

Regulatory Considerations for Maritime Nuclear Applications



May 14, 2026
1 – 3 PM ET

The NRC can apply our existing regulatory framework to maritime nuclear deployments.

- Updates to address EO 14300 and new licensing approaches in Part 53 and the proposed Part 57* will provide additional flexibility for designers to select the pathway that best aligns with their technology.

To enable the safe and efficient licensing of these technologies, the NRC is:

- Working across the U.S. Government:
 - Participating in the Department of Energy’s Maritime Nuclear Applications Group (MNAG)
 - Developing memorandum of understanding with the U.S. Coast Guard (USCG)
- Engaging internationally:
 - Participating in various efforts at the International Atomic Energy Agency (IAEA), including several working groups and the ATLAS (Atomic Technologies Licensed for Applications at Sea) project
 - Supporting the USCG at the International Maritime Organization

Purpose of Today's Meeting

The NRC's internal maritime nuclear team is developing a white paper to evaluate how new and existing licensing frameworks can be applied to maritime nuclear technologies, including **floating nuclear power plants (FNPPs)** and **civilian nuclear propulsion systems**.

Identify where existing regulations **already accommodate maritime applications**, highlight potential flexibilities that may **support innovative designs**, and outline areas where early engagement may **clarify licensing expectations**.

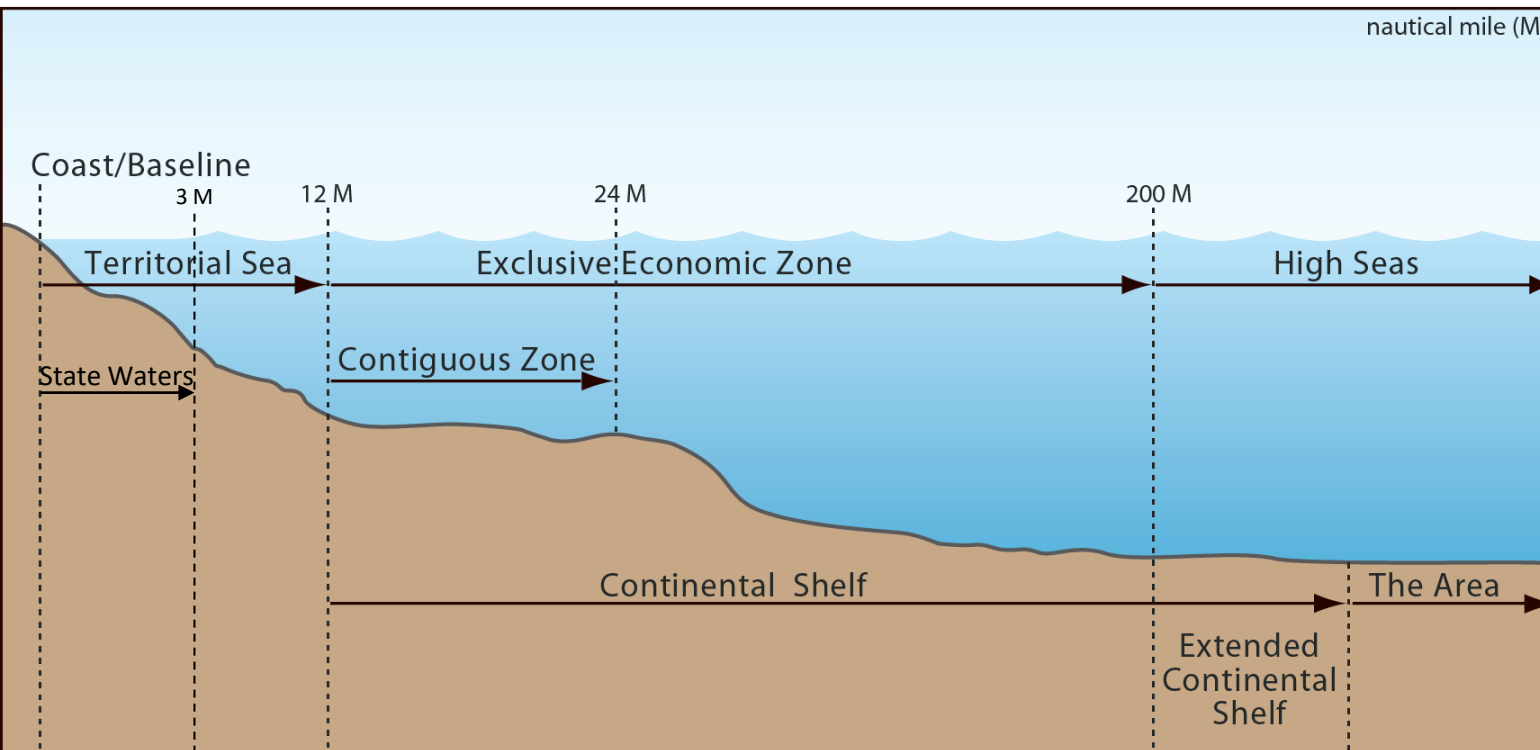
Provide high level discussion on **licensing, siting, transportation, emergency planning, security**, and related regulatory considerations to help prospective applicants understand the unique regulatory considerations associated with these technologies.

Meeting Purpose: Present the proposed outline of the white paper and collect stakeholder feedback to inform further development.

- Draft white paper targeted for release in Fall 2026.
- Additional stakeholder engagement will be coordinated, as necessary.

Deployment Scenarios & Jurisdiction

AEA Section 103, “Commercial Licenses,” states that *“no license under this section may be given to any person or activities which are **not under or within the jurisdiction of the United States...**”*



FNPP Deployments

Nearshore Deployments (< 12 NM):

- U.S. jurisdiction within territorial sea

Offshore Deployments (12-200 NM):

- Flagged barges or platforms
- Regulated under the Outer Continental Shelf Lands Act (OCSLA)*

High Seas (> 200 NM)

- Flagged barges or platforms

Propulsion

- U.S. flagged vessels remain under U.S. jurisdiction, even in foreign waters

[*43 U.S. Code § 1333\(a\)\(1\)\(a\)\(iii\)](#)

U.S. Historical Licensing Efforts

Offshore Power Systems (OPS)

- Proposed manufacturing **1,200-MWe FNPPs** using Westinghouse PWRs installed on concrete barges
- Received a **Manufacturing License (ML)** in 1982 authorizing the manufacture of up to 8 FNPPs
 - Utilities would apply for a construction permit (CP) and operating license (OL) at specific operating locations prior to deployment
- Developed a **generic “site envelope”** to bound coastal and inland deployment conditions
 - Envisioned to be deployed at breakwater-protected moorings along the East Coast

Nuclear Ship (NS) *Savannah*

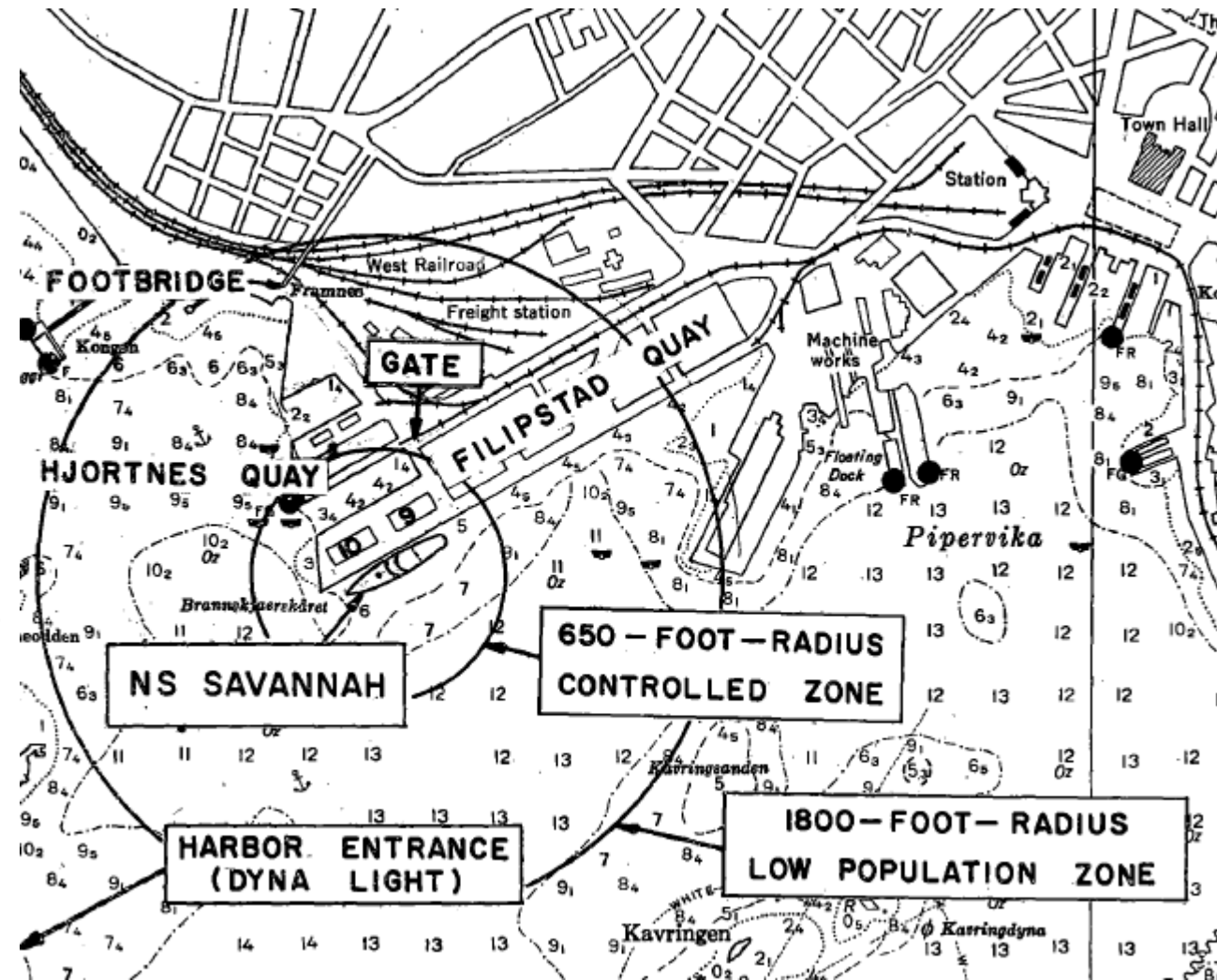
- Civilian nuclear-powered cargo and passenger ship
- Operated as an **experimental vessel** under Atomic Energy Authorization (AEC) from 1962-1965
- **Licensed by the AEC** for routine operations in 1965
- **U.S.-flagged** and certified by the USCG

