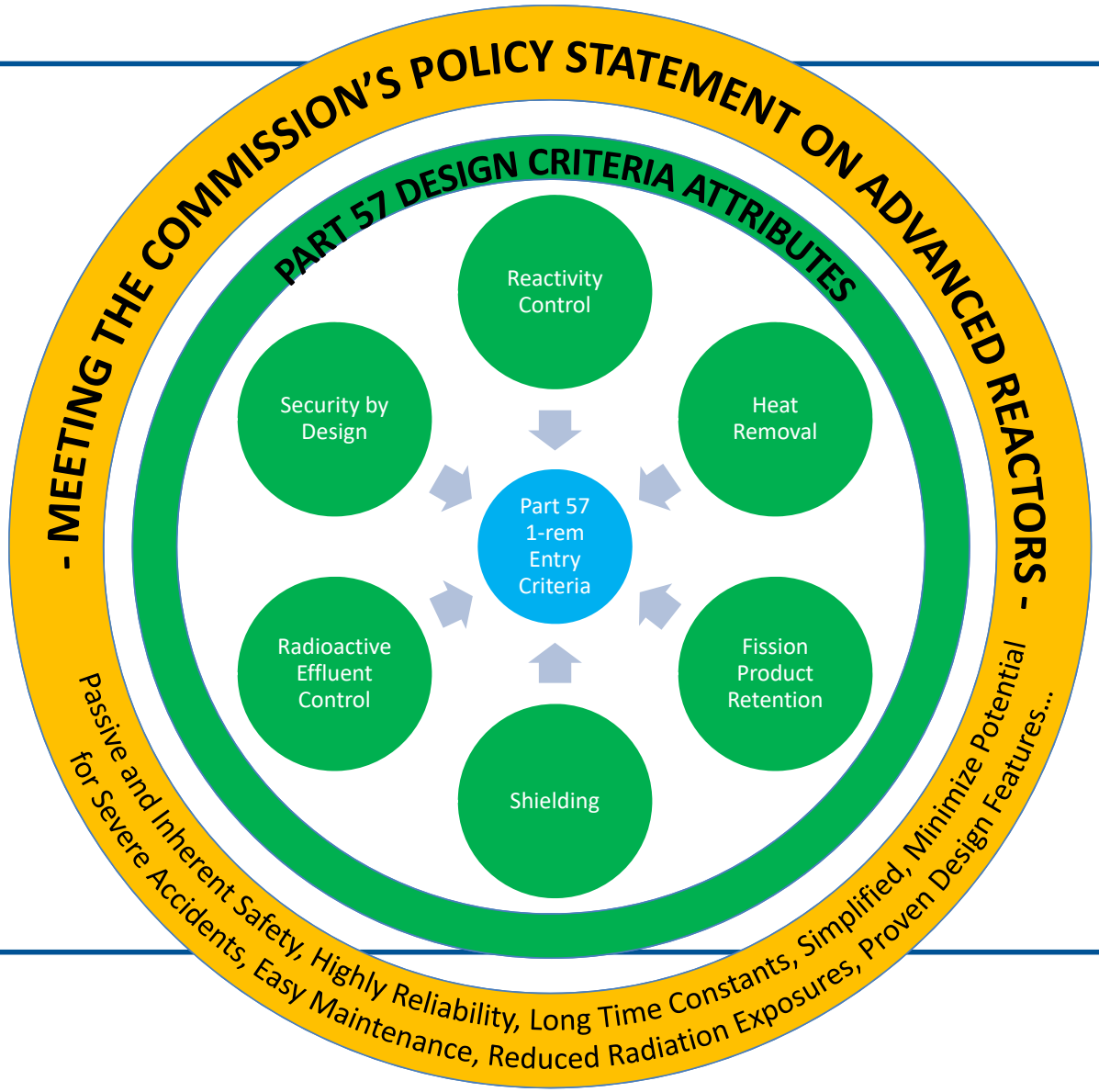
Specific provisions include:

- Dose-based eligibility criterion: § 57.25
- Design criteria attributes: § 57.30
- General license for construction: § 57.45(d)
- Remote monitoring, remote operation, and autonomous operation: § 57.60(a)(1)(iv)-(vi) and (a)(8)(xi)
- Applicant justified quality assurance program: § 57.60(a)(3)
- Siting and graded site characterization: § 57.60(a)(5)
- Use of postulated site parameter envelopes: §§ 57.60(a)(5), 57.155(b), and 57.350(b)(1)
- Appropriate emergency preparedness and security plans: § 57.60(a)(8)(iv) and (a)(8)(v)
- Custom use of codes and standards: § 57.60(a)(9)
- Increased enrichment of fuel for fresh fuel storage safety measures: § 57.60(a)(13)
- Categorical exclusion for environmental review for CPs and OLs: § 57.60(b)

Transformative Aspects of Part 57 (cont'd)

Specific provisions include:

- Standardized, generic operational programs: §§ 57.60(c), 57.142(e), 57.160(a), 57.172(a)(6), 57.175(c)
- Reduce regulatory burden of changes affecting finality of CP/OLs and MLs: §§ 57.142(c), 57.175(d)
- Approval of the complete plant design through an ML: §§ 57.155(c)(8), 57.172(a)(3), 57.172(b)(4), 57.175(c)
- Fuel loading at a manufacturing facility and transportation of fueled reactors: §§ 57.160(f), 57.197(d), 57.197(e)
- Irradiated fuel storage by OL holders, ML holders, and specific licensees: § 57.300
- Flexible decommissioning based on non-power reactor regulations, option for up-front approval, and site-specific cost estimates: §§ 57.60(a)(8)(xvii), 57.305
- Transportation package design certification, including the reactor as a transportation package: Subpart I
- Use of generally licensed reactor operators: Subpart P
- Use of Fitness for Duty program of licensee's own specification: § 26.3(f)



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