

ADVANCE Act Sec. 507

Acceptance of Digital Technology

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Purpose and Agenda

Purpose

- To discuss NRC's approach for addressing NEI's recommendations for ADVANCE Act, Section 507(d)(4) related to timely acceptance of digital technologies
 - NEI's recommendations are in NEI letter dated October 28, 2024 (ADAMS Accession No. ML24302A311)

Agenda

- Overview of ADVANCE Act Section 507 & 505 provisions
- Relevance of NEI recommendations on Section 507 to Section 505 provisions
- NRC staff insights & ongoing actions related to NEI recommendations
- Key messages & path forward

Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy Act of 2024 (ADVANCE Act)

- ADVANCE Act was signed into law in July 2024
- The Act builds on prior initiatives to modernize and streamline the regulatory environment for advanced nuclear technologies, including
 - 1) facilitate American nuclear energy leadership
 - 2) support development and deployment of new nuclear energy technologies
 - 3) preserve existing nuclear energy
 - 4) strengthen America's nuclear energy fuel cycle and supply chain infrastructure
 - 5) improve the NRC's resources and efficiency
- The Act increases emphasis on efficiency

ADVANCE Act: Section 505 Provisions

ADVANCE Act, Section 505 amended the ERA, Section 203 to state:

(c) Licensing process.—In carrying out the principal licensing and regulation functions under subsection (b)(1), the Director of Nuclear Reactor Regulation shall—

(1) establish techniques and guidance for evaluating applications for licenses for nuclear reactors to support efficient, timely, and predictable reviews of applications for those licenses to enable the safe and secure use of nuclear reactors;

(2) maintain the techniques and guidance established under paragraph (1) by periodically assessing and, if necessary, modifying those techniques and guidance; and

(3) obtain approval from the Commission if establishment or modification of the techniques and guidance under paragraph (1) or (2) involves policy formulation.

ADVANCE Act: Section 507 Provisions

ADVANCE Act, Section 507, “Improving Oversight and Inspection Programs,” in part, states:

(d)(4) assess the ability of the Commission, consistent with the mission of the Commission, to enable licensee innovations that may advance nuclear reactor operational efficiency and safety, including the criteria of the Commission for timely acceptance of licensee adoption of advanced technologies, including digital technologies;

NEI Suggestions

NEI's Section 507 recommendations related to digital technologies:

1. Elimination of 10CFR50.55(a)(h)
2. NUREG-0800, Chapter 7 Modernization
3. Consolidation of HFE review guidance
4. Systems engineering approach for digital technologies
5. Update DI&C-ISG-06 & Convert to Durable Document

NRC is assessing NEI's Section 507 recommendations related to digital technologies under Section 505 provisions

NEI Recommendation 1: Elimination of 10 CFR 50.55a(h)

“10 CFR 50.55a(h) incorporates by reference IEEE 279-1968, IEEE 279-1971, and IEEE 603-1991 providing prescriptive design criteria for protection and safety systems. 10 CFR 50, Appendix A provides General Design Criteria (GDCs) related to I&C, protection systems, and reactivity control systems that address similar design criteria. To enhance the flexibility of the regulations, we believe 10 CFR 50.55a(h) should be eliminated and the GDCs could be relied upon.”

NRC staff insights & ongoing actions:

- To address near-term industry needs based on stakeholder’s feedback, the staff is working on rulemaking to incorporate by reference IEEE Std 603-2018 in 10 CFR 50.55a(h) that is scheduled to be issued in June 2025 for public comments.
- For longer-term, the staff is willing to consider elimination of 50.55a(h) rule; however, the gaps between electrical and I&C systems regulatory requirements contained in IEEE Std 279/603 and the GDC regulatory requirements, which are written at the plant SSC level, would need to be addressed by future rulemaking activities.
- Proposed Part 53 rule, which is risk-informed and performance-based, does not incorporate by reference any consensus codes and standards, including IEEE Std 603.

NEI Recommendation 2: SRP Chapter 7 Modernization

“NUREG-0800, Chapter 7 provides 537 pages of staff review guidance for I&C systems, structures, and components for LWRs. Advanced Reactors use the “Design Review Guide (DRG): Instrumentation and Control for Non-Light Water (Non-LWR) Reviews,” which provides 45 pages of staff review guidance. The DRG should be used in developing streamlined guidance for operating plants.”

NRC staff insights & ongoing actions:

- The NRC is focusing on lessons learned from using DI&C-ISG-06 for operating reactor LARs and the DRG for non-LWR licensing. Based on these lessons learned, proposed changes to the NUREG-0800 Standard Review Plan (SRP), Chapter 7 are being considered.
 - DI&C-ISG-06 lessons learned workshop is scheduled on March 13-14, 2025.
- SRP Chapter 7 modernization will occur after the staff updates its internal guidance for SRP development.