NS Savannah

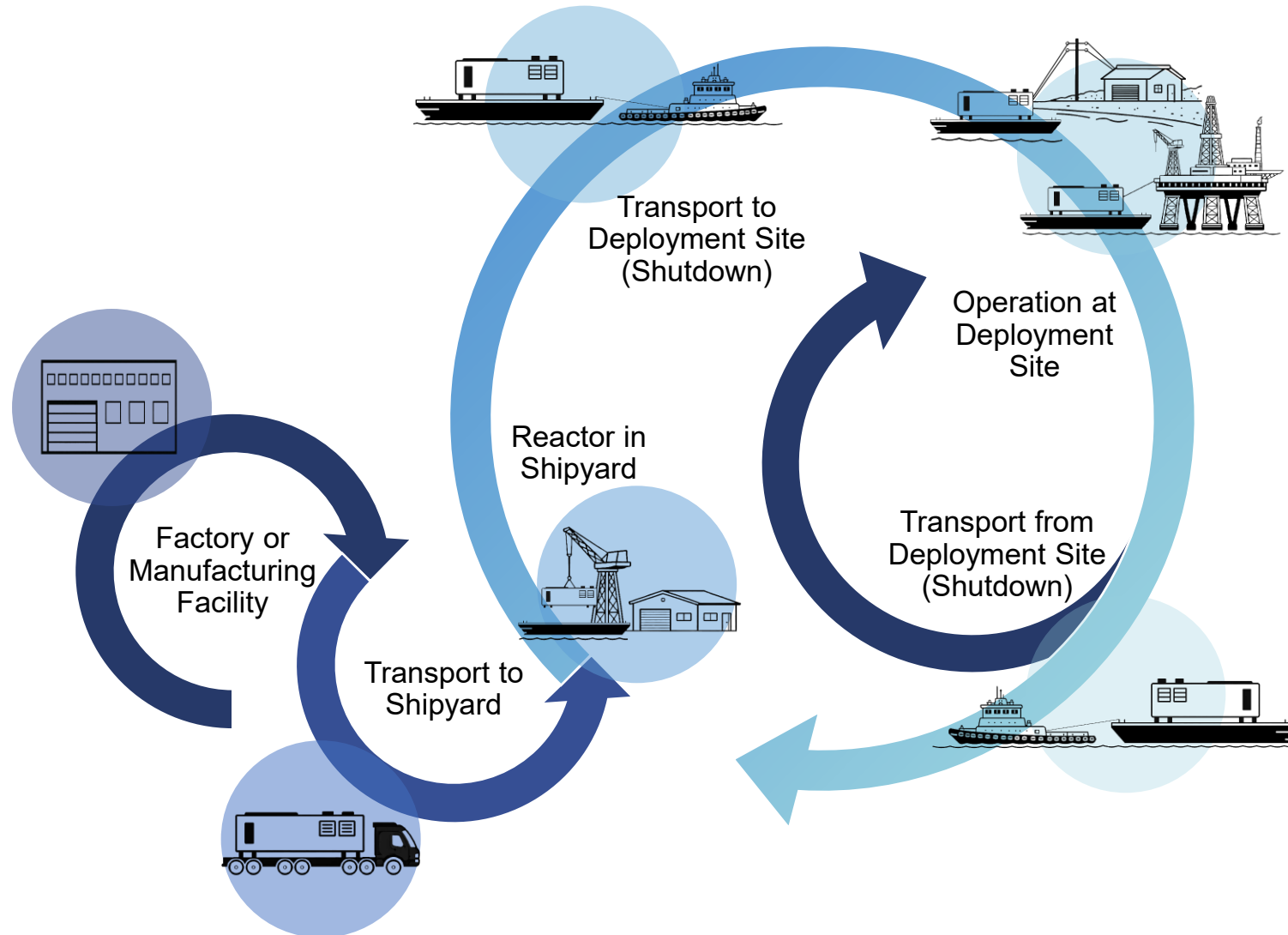
Developed port-specific safety and operating plans derived from a generic version.

Port-entry plans included:

- Operating restrictions and power-level limits during approach.
- **Site evaluation** to confirm local conditions were bounded by the vessel's licensing basis.
- **Review of controlled and low-population zones (LPZ)** relevant to the port area.
- Identification of **remote anchorage locations** for safe standby or emergency conditions.
- **Assessment of available port services**, including tugs, police, fire, and emergency response capabilities.
- **Emergency planning coordination** with local authorities and response organizations.

