

POLICY ISSUE
(Information)

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FOR: The Commissioners

FROM: Victor M. McCree
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SUBJECT: STATUS OF GUIDANCE DEVELOPMENT FOR DIGITAL INSTRUMENTATION AND CONTROL UPGRADES UNDER TITLE 10 OF THE *CODE OF FEDERAL REGULATIONS*, SECTION 50.59, "CHANGES, TESTS AND EXPERIMENTS"

PURPOSE:

This paper informs the Commission of the U.S. Nuclear Regulatory Commission (NRC) staff's progress in developing guidance for digital instrumentation and control (I&C) upgrades. In November 2017, the staff intends to issue a regulatory issue summary (RIS) that will clarify the staff's endorsement of industry guidance for preparing and documenting qualitative assessments licensees use in determining whether a change requires a license amendment. Licensees are expected to use this information to facilitate near-term digital upgrades and replacements to I&C systems, with initial focus on nonsafety-related systems and auxiliary support safety systems for new and operating power reactors. This paper does not address any new commitments or resource implications.

BACKGROUND:

The staff issued RIS 2002-22, "Use of EPRI [Electric Power Research Institute]/NEI [Nuclear Energy Institute] Joint Task Force Report, 'Guideline on Licensing Digital Upgrades: EPRI TR-102348, Revision 1, NEI 01-01: A Revision of EPRI TR-102348 to Reflect Changes to the 10 CFR 50.59 Rule,'" dated November 25, 2002 (Agencywide Documents Access and

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Management System (ADAMS) Accession No. ML023160044). In this RIS, the staff endorsed the use of NEI 01-01 for designing, licensing, and implementing digital upgrades and replacements to I&C systems in a consistent and comprehensive manner. The RIS was intended to ensure that digital upgrade regulatory and technical issues were adequately addressed when performing evaluations under Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.59, “Changes, tests and experiments.”

Using varying interpretations of the guidance in NEI 01-01, some licensees have inconsistently performed or inadequately documented 10 CFR 50.59 evaluations of digital I&C modifications. For example, NRC inspectors identified cases where licensees did not adequately document how the application of codes and standards supported the determination that a license amendment was not required. Based on these findings, the staff issued a letter to NEI¹ in November 2013 that described the staff’s concerns that interpretations of NEI 01-01 were not leading to the appropriate application of 10 CFR 50.59. In response, industry requested the NRC staff to clarify how licensees should use 10 CFR 50.59 appropriately to perform near-term upgrades to many nonsafety-related systems and auxiliary safety support systems.

In 2015, after discussion in a series of NRC public meetings, NEI identified a strategy for resolving issues with implementing NEI 01-01. The strategy involved the development of two supplemental documents: NEI 16-16² and NEI 96-07, Appendix D³. These two draft documents have not been finalized, but are currently under staff review for comment in accordance with schedules outlined in the Digital I&C Integrated Action Plan (IAP)⁴.

In Section 5 of the IAP, Modernization Plans 1 and 2 outline how the staff plans to clarify its previous endorsement of the NEI 01-01 guidance by providing additional guidance via a supplement to RIS 2002-22. This supplement clarifies guidance for developing and documenting acceptable qualitative assessments in support of the performance of 10 CFR 50.59 evaluations of proposed digital I&C modifications. The staff may ultimately endorse or issue new guidance that could supersede the supplemental RIS. However, the staff has not yet determined whether the current efforts, including NEI’s development of NEI 16-16 and NEI 96-07, Appendix D, would be sufficient to eventually supersede the supplemental RIS.

DISCUSSION:

Industry representatives have reported that most operating plants have completed digital upgrades to nonsafety-related systems (e.g., feedwater control systems) under 10 CFR 50.59. However, licensees have indicated reluctance to implement other digital upgrades, such as upgrades to control room chillers and emergency diesel generator voltage regulators, because

¹ NRC Staff letter to NEI entitled “Summary of Concerns with NEI 01-01” (ADAMS Accession No. ML13298A787).

