

October 5, 2015

MEMORANDUM TO: Anthony J. Mendiola, Chief
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Office of Nuclear Reactor Regulation

FROM: Joseph J. Holonich, Senior Project Manager /RA/
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SUBJECT: SUMMARY OF AUGUST 19, 2015, PERIODIC MEETING ON
DIGITAL INSTRUMENTATION AND CONTROL

On August 19, 2015, staff from the U.S. Nuclear Regulatory Commission (NRC) met with representatives from the Nuclear Energy Institute (NEI) and industry for a periodic update meeting on digital instrumentation and control (DI&C). The purpose of the meeting was to provide information and status updates to the public on various activities being undertaken by the NRC staff and industry in the area of DI&C. Meeting-related information—including presentations and attendees list—can be found online in the NRC Agencywide Documents Access and Management System (ADAMS) at Accession No. ML15162A520.

In its opening remarks, the NRC staff stated that it appreciated having the participation of industry and NEI stakeholders at public forums of this type. Furthermore, the NRC staff stated that the periodic meetings enabled it to communicate its views, technical positions, and plans for moving the licensing process for DI&C safety systems forward. The NRC staff also noted that the meetings provide an opportunity for stakeholders and the public to provide feedback, concerns, and ideas, all of which help the NRC staff confirm it is on target.

The NEI representatives stated in their opening remarks that these periodic meetings helped them address issues. The industry believed it was in the best possible position to move forward with license amendment requests (LARs) on DI&C modifications. In addition, the industry reported that the meetings have helped build confidence on how Title 10 of the *Code of Federal Regulations* (10 CFR) 50.59, “Changes, Tests, and Experiments,” is being implemented for DI&C modifications. As an example, NEI noted that one fleet has nonsafety-related nuclear steam supply control system modifications being planned at some of its sites that it intends to complete under 10 CFR 50.59 with NRC involvement as a demonstration project.

NEI gave the first presentation, which was on the status of ongoing activities related to NEI 01-01, “Guideline on Licensing Digital Upgrades— TR-102348, Revision 1—NEI 01-01: A Revision of EPRI TR-102348 To Reflect Changes to the 10 CFR 50.59 Rule,” ADAMS Accession No. ML020860169. Copies of the NEI presentation can be found in the ADAMS package previously referenced.

During this presentation, a participant asked the NEI representative how the ongoing work to supplement NEI 96-07, "Guidelines for 10 CFR 50.59 Evaluations," was being performed to be consistent with ongoing revisions to Regulatory Guide 1.187, "Guidance for Implementation of 10 CFR 50.59, 'Changes, Tests, and Experiments.'" NEI is developing Appendix D to NEI 96-07 to provide specific guidelines for application of 10 CFR 50.59 to digital modifications. In response to the question, the NEI presenter stated that the revisions to Regulatory Guide 1.187 apply to all activities being done under 10 CFR 50.59 but that Appendix D will not be impacted because NEI will be looking for a separate endorsement.

In addition, there was some discussion on the coping analysis mentioned on slide 16 of the NEI presentation. The second bullet stated:

Establishes that coping analyses that involve safety analyses that use the same method of evaluation as described in the UFSAR [Updated Final Safety Analysis Report] are not revisions or replacements of that method of evaluation.

The NRC staff asked how NEI was applying this analysis. The NRC staff elaborated that one application of this bullet could be a digital-to-digital protection system replacement. That is, if the installed digital protection system had a coping analysis (such as is referenced in the staff requirement memorandum (SRM) to SECY-93-087, "Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor (ALWR) Designs," Item II.Q) and there was a proposed DI&C protection system replacement, would that eliminate the need for a new evaluation of the DI&C replacement? The NRC staff continued that it is probable that the versions of (SRM to SECY-93-087, Item II.Q) coping analysis used were different than the current guidance and, thus, would this be considered a revision.

The NRC staff also noted that, for an analog to digital replacement, the installed analog system would not have had a SRM to SECY-93-087 Item II.Q coping analysis. Yet the new digital replacement system should have one, unless it involved Section 1.9 of Branch Technical Position 7-19, "Guidance for Evaluation of Diversity and Defense-in-Depth in Digital Computer-Based Instrumentation and Control Systems." NRC staff said it was not clear in the NEI presentation if the proposed guidance is a revision or replacement of that method of evaluation. Participants agreed that additional clarification was needed and created an action item to schedule a call or meeting between NEI and the NRC to clarify what was meant by the bullet.

As part of the presentation, it was noted that a draft of the Electric Power Research Institute (EPRI) technical report supporting Appendix D would be available in September 2015. NEI plans to issue Appendix D of NEI 96-07 in October; however, the final EPRI technical report would not be issued until November 2015. It was agreed that once the EPRI report was issued and the NRC had reviewed it, a public meeting could be beneficial to discuss the NRC's thoughts on the report. This would provide NEI with insights regarding the NRC staff's perspectives on the EPRI technical report supporting Appendix D. Participants created an action item to schedule a public meeting for this purpose.

The second agenda item was a discussion led by an NEI representative on activities related to the new NEI DI&C Executive Working Group. NEI said that the industry needs to make modifications to currently operating facilities involving system upgrades to digital platforms. It stated that NEI 01-01 with NEI 96-07 Appendix D are tools that will provide the necessary guidance to support the DI&C modifications. These modifications may be needed to help plants continue to operate safely and reliably over the long term, and plants should not allow regulatory

issues to get in the way of safe operations. However, participants stated that plants are hesitant to move forward with digital modifications because of perceptions that they will take too long and have a high risk of increased costs to complete all related activities.