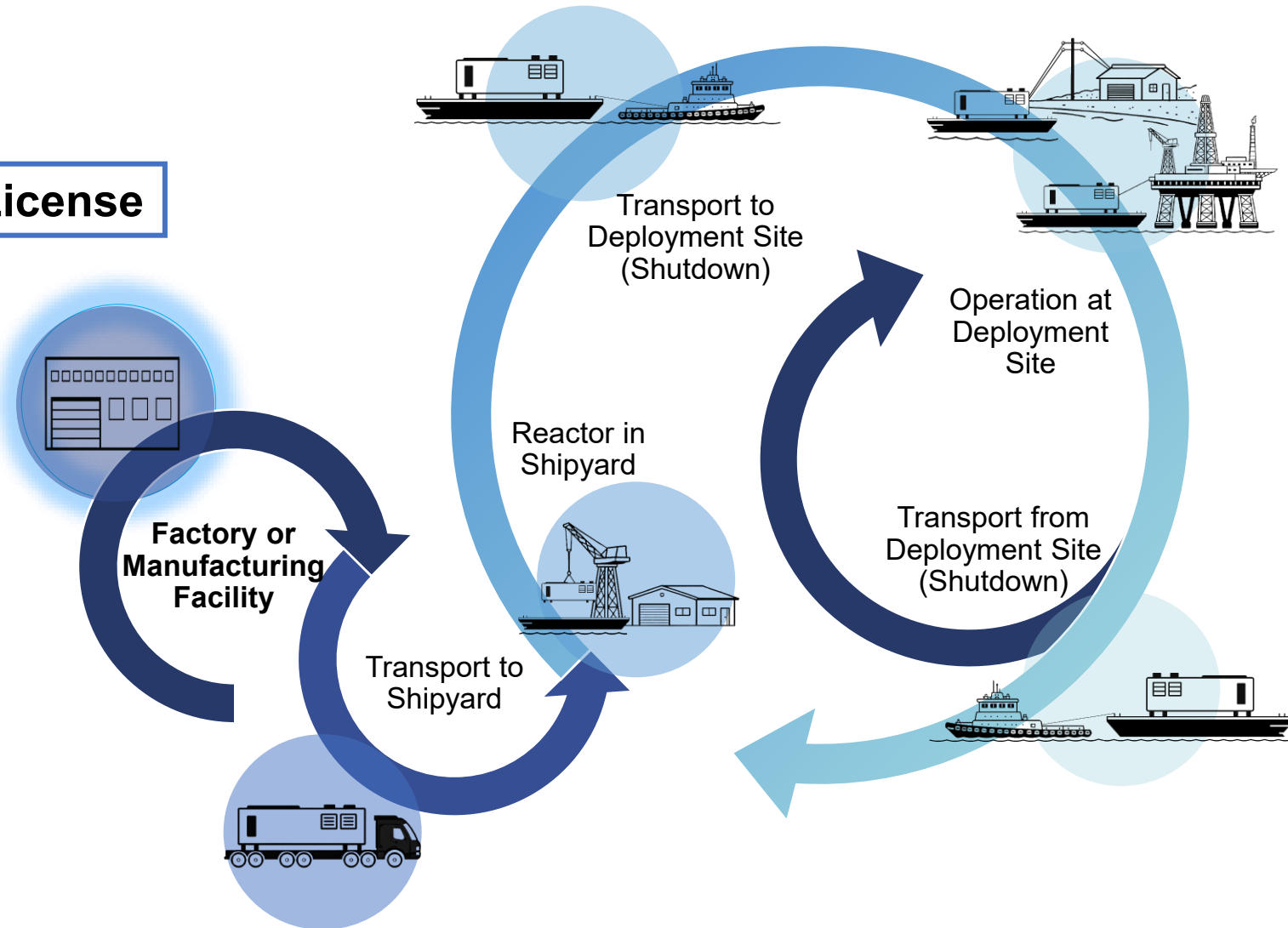


Generic Stationary Deployment Model

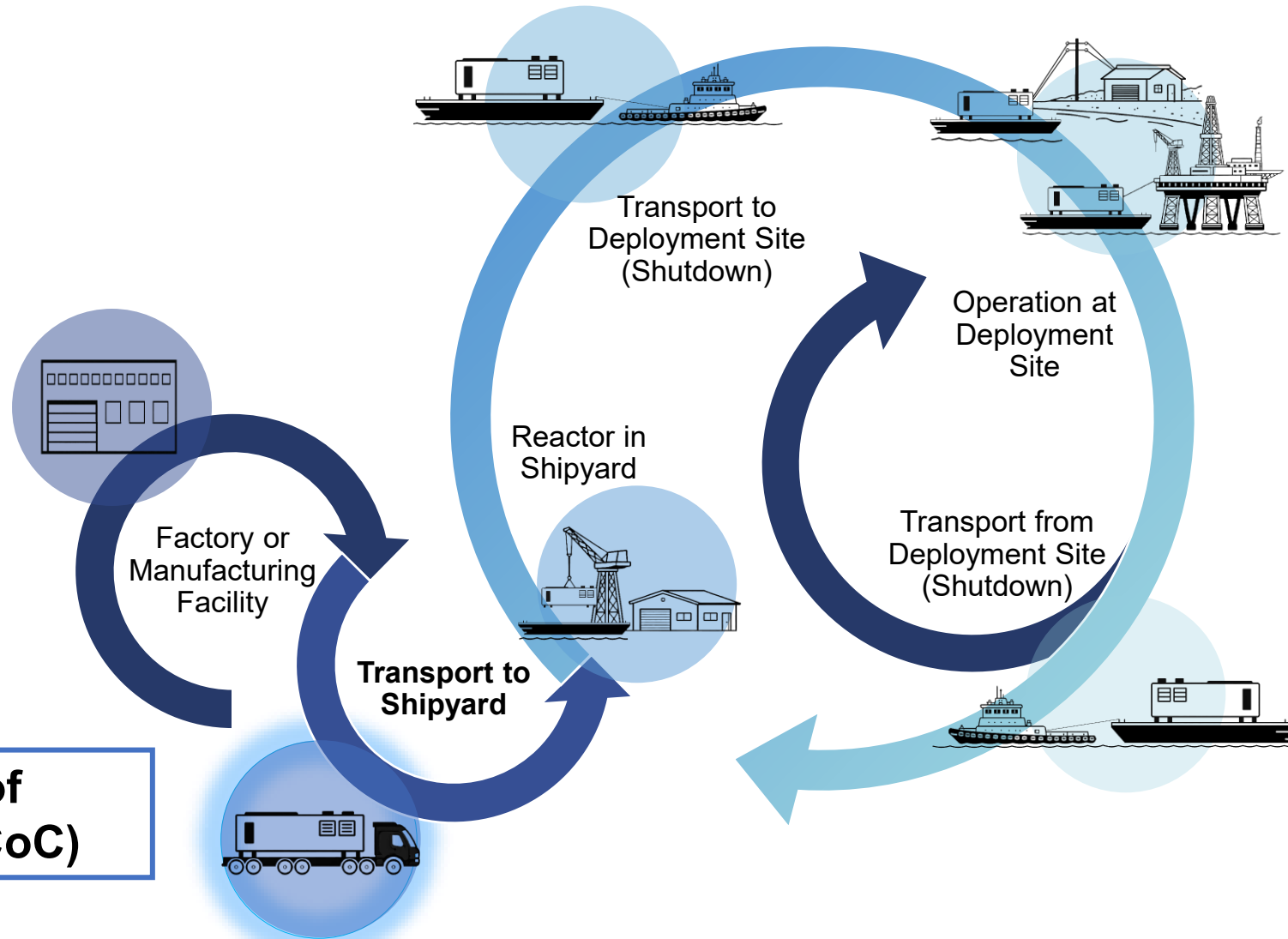


Generic Stationary Deployment Model