² NEI 16-16, “Guidance for Addressing Digital Common Cause Failure” (ADAMS Accession No. ML17135A253).

³ NEI 96-07, Appendix D, “Guidelines for 10 CFR 50.59 Evaluations,” Appendix D [Draft], “Supplemental Guidance for Application of 10 CFR 50.59 to Digital Modifications” (ADAMS Accession No. ML17075A371).

⁴ NRC IAP to Modernize Digital Instrumentation and Controls Regulatory Infrastructure, Revision 1 (ADAMS Accession No. ML17102B307).

of regulatory uncertainty they have encountered in using the 10 CFR 50.59 process for such upgrades.

Based on feedback from industry, the most urgent regulatory need for digital upgrades is the development of additional staff guidance aimed at supporting the upgrade of safety system auxiliary functions (e.g., cooling systems, auxiliary power systems) under 10 CFR 50.59. Because of the challenges identified with using the guidance in NEI 01-01 for performing such upgrades, and given the current state of review of NEI 16-16 and NEI 96-07, Appendix D, the staff engaged industry via a series of public meetings to develop an alternative approach for providing guidance to licensees who are currently planning to implement near-term digital I&C upgrades.

The staff's strategy to issue a supplemental RIS responds directly to the staff requirements memorandum (SRM)⁵ to SECY-15-0106. This SRM included direction that "NRC requirements and guidance should not pose an unnecessary impediment to advancement in nuclear applications of digital technology." Issuing a supplemental RIS as an interim step will allow continued progress to be made on the broader context of digital I&C regulatory challenges, while providing the industry with a path for immediate digital upgrade implementations of lower risk-significant systems under 10 CFR 50.59.

Scope and Utilization of the Supplemental RIS

The supplemental RIS does not change the staff positions previously established in RIS 2002-22 endorsing NEI 01-01. The supplemental RIS expands upon the staff's previous endorsement of NEI 01-01 by clarifying how licensees can develop and document effective qualitative assessments that are used to provide reasonable assurance that a digital modification will exhibit a low likelihood of failure relative to existing systems under a current licensing basis. This low likelihood is a key element in determining whether a change requires prior NRC approval. Specifically, the supplemental RIS is intended to clarify what is expected from licensees in performing and documenting these qualitative assessments of proposed digital I&C changes to primarily support conclusions to be reached for addressing criteria (i), (ii), (v), and (vi) of 10 CFR 50.59(c)(2).

Further, the supplemental RIS describes the importance of documenting how key design attributes, quality design processes, and evaluation of operating experience are being credited in judging that the proposed digital modification will exhibit a low likelihood of failure. If these aspects are considered appropriately, the technical basis for the qualitative assessments can be used to conclude that the proposed digital modification will exhibit a low likelihood of failure. Whereas the guidance in NEI 01-01 provides a road map to relevant standards and other sources of detailed guidance, the attachment to the supplemental RIS clarifies how the licensee should document the aggregate of the proposed digital I&C system design features, quality design processes, and equipment and software operating experience that are applied to the proposed design. The supplemental RIS also identifies standards and guidance to prepare an

⁵ SRM-SECY-15-0106, "Proposed Rule: Incorporation by Reference of Institute of Electrical and Electronics Engineers Standard 603-2009, 'IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Systems' (RIN 3150-AI98)" (ADAMS Accession No. ML16056A614).

effective qualitative assessment to support any conclusions within a 10 CFR 50.59(c)(2) evaluation that a license amendment is not needed.

The staff began drafting the supplemental RIS in March 2017 and issued the draft for public comment in the *Federal Register* on July 3, 2017, as summarized in Draft RIS 2017-XX⁶. The comment period closed on August 16, 2017, and the staff received over 100 comments from 13 stakeholders. The staff is currently addressing those public comments as it finalizes the RIS. Given the generally supportive nature of comments and feedback from industry, the staff is confident that the RIS supports a more effective and efficient licensing process for digital upgrades across the operating fleet. As described in the next section, licensees have successfully used the draft supplemental RIS to prepare example 10 CFR 50.59 evaluations that appear to be complete and consistent with NRC requirements, as clarified within the draft RIS. The staff plans to issue the final supplemental RIS for use in November 2017. The staff expects this issuance to support licensees' plans for near-term upgrades to many nonsafety-related systems and auxiliary safety support systems (e.g., chillers, feedwater).

