



ANS Meetings

IT'S GO TIME

*Creating Momentum Toward
Transformational Change*

New Approaches for Licensing a Safety-Related Digital I&C Upgrade

Eric Benner

Director, Division of Engineering

Office of Nuclear Reactor Regulation, USNRC



What I'll Be Covering Today

➤ ***NRC Vision***

➤ ***Licensing Initiatives & Accomplishments***

➤ ***What's Next***

NRC Vision for Digital I&C

“A clear regulatory structure with reduced regulatory uncertainty that enables the expanded safe use of digital I&C in commercial nuclear reactors while continuing to ensure safety and security.”

From NRC SECY-19-0112

The Road We're On

Efficient
Licensing

Today's Focus

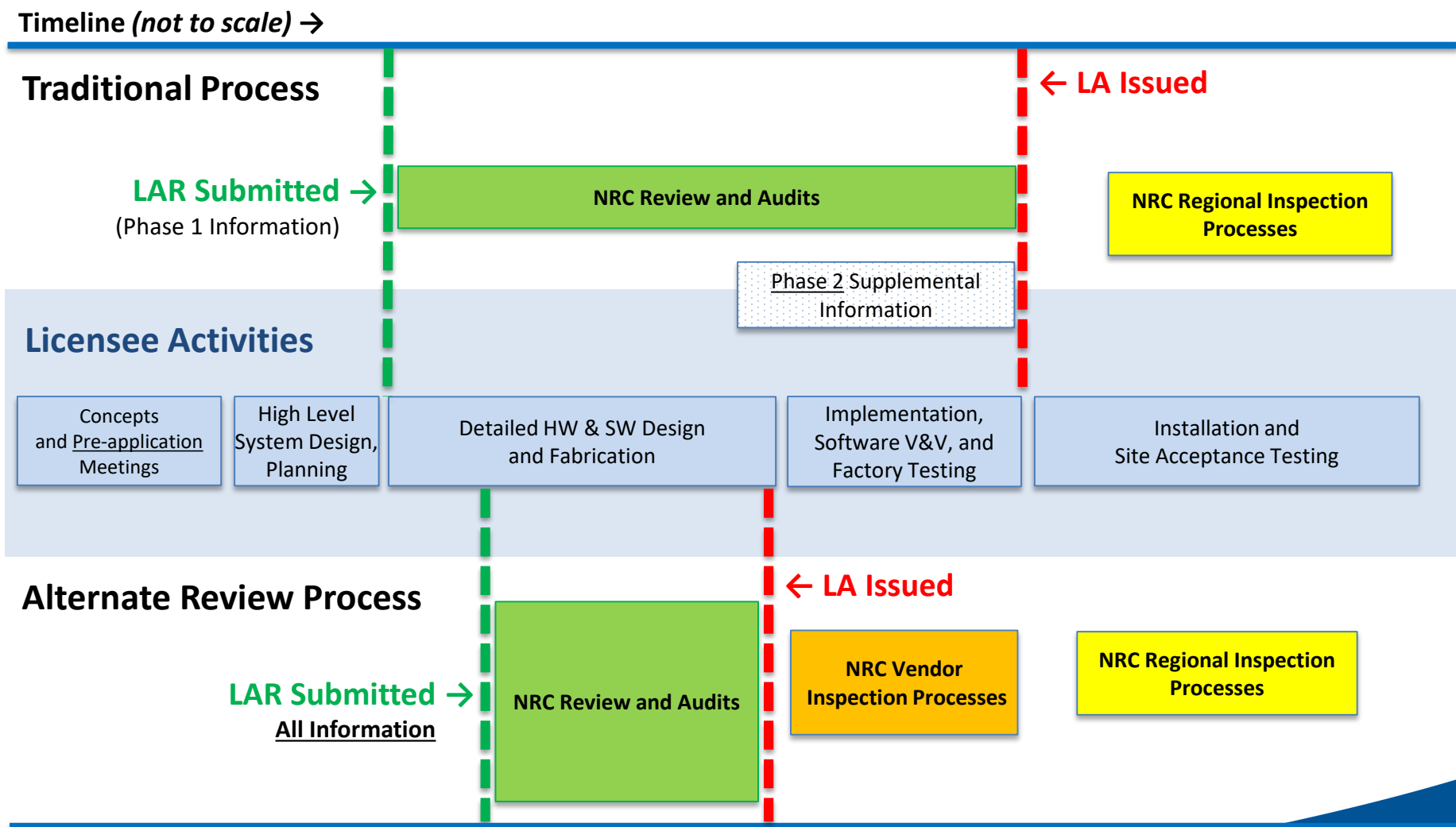
Clear 50.59
Expectations

Endorsement of
Updated Standards



LICENSING INITIATIVES & ACCOMPLISHMENTS

NRC DI&C Interim Staff Guidance (ISG) 06 Revision 2



NRC Branch Technical Position 7-19

Risk-Informed Graded Approach

	Safety-Related	Non-Safety Related
Safety-Significant Significant contributor to plant safety	A1 Analysis Needed: D3 Assessment	B1 Analysis Needed: Qualitative Assessment
Non-Safety-Significant Not a significant contributor to plant safety	A2 Analysis Needed: Qualitative Assessment	B2 Analysis Needed None may be needed

Allows leveraging of any available risk information and insights

NRC Branch Technical Position 7-19

Clarification on Acceptable Methods for Addressing CCF

Category	Method Name and Description
Eliminate	Internal Diversity If sufficient diversity exists within in the protection system, then vulnerabilities to Common Cause Failure (CCF) can be considered to be appropriately addressed without further action.
	Simple Design A system is sufficiently simple such that every possible combination of inputs and every possible sequence of device states are tested, and all outputs are verified for every case.
Limit	Design Measures Design measures are used to reduce the likelihood of a CCF (e.g., self-diagnostic, failure analysis, etc.).
Mitigate	Existing Equipment An existing system or equipment is used to perform the diverse or different function to mitigate the loss of the safety function performed by the digital I&C system during a Design Basis Event (DBE).