Manufacturing License

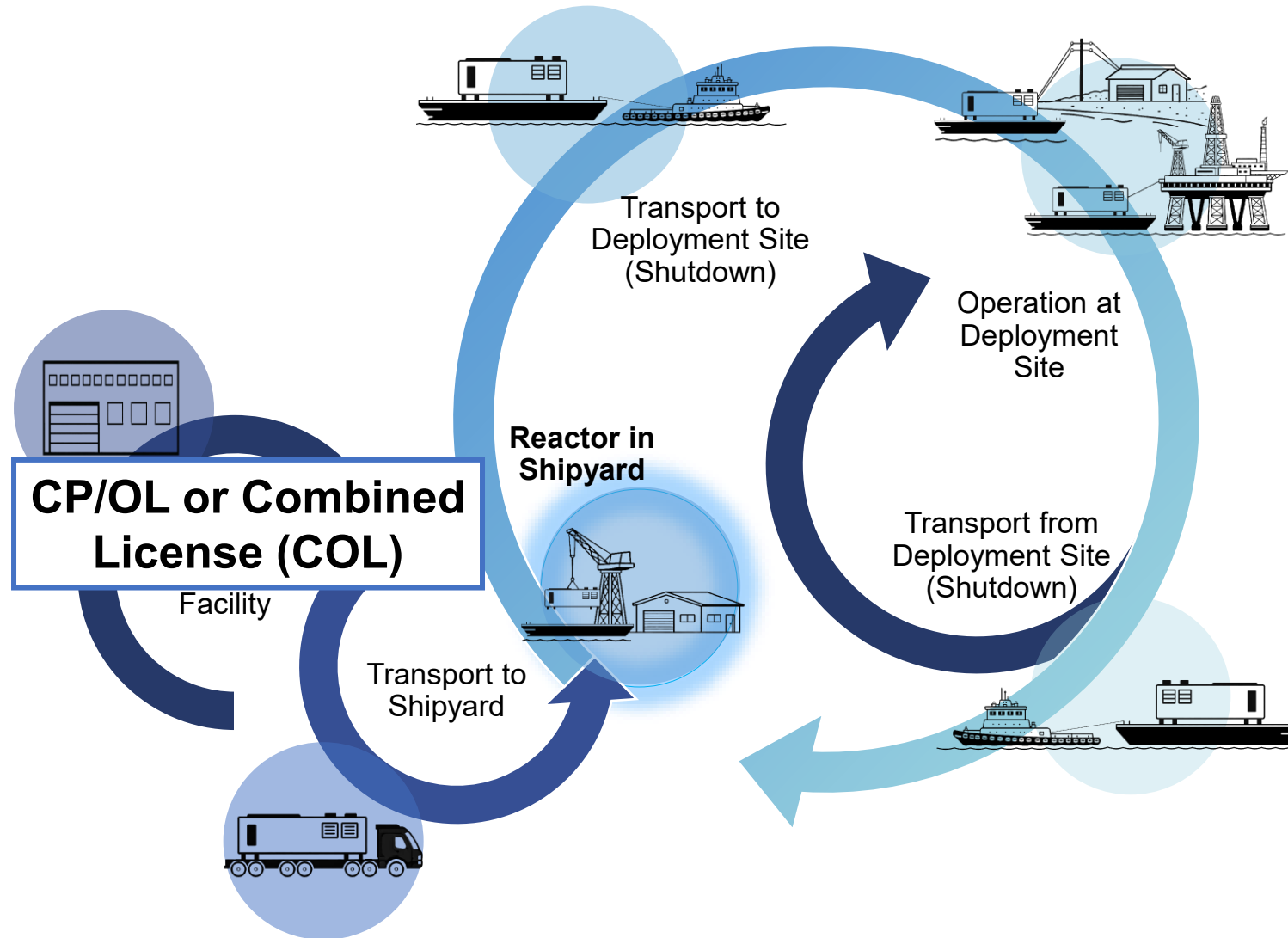


Generic Stationary Deployment Model



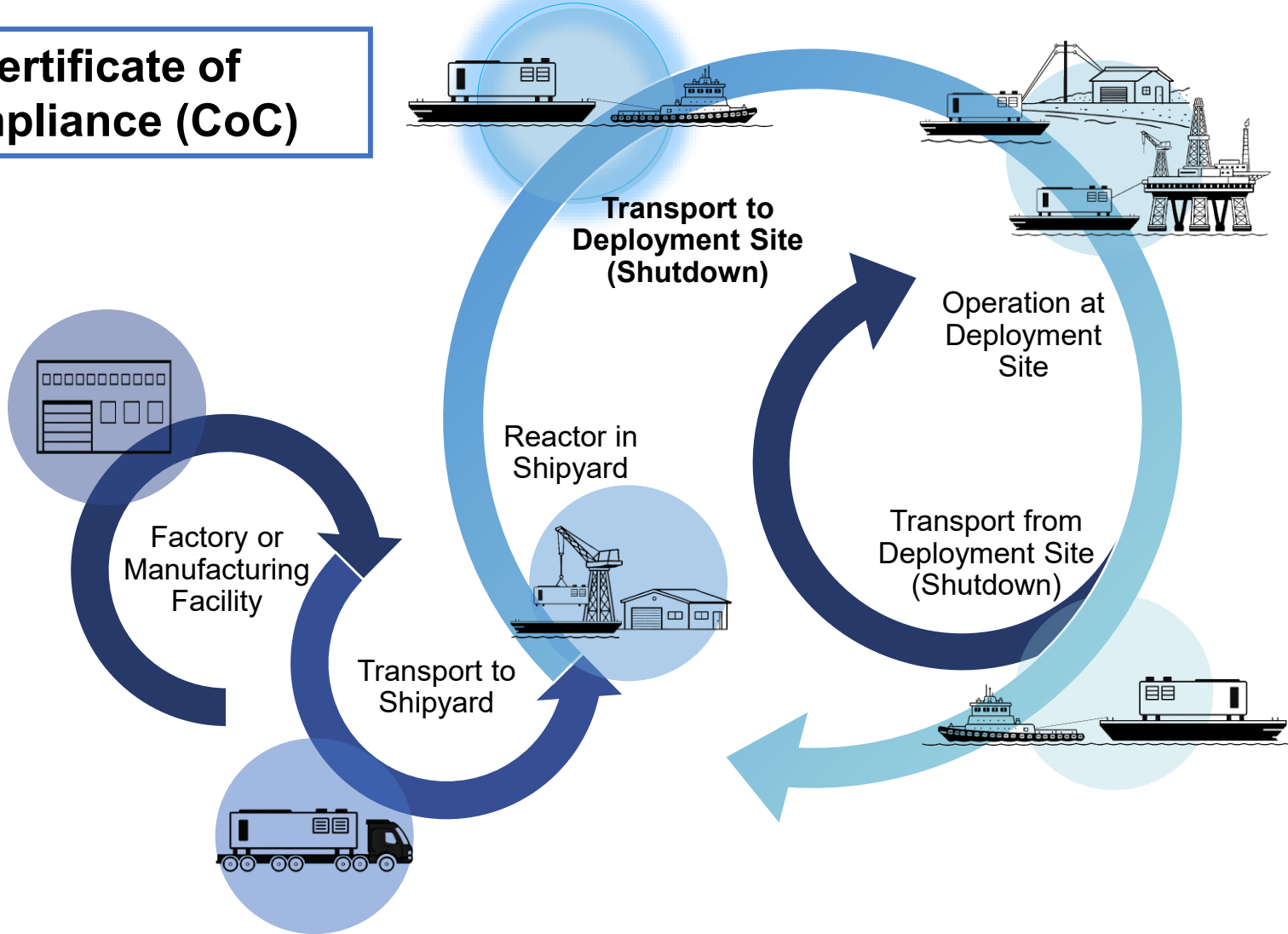
Certificate of Compliance (CoC)

