The Future of Advanced Reactor Construction Oversight

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Advanced Reactor Construction Landscape

- Different designs using new fuel, materials, and design codes/standards
- Co-location with fuel facilities
- Wide range of sizes
- Enhanced safety margin/risk profile

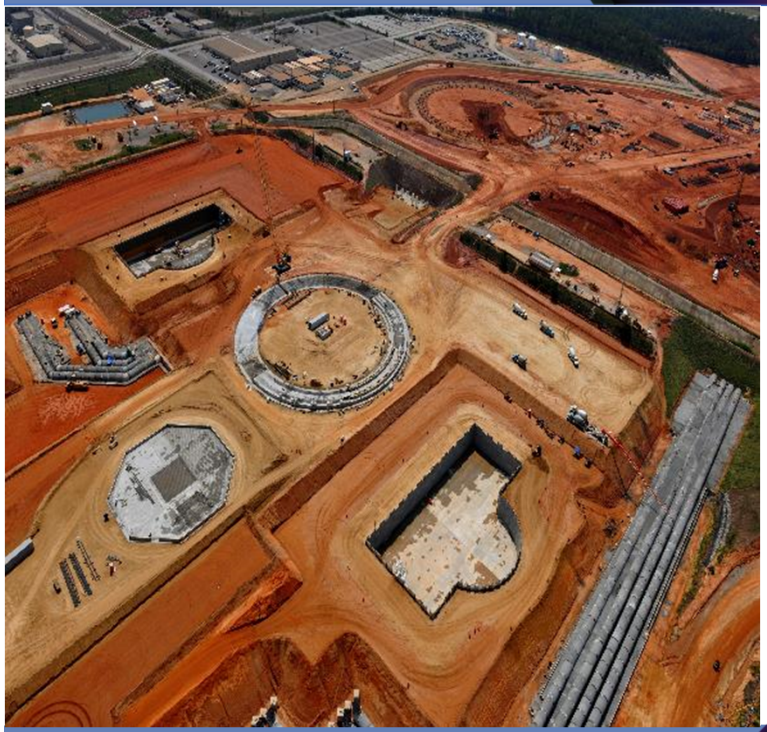
- Greater use of factory fabrication
- Shorter construction schedules

- 10 CFR Parts 50, 52, and 53
- Depending on the licensing requirements, different information may be available during construction (e.g., 10 CFR Part 52 plants would have a final design; 10 CFR Part 50 plants likely would not)

ADAPTING TO A
CHANGING LANDSCAPE

Construction Projects Lessons Learned

- AP1000 Reactors, V.C. Summer Units 2 and 3, Vogtle Units 3 and 4 (10 CFR Part 52)
- Watts Bar Unit 2 (10 CFR Part 50)
- Nonpower Production or Utilization Facility, SHINE (10 CFR Part 50)
- Fuel Cycle Facilities, Louisiana Energy Services LLC, Mixed Oxide (10 CFR Part 70)



Lessons Learned

- "10 CFR Part 52 Lessons-Learned from Construction at Vogtle 3 & 4 and V.C. Summer 2 & 3," dated January 16, 2024, ML23325A202
- NUREG-1055, "Improving Quality and the Assurance of Quality in the Design and Construction of Nuclear Power Plants," issued May 1984, ML063000293
- "Watts Bar Unit 2 Construction Lessons Learned Report," dated December 20, 2017, ML17356A269

Construction Inspection Oversight Program

OVERSIGHT PROCESS AND INSPECTION SCOPING SHOULD BE RISK-INFORMED, FLEXIBLE, SCALABLE, PERFORMANCE BASED, AND TECHNOLOGY INCLUSIVE.

FOCUSING INSPECTION PLANNING ON DISCRETE OR SPECIFIC INSPECTION ITEMS CAN LEAD TO INEFFICIENT USE OF RESOURCES WHEN THE CONSTRUCTION SCHEDULE REGULARLY CHANGES.

Enforcement Process for Facilities in Construction

Significance determination for construction oversight should appropriately characterize finding significance based on risk to operations and should be comparable to risk thresholds in the Reactor Oversight Process (source: SRM-SECY-10-0140).

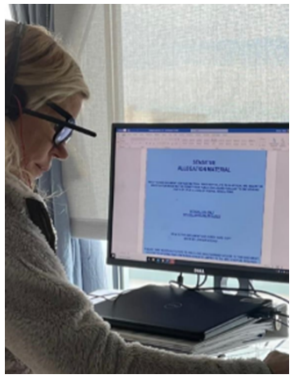
Determining the significance of construction findings should be based upon a risk-informed, safety-focused inspection and enforcement process, with time spent proportional to the safety and risk significance of the structure, system, or component, along with the potential for an issue to have remained undetected and impact plant operations (source: AP1000 Lessons Learned, ML23325A202).