NEI Recommendation 3: Consolidation of HFE review guidance

"NUREG-0800, Chapter 18 provides staff review guidance for Human Factors Engineering (HFE) for LWRs. Chapter 18 provides directions for the staff to also use acceptance criteria in NUREG-0700, NUREG-0711, NUREG-1220, NUREG-1764, and NUREG-1852. The staff should consider incorporating clear, concise review guidance in a single document to facilitate understanding."

NRC staff insights & ongoing actions:

- The referenced NUREGs have specific purposes. Combining the documents is likely to cause additional confusion and make updates more challenging, but staff agree that additional clarity is needed.
- Table 1 was added to Chapter 18 Rev 3 (2016) to help improve clarity, but challenges persist.
- Staff are planning an update to Chapter 18 which includes improving the clarity about how to use the acceptance criteria.
- Staff can plan future public engagements for more specific feedback if desired.
- In the meantime, pre-application meetings can be used to identify the appropriate acceptance criteria.

NEI Recommendation 4: Systems engineering approach for digital technologies

“Regulatory Guides 1.152, 1.168, 1.169, 1.170, 1.171, 1.172, and 1.173 provide guidance to licensees related to digital technology design and development activities. These Regulatory Guides focus on distinct elements of the lifecycle. The NRC should consider a systems engineering approach towards digital technology in lieu of prescriptive regulatory guidance associated with each phase of the lifecycle process.”

NRC staff insights & ongoing actions:

- The NRC is reviewing NEI 20-07 that uses a systems engineering approach.
- The NRC is researching system engineering methods including STPA (Systems-Theoretic Process Analysis) for advanced non-LWRs, new LWRs, and operating reactors.

NEI Recommendation 5: Update DI&C-ISG-06 & Convert to Durable Document

“DI&C-ISG-06 provides the review process for operating LWRs. Revision 3 introduced an Alternate Review Process (ARP) that streamlines digital specific review criteria. Digital LARs often impact other review areas such as HFE, Technical Specifications, Equipment Qualification, etc., that do not follow the ARP. These areas should be included in the scope of the ARP to allow for a single streamlined LAR review process. Additionally, this guidance should be moved out of Interim Staff Guidance and into a long-term, durable regulatory document.”

NRC staff insights & ongoing actions:

- The NRC is gathering lessons-learned (including HFE issues) to incorporate into the next revision of ISG-06. The staff is planning to host a workshop to discuss the lessons-learned in the 1Q2025 (CY). Upon revision, this ISG will transition to a durable guidance (e.g., SRP).

What's Next?

- Coordinate work on ADVANCE Act, Sections 505 and 507 for addressing digital technologies regulatory infrastructure
- Evaluate NEI 20-07 guidance document
- Modernize SRP Chapter 7 to include ADVANCE Act provisions with due considerations to NEI recommendations
- Update DSRS Chapter 7 and DRG staff review guidance documents to address ADVANCE Act provisions and lessons learned



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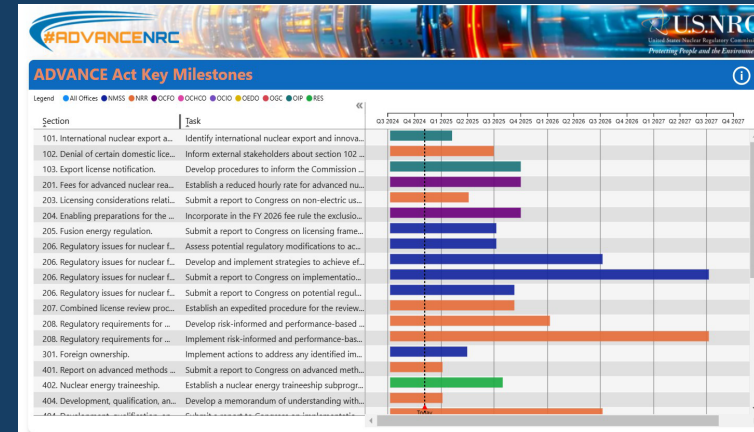


ACRONYMS

ADAMS	Agencywide Documents Access and Management System
ADVANCE Act	Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy Act of 2024
DI&C-ISG-06	Digital Instrumentation & Controls Licensing Process Interim Staff Guidance
DSRS	Design Specific Review Standard
DRG	Design Review Guide: I&C for Non-LWR Reviews
ERA	Energy Reorganization Act
GDC	General Design Criteria
HFE	Human Factors Engineering
I&C	Instrumentation and Controls
LWR	Light Water Reactor
NEI	Nuclear Energy Institute
STPA	Systems-Theoretic Process Analysis

Be Engaged!

Stay informed of progress
and follow NRC's
ADVANCE Act
implementation



For upcoming and
past public meeting
information on
ADVANCE Act



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ADVANCE Act
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