Generic Stationary Deployment Model

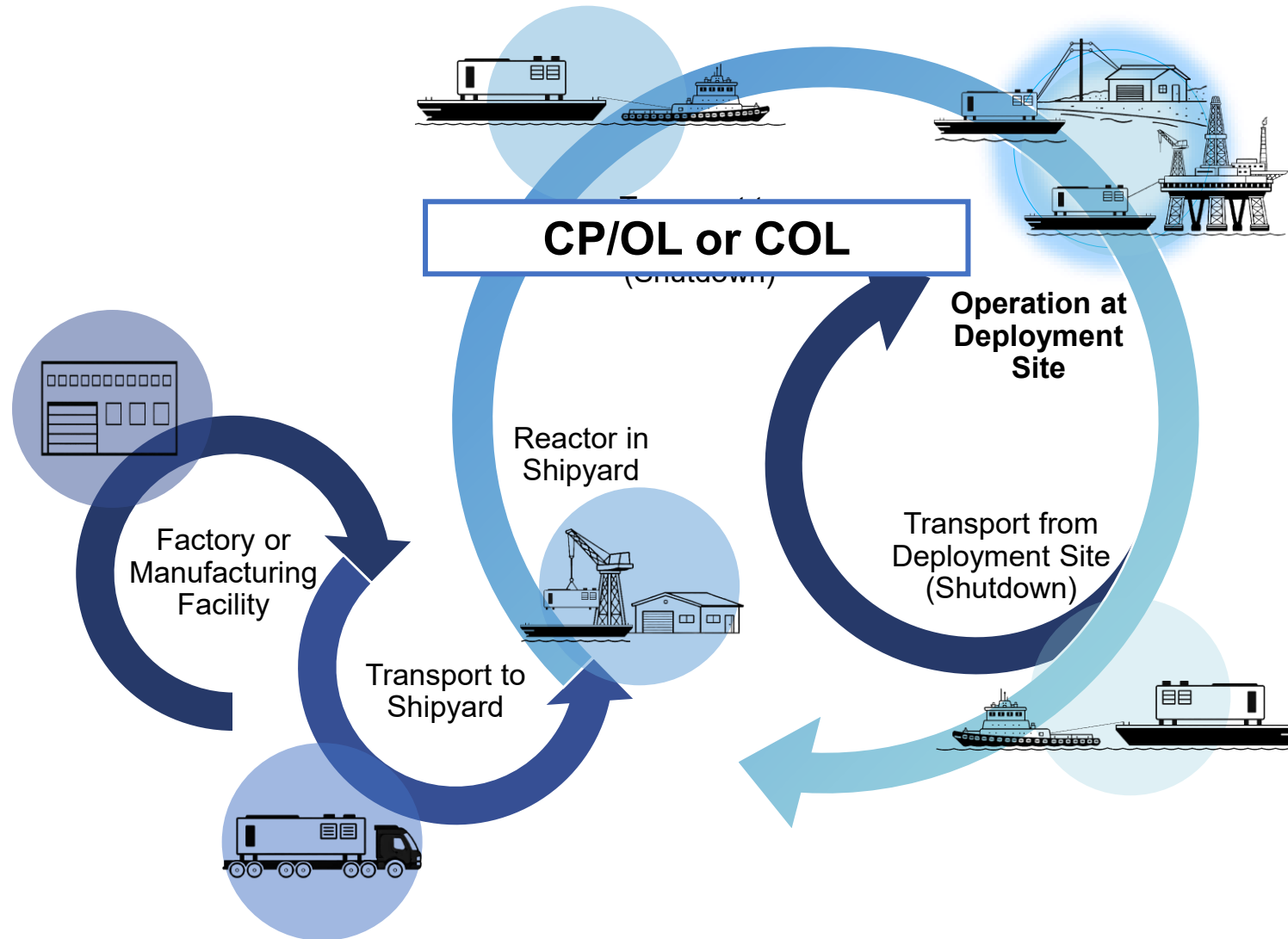


Generic Stationary Deployment Model

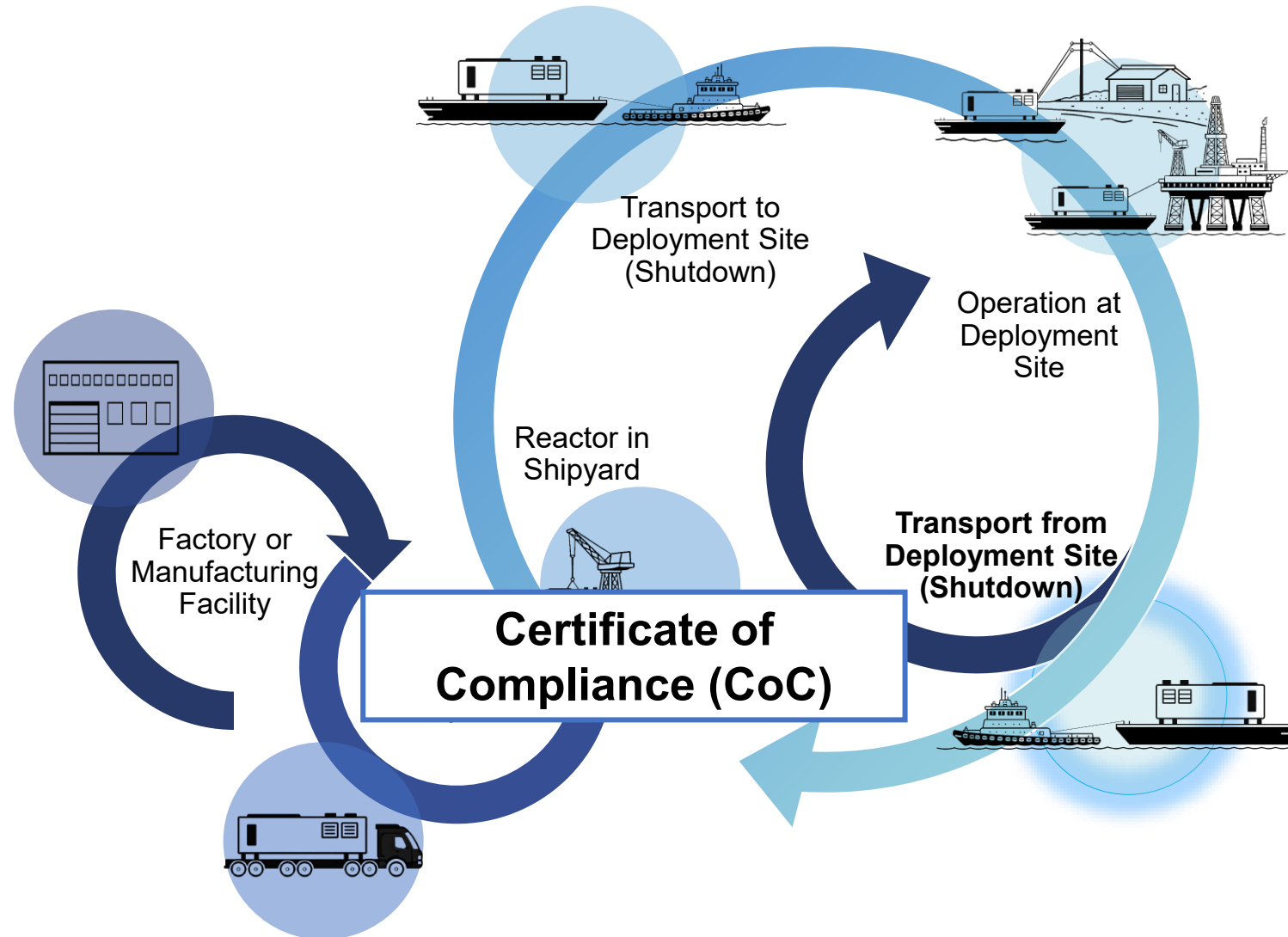
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Generic Stationary Deployment Model