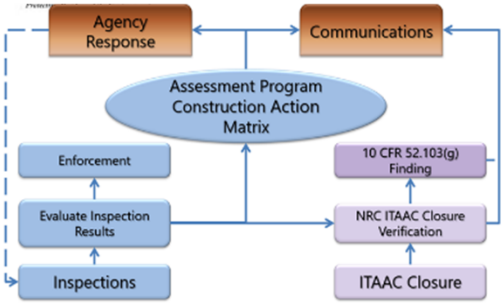
Assessing Licensee Performance During Construction

The assessment element for an overall construction oversight program provides a key method for determining and resolving issues impacting safety.

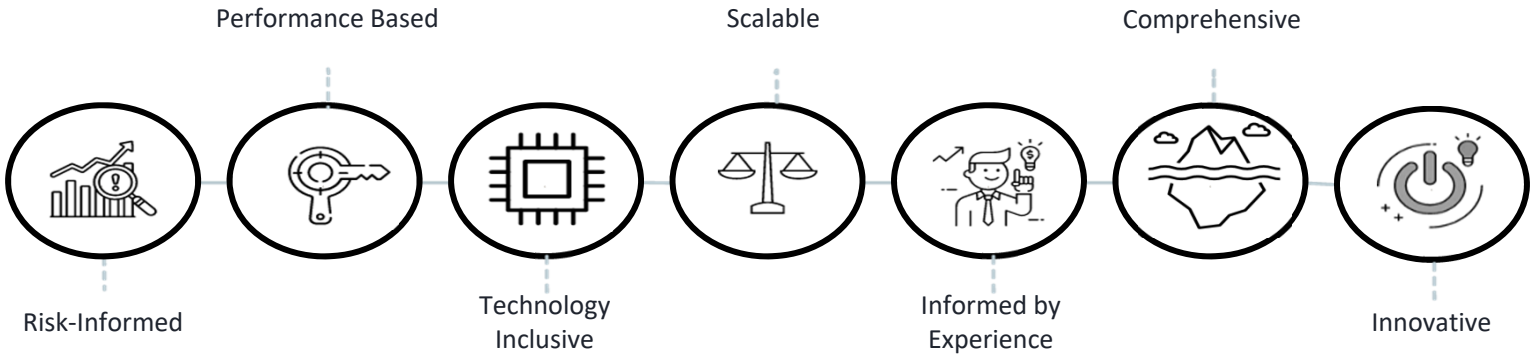
Looking forward, small modular reactors and advanced reactors may have shorter construction timeframes and, therefore, include faster completion times for structures and systems.

The current annual assessment frequency is potentially too long for a faster moving project, and as a result, future construction oversight programs should consider a system of more continuous assessment and more frequent public communications.



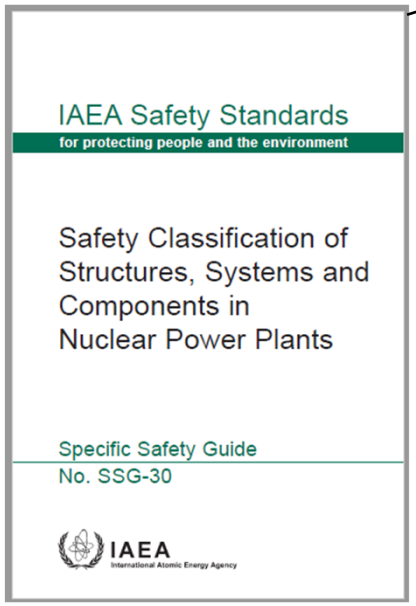


Key Guiding Principles of Future Construction Oversight



Source: SECY-23-0048, "Vision for the Nuclear Regulatory Commission's Advanced Reactor Construction Oversight Program," dated June 6, 2023

Identify Safety-Based Commonalities among All Reactors



"Fundamental Safety Functions"

A generic set of reactor safety functions applicable to all reactor technologies:

- reactivity control
- heat removal
- radionuclide retention

+ Security and Operational Programs

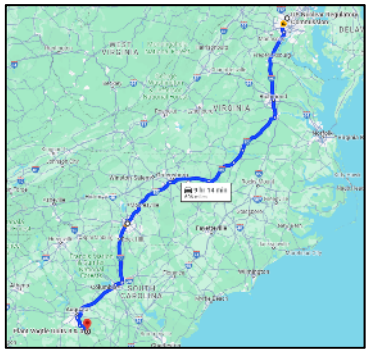
Performance Monitoring

Enforcement
(including significance determination)

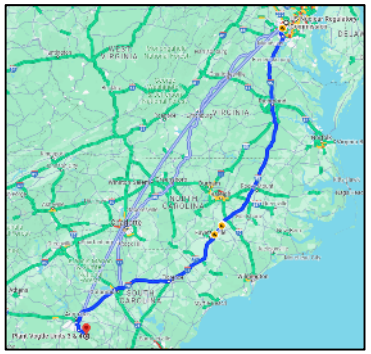
Assessing Performance

ADAPTING TO A CHANGING LANDSCAPE

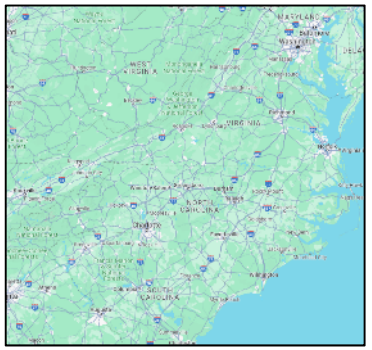
Performance Monitoring—Inspecting Quality