Stakeholder Interaction

The staff has made a concerted effort to engage all stakeholders in the development of the supplemental RIS. To support high-level planning and strategy for the supplemental RIS, the NRC's Digital I&C Steering Committee (SC) attended NEI's Industry Digital I&C Working Group quarterly meetings in March and June 2017. The SC will continue to attend the quarterly meetings to maintain awareness of industry plans related to digital I&C.

To ensure that the supplemental RIS addressed the inspection issues, regional staff were engaged to gain perspective on challenges with NEI 01-01 and to assist in developing the framework for the supplemental RIS. The SC made preliminary working drafts of the supplemental RIS available to the staff for discussion in weekly meetings. The SC also invited staff from the regions to participate in weekly team calls.

The staff held public meetings throughout the development of the supplemental RIS and the public comment period. The first public meeting⁷ was held on March 30, 2017, to obtain feedback on the proposed purpose, scope, methodologies, and application of the supplemental RIS. The second public meeting⁸ was held on April 20, 2017, to further refine the scope and application and to discuss the qualitative assessment process in more detail. The third public meeting⁹ was held on May 25, 2017, with specific focus on clarifying potential problem areas in the supplemental RIS associated with interpretations and application utilizing a tabletop exercise. NEI provided an example qualitative assessment¹⁰, which was developed using guidance provided in the draft supplemental RIS. The staff gained valuable insights by walking through the example with NEI and other industry stakeholders and used these insights in finalizing the draft supplemental RIS. The fourth public meeting¹¹ was held on August 2, 2017, during the public comment period. At the meeting, NEI provided a high-level overview of the

⁶ Draft RIS 2017-XX, "Clarification of the Staff Endorsement on the use of NEI 01-01" (ADAMS Accession No. ML17102B507).

⁷ March 30, 2017, Public Meeting Summary (ADAMS Accession No. ML17159A789).

⁸ April 20, 2017, Public Meeting Summary (ADAMS Accession No. ML17159A793).

⁹ May 25, 2017, Public Meeting Summary (ADAMS Accession No. ML17159A797).

¹⁰ NEI example qualitative assessment (ADAMS Accession No. ML17144A309).

¹¹ August 2, 2017, Public Meeting Summary (ADAMS Accession No. ML17137A326).

expected industry comments on the draft supplemental RIS. NEI also presented two examples¹² of 10 CFR 50.59 digital I&C upgrade evaluations that were prepared using the principles in the draft supplemental RIS. The staff determined the examples were consistent with the guidance in the draft RIS, and could meet the requirements of 10 CFR 50.59 with some additional documentation. Industry feedback received during the public exchanges indicates the draft supplemental RIS will aid in completing 10 CFR 50.59 evaluations.

Following the formal issuance of the supplemental RIS, the staff plans to conduct public workshops and training seminars for stakeholders, as well as internal training for NRC staff, on the use, interpretation, and application of the supplemental RIS guidance. Specific attention will be given to how staff would apply the supplemental guidance during inspections and audits of future 10 CFR 50.59 digital modifications.

CONCLUSION:

The staff expects that this supplemental RIS will both assist NRC inspectors and directly respond to the industry's request for clarity on how licensees may be able to perform near-term upgrades to many nonsafety-related systems and auxiliary safety support systems for new and operating power reactors. Therefore, the RIS is an important step in the continued forward progress, in the very near future, in implementing digital I&C modifications.

COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objections.

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¹² NEI example 10 CFR 50.59 digital I&C upgrade evaluations (ADAMS Accession Nos. ML17209A380 and ML17209A382).

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