Generic Stationary Deployment Model

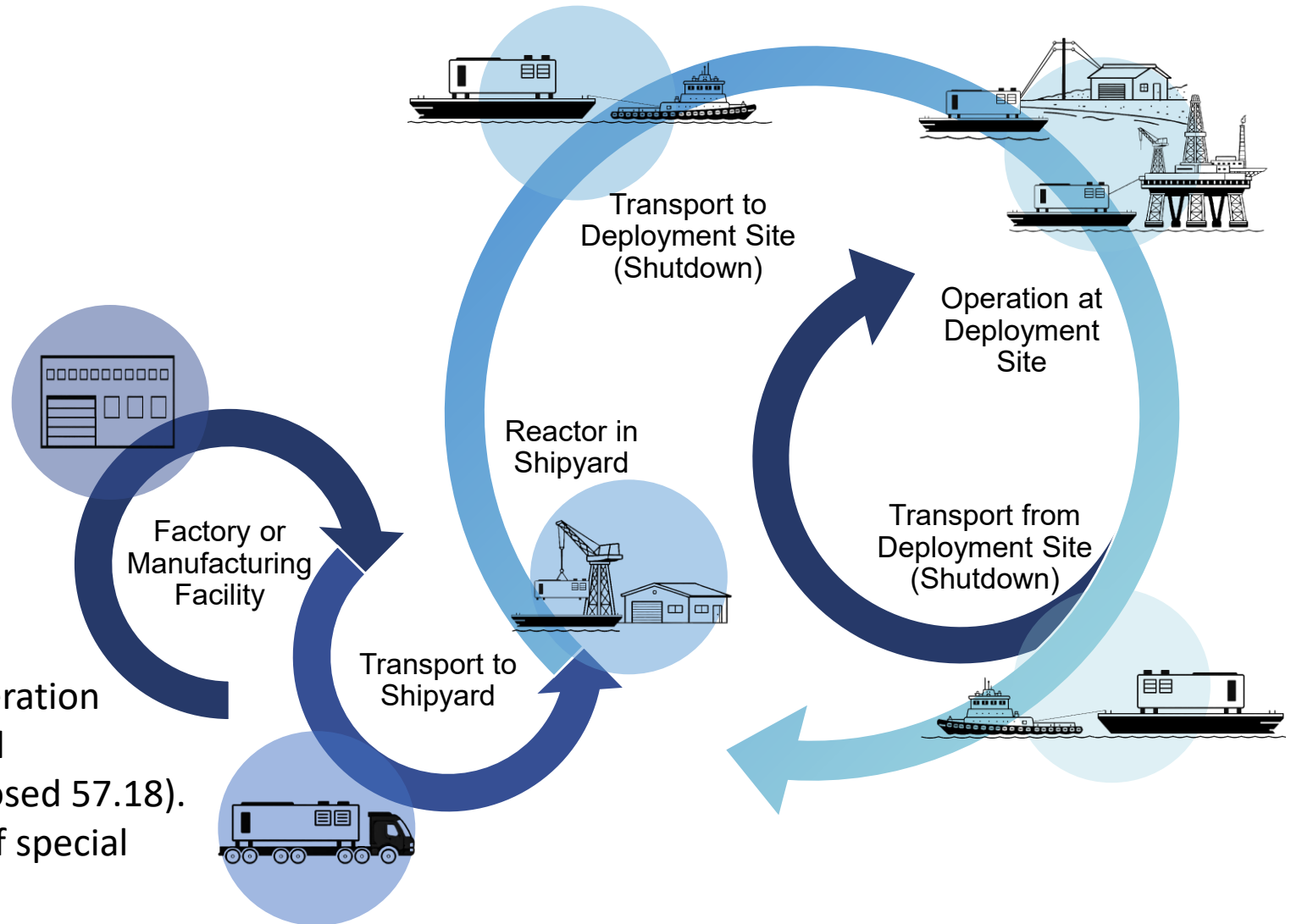


Generic Stationary Deployment Model

ML (10 CFR 52, 53, or 57[†])
at manufacturing facility

CP/OL (50, 53, or 57[†])
or **COL** (52 or 53)
at shipyard and
deployment site

CoC (10 CFR 71)
for land-based and
marine-based transport

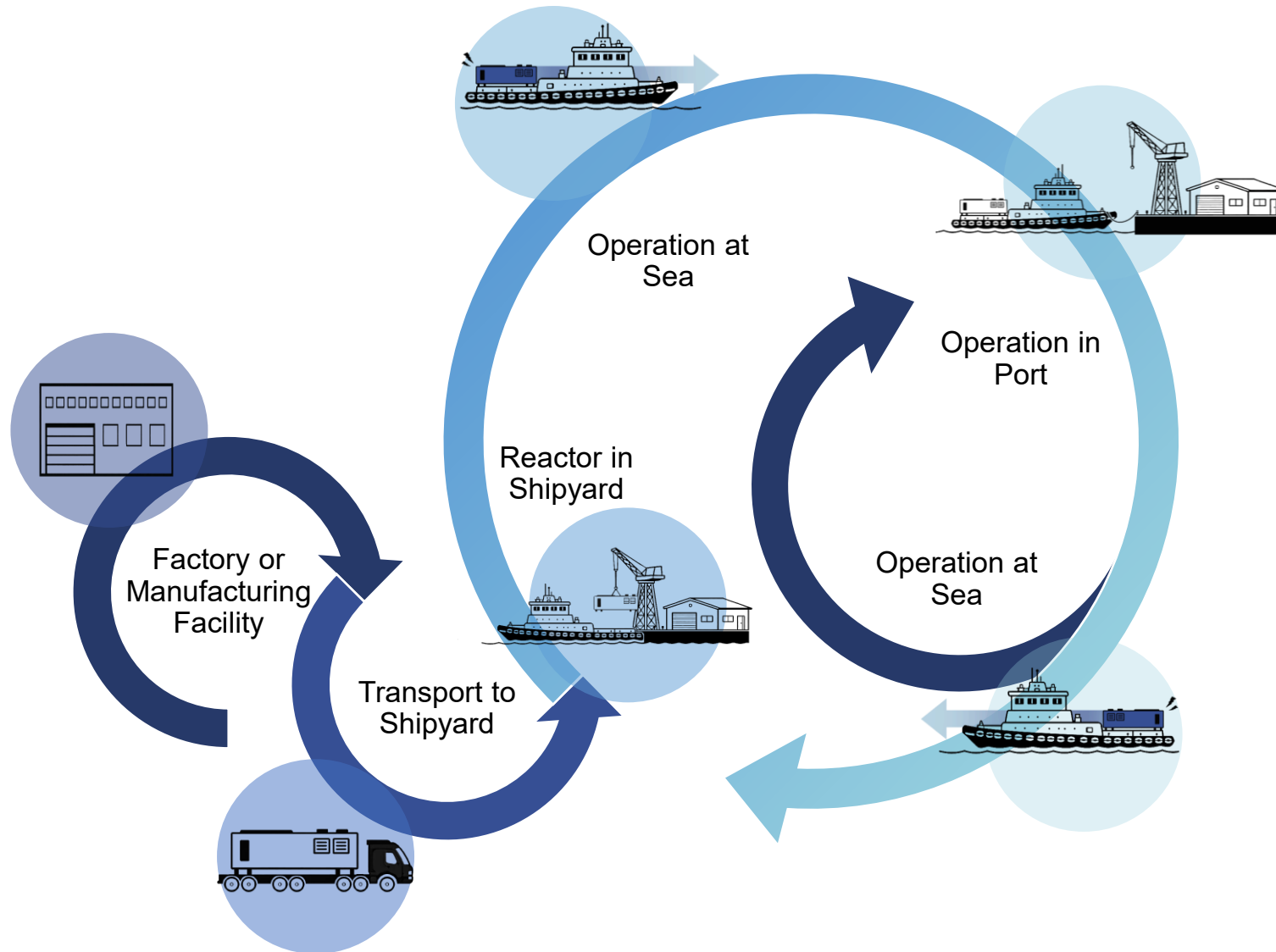


[†]Part 57 is a proposed rule under consideration

*Applications for licenses can be bundled
(10 CFR 50.31, 52.8, 53.1103, and proposed 57.18).

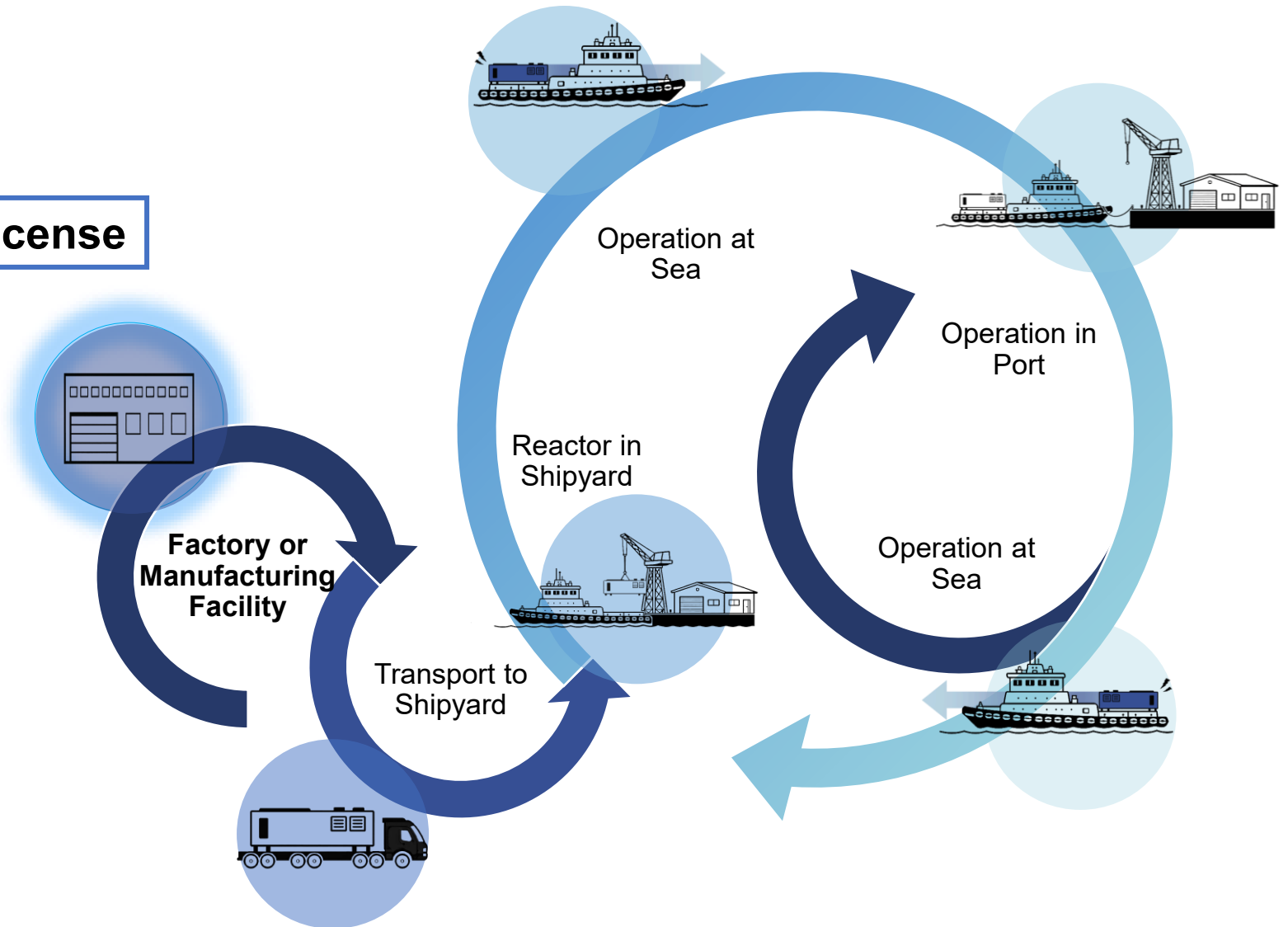
*Part 70 license needed for possession of special
nuclear material.

