



HITACHI

Pre-Submittal Meeting
for CRN PSAR Chapter 7

*NRC Annotated Outline Audit Comments on
Use of NRC I&C Design Review Guide*

October 18, 2023

Agenda

- Design Review Guide (DRG) Development Background
- NRC Annotated Outline Audit Observations on DRG
- Acceptability of I&C DRG as an Alternative RG 1.233 Conformance
- Acceptability of I&C DRG as an Alternative to SRP Conformance
- Questions & Comments

Design Review Guide Development Background

- NRC issued the I&C DRG in February 2021 and includes the following major features:
 - Characterized as a proactive way to modernize I&C safety reviews by providing guidance for technology-inclusive, risk-informed, and performance-based reviews.
 - Anticipates that new advanced reactor designs will continue to use modern digital I&C technology developed to state-of-the-art standards.
 - Provides guidance to evaluate whether I&C systems and components are designed in accordance with the relevant domestic and/or international standards and via proven engineering design practices and processes.

I&C DRG as an Alternative RG 1.233 Conformance

- Purpose of RG 1.233 and independence of DRG
 - RG 1.233 provides guidance to identify LBEs, classify SSCs, establish special treatments, identify programmatic controls, and assess DID using guidance from NEI 18-04
 - NEI 18-04 describes a systematic process using probabilistic risk assessment (PRA) for identifying and categorizing event sequences into AOO, DBE, and BDBE based on frequency and consequences (F-C) – this is performed by the BWRX-300 safety strategy
 - BWRX-300 I&C design is based on the classifications derived from the BWRX-300 safety strategy described in Chapter 15 – this makes the use of DRG in Chapter 7 independent from the implementation of RG 1.233

I&C DRG as an Alternative RG 1.233 Conformance

- I&C DRG provides guidance for NRC staff to use in reviewing I&C portions of applications for advanced non-LWRs
 - I&C DRG states that it was developed to address immediate needs associated with the non-LWR community
 - I&C DRG applicability was expanded based on Advisory Committee on Reactor Safeguards (ACRS) comments
 - ACRS concluded that the I&C DRG is technology inclusive, therefore, it may be used for the review of LWR plant designs and other reactor technologies.

I&C DRG as an Alternative RG 1.233 Conformance

- In the response to the ACRS, the NRC staff noted:

Staff Response: The NRC staff agrees that the DRG is technology neutral and could be used for the review of non-LWR or LWR plant designs and any proposed safety I&C system modifications in operating plants. The DRG was developed to address the immediate needs associated with the non-LWR community consistent with Regulatory Guide 1.233, “Guidance for a Technology-Inclusive, Risk-Informed, and Performance-Based Methodology to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-Light-Water Reactors” and Nuclear Energy Institute 18-04, “Risk-Informed Performance-Based Technology Inclusive Guidance for Non-Light Water Reactor Licensing Basis Development,” referred to as the Licensing Modernization Project (LMP). Although the DRG aligns with the LMP framework, the DRG provides the flexibility for the NRC staff to perform I&C reviews for applications that do not implement the LMP framework. The NRC staff will continue to

I&C DRG as an Alternative to SRP Conformance

- New Reactor Licensing Process Lessons Learned Review noted that new reactor designs contain highly-integrated and complex digital I&C systems
 - These design presented issues that have been resource-intensive and challenging
 - NRC has undertaken several innovative and integrated approaches to develop better I&C review guidance in recent years to support operating plant I&C modernization projects and new plant reviews
 - To date, these efforts have not resulted in an update to NUREG-0800 Standard Review Plan (SRP) used for I&C review guidance

DRG developed to “improve I&C reviews for small reactors, remove requirements that no longer applied to SMR's like IEEE standard 279, and to remove duplicate reviews of the same requirements as many of the requirements were reviewed in each set of chapters of the SRP”

[Mr. Ashcraft, Page 18, ACRS I&C subcommittee transcript Oct 21, 2020]

I&C DRG as an Alternative to SRP Conformance

- The NRC issued Interim Staff Guidance (ISG) DNRL-ISG-2022-01 to facilitate the safety review of LWR reactor construction permit (CP) applications and to supplement guidance in NUREG-0800. The ISG discusses:
 - Lessons learned from previous new plant I&C system reviews and improvements in Design-Specific Review Standard (DSRS) guidance.
 - DSRS guidance emphasizes fundamental I&C design principles of independence, redundancy, predictability and repeatability, and diversity and defense in depth.
 - SRP Chapter 7 guidance is system focused and does not take advantage of such a unifying framework.

I&C DRG as an Alternative to SRP Conformance

- I&C DRG leverages DSRS Chapter 7 framework while factoring in lessons learned from new reactor reviews by providing:
 - Guidance for flexible regulatory reviews within bounds of existing regulations
 - New regulatory framework that is risk-informed and performance-based
- I&C DRG aligns with I&C review objectives identified in DNRL-ISG-2022-01:
 - Overall I&C architecture adhering to fundamental I&C design principles,
 - Plant safety functions allocated to each of safety-related I&C systems,
 - Proposed communications between different class I&C systems,
 - Regulations that applicant intends to comply with for the I&C design, and
 - Regulations that applicant intends to take exemption from or deems not applicable to its design

Acceptability of I&C DRG to LWR Design Review

- ACRS supported that the DRG is technology neutral and could be used for the review of non-LWR or LWR plant designs and any proposed safety I&C system modifications in operating plants
- DRG provides flexibility for the NRC staff to perform I&C reviews for applications that do not implement the LMP framework
- I&C DRG leverages DSRS Chapter 7 framework while factoring in lessons learned from new reactor reviews
- I&C DRG aligns with I&C review objectives identified in DNRL-ISG-2022-01

Questions or Comments



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