	Manual Operator Action (MOA) Actions that can be reasonably taken by operators to identify CCF failures and mitigate consequences within a realistic time frame during a DBE.
	Diverse Actuation System (DAS) Independent and diverse system that can activate protection systems if primary system fails during a DBE. Technology used can be analog or digital.
Accept	Consequence Calculation Consequence models, using best estimate methodologies, demonstrated that CCF failures concurrent with DBEs and Anticipated Operational Occurrences do not result in doses that exceed 10% of the applicable siting dose guideline values.

Next step is second briefing of ACRS Subcommittee in September after staff incorporates feedback received at June Subcommittee meeting

Standards

- Endorsement of IEEE-603-2018
- Endorsement of IEEE 7-4.3.2-2016
- Considering broader use of International Electrotechnical Commission standards

Licensing Accomplishments

- **New Reactors:**

- APR1400 Design Certification
- NuScale Design Certification

- **Research Reactors:**

- Purdue
- MIT

- **Topical Reports:**

- Lockheed Martin (Nuclear Protection & Control)
- Mitsubishi Heavy Industries (Mitsubishi Total Advanced Controller)
- Radiy (RadICS Digital I&C Platform)

- **Operating Reactors:**

- Hope Creek Power Range Neutron Monitoring System

WHAT'S NEXT?

Operating Reactor License Applications

- Developing NRC safety evaluation report templates
- Assessing inspection procedure enhancements
- Preparing staff in all relevant disciplines (I&C, human factors, systems engineers, lawyers)
- Reviewing Waterford Core Protection Calculator application
- Conducting pre-application discussions with Exelon regarding a broad digital modernization license application request anticipated June 2021

Advanced Reactor Applications

- Developing NRC staff review guidance for I&C evaluations
- Preparing staff in all relevant disciplines
- Review of Oklo application

NEI 20-07

- New guidance for addressing common cause failure
- Particularly focuses on the use of defensive measures as a way to demonstrate quality of digital systems
- NEI expects to provide a draft to NRC in September

Digital Modernization!

*Our
Destination*

**Efficient
Licensing**



**Endorsement of
Updated Standards**



**Clear 50.59
Expectations**