Generic Mobile Deployment Model

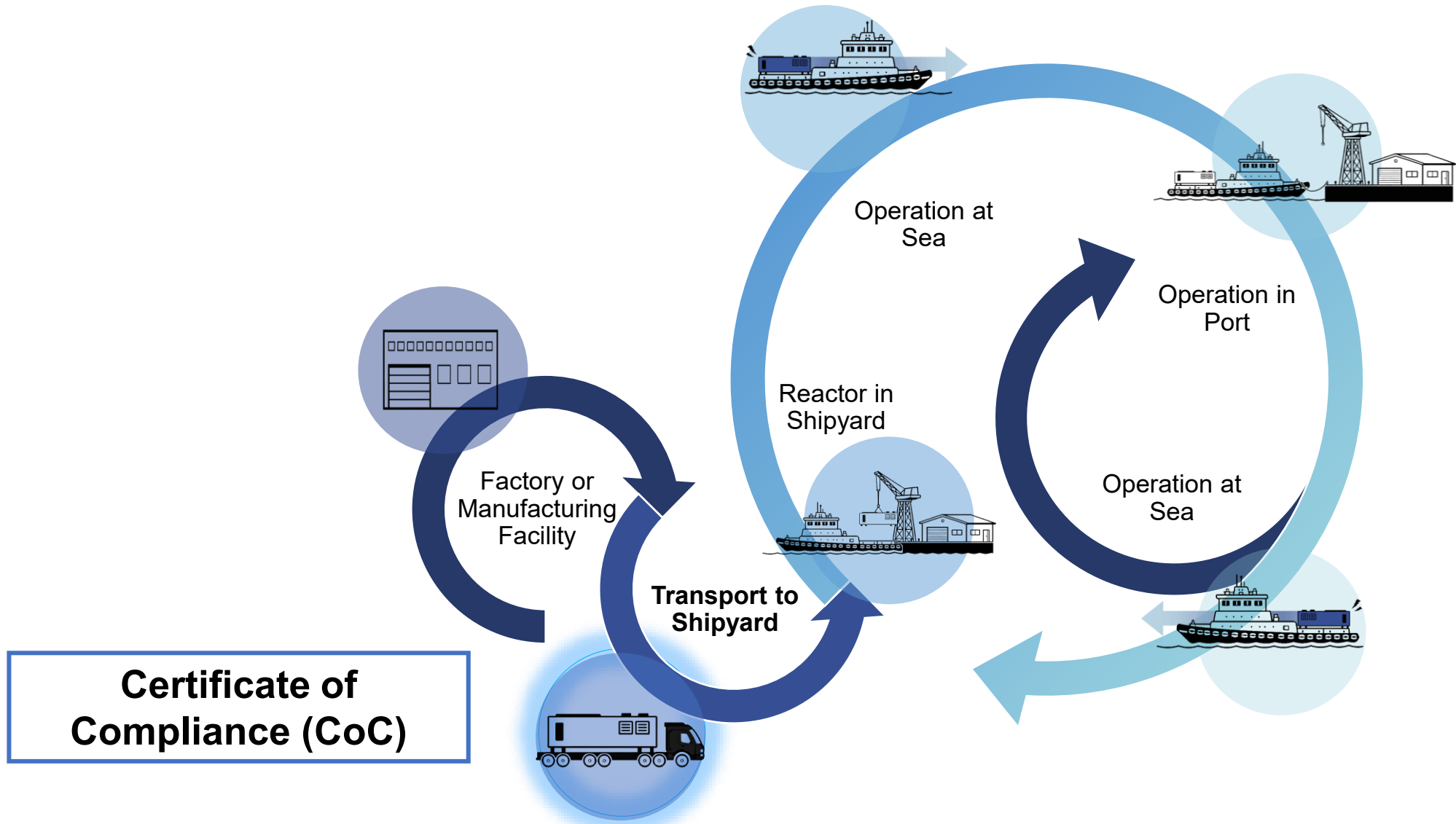


Generic Mobile Deployment Model

Manufacturing License

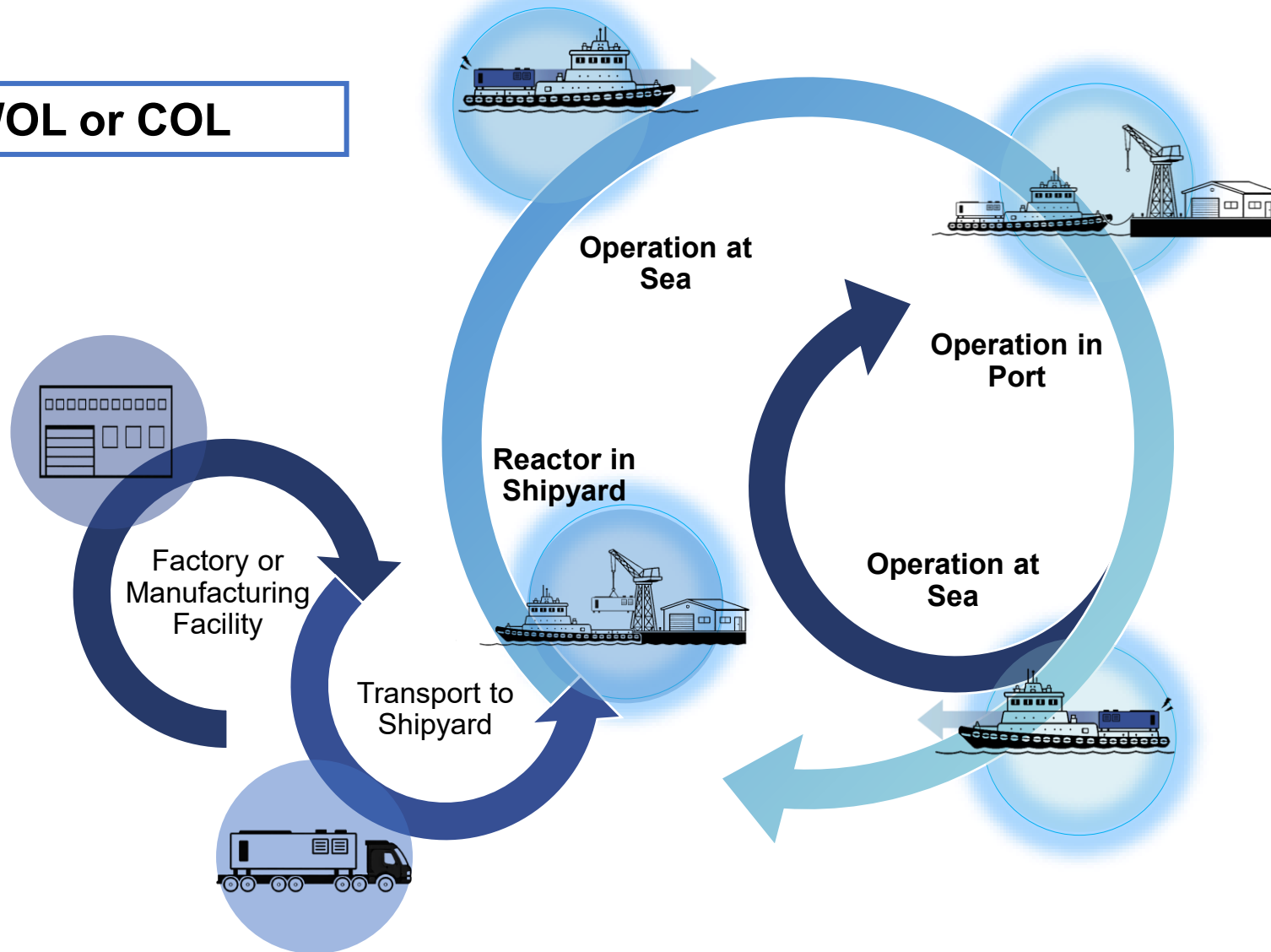


Generic Mobile Deployment Model



Generic Mobile Deployment Model

CP/OL or COL

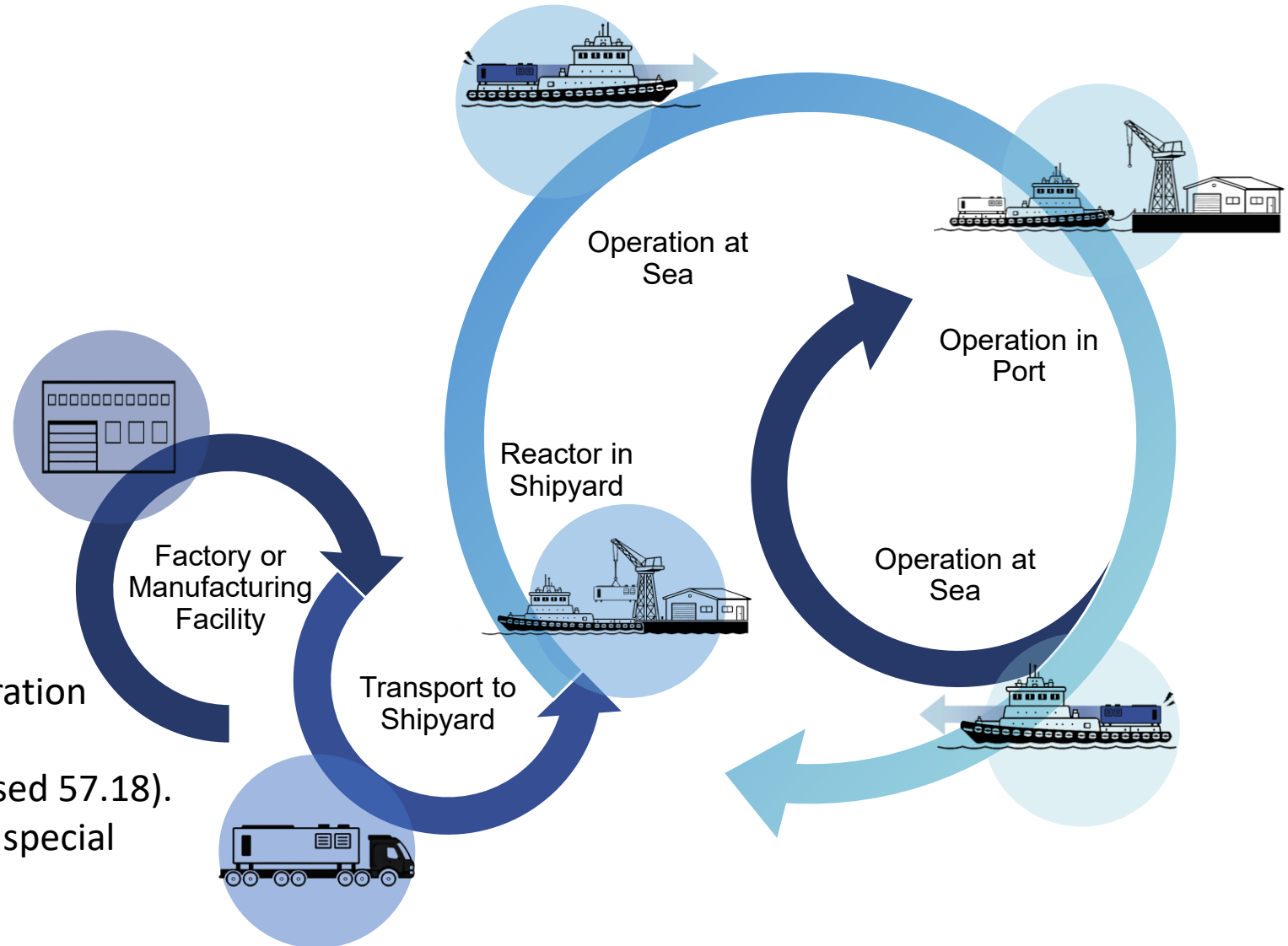


Generic Mobile Deployment Model

ML (10 CFR 52, 53, or 57[†])
at manufacturing facility

CP/OL (50, 53, or 57[†])
or **COL** (52 or 53)
at shipyard and for
the vessel

CoC (10 CFR 71)
for land-based transport



[†]Part 57 is a proposed rule under consideration

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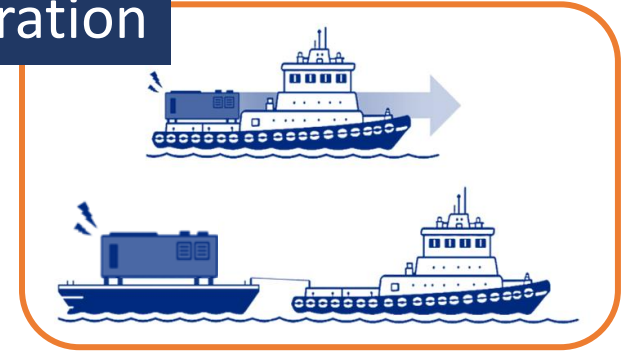
Siting Considerations