SSC/ITAAC
Targeting



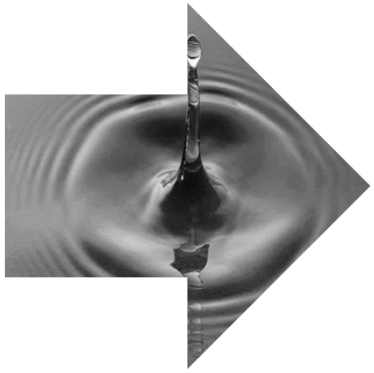
Baseline Inspection
Scoping Matrices



Availability-Based
Inspection

More Specific — More Flexible

Determining Significance of Noncompliances

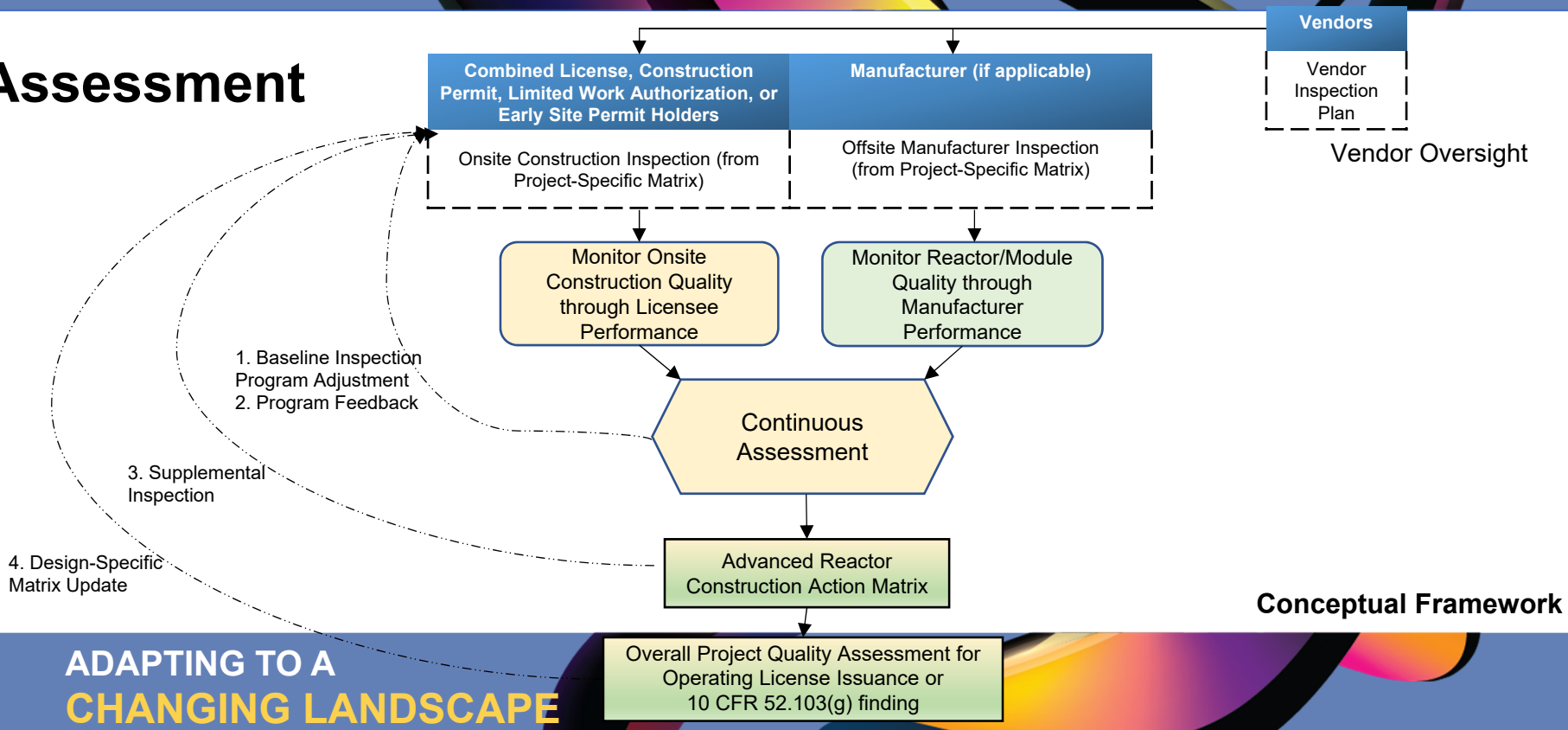


Significance of Impact to Fundamental Safety Functions

Credit for Existing Barriers

Likelihood that Deficiency Exists During Operation

Assessment



Conceptual Framework

Development Timeline