Stationary Operation



- Exclusion area boundary (EAB) and LPZ based on dose requirements in:
 - Part 100 for Parts 50 and 52
 - Subpart D of Part 53
- Site boundary based on maximum hypothetical accident (MHA) or maximum credible accident (MCA) under the proposed Part 57
- Site parameters may come from an ML, design certification (DC), or a reference CP/OL or COL
- A CP/OL or COL application shows specific site's characteristics falls within those parameters

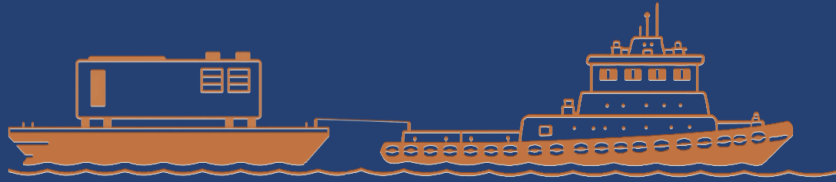
Mobile Operation



- EAB and LPZ based on dose requirements that move with the reactor:
 - Part 100 for Parts 50 and 52 (exemptions likely needed)
 - Subpart D of Part 53
- Site boundary based on MHA or MCA under the proposed Part 57
- Distinction between site parameters and site characteristics is less pronounced
- Siting characteristics may incorporate additional conservatism to capture all operating conditions

Transportation Safety

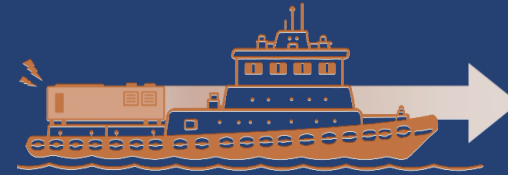
Stationary Operation:



Transport reactors with **installed features to prevent criticality** during transport.*

10 CFR 71.41 allows for approval of packages that provide an equivalent level of safety.

Mobile Operation:



Safety during transit **addressed through licensing** under Parts 50, 52, 53, or proposed 57.

10 CFR 71.0(c): Part 71 only applies to licensed material transported **outside the site of usage** specified in the NRC license (or is transported on public highways).

*[SRM-SECY-24-0008](#) approved for Part 52, explicitly included in Part 53 and the proposed Part 57

Technical Considerations

Hazard Identification and Analysis

- Effects of **wave-induced motion** on natural circulation or other passive safety systems
- **Sloshing, surge, or dynamic loads** affecting reactor system performance

Radiological Consequences

- Transport of radionuclides may differ due to unique atmospheric and marine conditions
- **Maritime meteorology** may need to be considered in atmospheric dispersion analysis

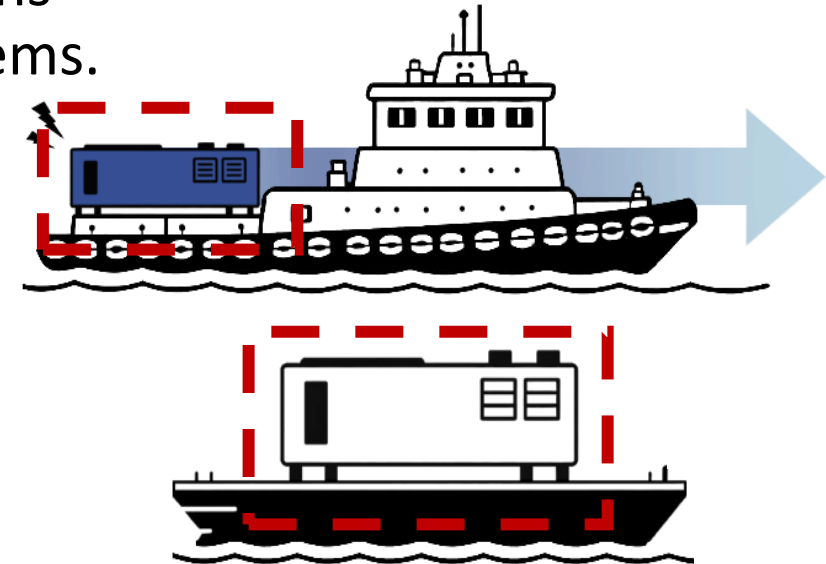
Materials

- Cyclic mechanical loading, environmental degradation, fluid mechanics

SSC Classification

Consider how nuclear structures, systems, and components (SSCs) could be separated from maritime SSCs:

- Applicants may describe how the nuclear island maintains **functional independence** from the ship's maritime systems.
 - Likely difficult for highly-integrated SSCs, such as the hull
 - Interface between maritime and nuclear SSCs is an important topic for **pre-application discussion**
- Potential **use of graded approaches** to SSC classification and quality assurance.
- **Industry collaboration** may support shared expectations for defining SSC boundaries and managing interfaces.



Programmatic Considerations



Port Entry

The licensing basis likely needs to consider the conditions expected during port entry and operations.



Security

Security approaches may differ based on deployment scenario, jurisdiction, and vessel mobility.



Safeguards

Safeguards responsibilities may shift based on jurisdiction.



Liability

Indemnification under the Price-Anderson Act includes the territorial sea (12 NM).

Emergency Planning

Stationary Operation: Emergency planning could mirror terrestrial reactor approaches while considering unique maritime considerations.

Mobile Operation: Emergency planning may need to address both in-port and at-sea conditions across varying jurisdictions and hazard profiles. Like the *NS Savannah*, a licensing approach may include:

- **Identifying relevant offsite organizations** for each intended port or operating region
- **Addressing how changes in destination ports or operational areas will be managed** under the license (e.g., through administrative controls or a generic port entry plan)
- Licensee verification that appropriate measures are in-place before a vessel enters a port.



The *NS Savannah* demonstrated how towing, remote anchorage, and coordination with local emergency responders can be incorporated into in-port emergency planning.

Other Topics for Consideration

Export Controls

- Consider how the movement of maritime reactors across jurisdictional boundaries affects export control requirements, including:
 - Unflagged Barges operating outside the territorial sea (12 NM)
 - Flagged vessels or barges operating in foreign waters

Environmental Reviews

- Examine how National Environmental Policy Act (NEPA) review requirements apply to maritime nuclear deployments

Staffing / Operator Licensing

- Consider potential approaches for operator licensing that align with maritime nuclear deployment concepts

Topics for Discussion

- **Siting for Stationary and Mobile deployments**
- **Technical Considerations**
 - Hazard Identification and Analysis, Radiological Consequences, Materials
- **SSC Classification**
- **Programmatic Considerations**
 - Port Entry, Security, Safeguards, Liability
- **Emergency Planning**
- **Other Topics**
 - Export Controls, Environmental Reviews, Operator Licensing

Modernizing How We Regulate








Maritime Nuclear Applications

As interest in advanced reactor technologies continues to expand, the NRC is seeing growing attention on the potential deployment of nuclear reactors in maritime environments, including floating nuclear power plants (FNPPs) and nuclear propulsion systems.

The NRC stands ready to license maritime nuclear reactors today under 10 CFR Part 50, Part 52, and Part 53. Staff is also pursuing a rulemaking focusing on [licensing microreactors and other reactors with comparable risk profiles](#), which would offer an additional framework that could be used to license these technologies.

The NRC is undertaking the development of a white paper that will describe how existing licensing frameworks can be applied to FNPPs and nuclear propulsion. This effort builds on the staff's experience with microreactor licensing activities, lessons learned from the licensing of the Offshore Power Systems FNPP design, and the Atomic Energy Commission's licensing of the NS Savannah. The purpose of this white paper will be to provide prospective applicants with an overview of unique regulatory considerations in maritime nuclear deployments and present current perspectives on flexible, performance-based regulatory approaches.

Useful Links:

- [NS Savannah](#) 
- Offshore Power Systems (OPS) licensing documentation:
 - OPS Plant Design Report ([ML20119A462](#)) 
 - OPS Initial NRC Safety Evaluation Report (SER) ([ML24152A289](#)) 
 - OPS SER Supplement 1 ([ML19242D918](#)) 
 - OPS SER Supplement 2 ([ML19242D919](#)) 
 - OPS SER Supplement 3 ([ML19284A856](#)) 
 - OPS SER Supplement 4 ([ML20031C715](#)) 
 - OPS Manufacturing License ([ML20070J215](#)) 

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Closing Remarks