The NEI representative indicated that there are three steps that need to be undertaken:

- 1) Identifying the specific DI&C issues to be resolved.
- 2) Gaining an understanding of the issues.
- 3) Agreeing on what to do to address the issues.

The NEI representative emphasized that airlines, the Navy, and many nuclear fleets outside the United States have determined how to safely implement DI&C modifications, and new reactors undergoing licensing are using DI&C equipment. Therefore, there may be opportunities to learn from the success of others in implementing digital systems.

To help operating reactors accelerate the use of DI&C systems, participants noted a need for better guidance in implementing the safety and nonsafety DI&C packages. For LARs, once DI&C-ISG-06 becomes firm guidance, it will ensure better applications and better milestone schedules that provide plants more certainty for the LAR review. For DI&C modifications as a result of 10 CFR 50.59 screening and evaluation, the soon-to-be-released NEI 96-07 Appendix D and EPRI common cause failure (CCF) guidance will lead to high quality application of the 10 CFR 50.59 process.

The NEI representative also recommended that NEI and NRC staff coordinate their roadmaps on DI&C topics. One roadmap coordination effort would focus on what was needed to address topics in DI&C modification, and another would focus on how to perform and evaluate DI&C modifications. This effort should not only include NEI representatives and NRC headquarters staff but also NRC regional staff. Participants said including NRC regional staff is essential because plants are concerned that an inspector could raise issues with areas found acceptable by NRC headquarters staff. They said NRC headquarters staff tends to focus on design while the NRC regional staff tends to focus on operations.

Participants agreed to an action item to develop a roadmap coordination effort to determine 1) what topics should be included in a plant to resolve the DI&C modification issues, and 2) how to resolve the topics identified.

In the discussion on the topical report (TR) management process, the NEI representative relayed a view from a nuclear vendor's senior vice president (SVP) during the 2015 Regulatory Information Conference (RIC). At the RIC, the SVP stated that, in his view, several of the vendor's TRs were frozen in the review and approval process. The NEI representative, however, stated that a subsequent review confirmed that this was not the case for any DI&C TRs. Nonetheless, the NEI representative noted that there were some opportunities to improve the process for submitting and evaluating DI&C TRs.

One point raised in this discussion was that the digital platform TRs the NRC has currently received were not system designs but rather were for components (cards) that would be programmed and then put into systems at plants. Since the card designs were highly generic, the NRC staff approval of the use of the equipment described within a TR included many

plant-specific action items (PSAIs). The NRC staff stated that these PSAIs were needed because the NRC staff did not understand from the TR information provided how the cards would be used in systems developed for use within licensee plants.

A second topic raised in the TR management process discussion was that the TR process itself appeared to be less effective than desired. The industry view presented at the meeting was that TRs were intended to help streamline the LAR review process. In other words, the industry view was that the majority of the technical review would be done in the TR process and this would streamline the LAR review of the plant-specific modification. However, the industry reported that this did not appear to be the case.

In response to this comment, the NRC staff recommended that future TRs provide proposed system-level architectures outlining how plants would implement systems that employ appropriate combinations of the cards to perform safety functions. Such information would help the NRC staff better focus its review, with a resulting greater potential for a more efficient LAR review that references the results of a topical report.

The NRC staff said its view was that the DI&C TR process was effective. In addition, a vendor representative pointed out that the DI&C-ISG-06 pilot project LAR progress was not delayed by the NRC staff review. It was noted that the NRC staff evaluation of new reactors was performed before the NRC accepted TRs in evaluating the design of the Advanced Pressurized Water Reactor 1000.

In its presentation on the NRC Digital I&C Path Forward Action Plan, the NRC staff provided insights to its goals and priorities. The staff briefly described nine issues it had identified in which the staff, with input from stakeholders, could take steps to gain efficiencies in the performance of license application or license amendment request evaluations.

During the presentation, the NRC staff mentioned internal NRC letter reports, which prompted a question from a member of the public asking for an explanation of these reports. The NRC staff reported that these were internal working documents received from contractors and that the contents of these letter reports would be made available to the public through NRC staff products such as rulemaking package. The member of the public was satisfied that the NRC staff would make the information available to stakeholders at the appropriate time.

The NRC staff made a second presentation on the international task force on safety critical software. Copies of this and the NRC roadmap presentation can be found in the ADAMS package for the meeting.

Several topics were covered in the New Topics and Open Discussion sections of the meeting.

Industry expressed its concern with the predictability of DI&C licensing review schedules. The NEI representative stated that DI&C modifications involved large costs over significant time periods and plant operators perceived it to be high risk to proceed without receiving early approvals of the DI&C modification in the existing regulatory process. Reducing the risk associated with DI&C modifications is necessary because both the NRC and industry recognize that the analog systems are becoming obsolete and plants want to convert to DI&C systems for their advanced features, which would lead to improved operations.

The NRC staff discussed how other countries used the license renewal (LR) process to address safety upgrades, including DI&C. The NRC staff said that for the LRs for plants originally licensed 60 to 80 years ago the use of analog systems was not a safety concern. It was discussed that in the next 5 years, some plants would be developing second LR applications for the next incremental period of 60 to 80 years of operation. The NRC staff believed that expectations for operations of analog control systems with up to an 80-year lifespan raises many questions. Strong consideration for the use of digital technology should be made to replace such aging analog system designs.

NEI stated that the industry was looking forward to having an efficient and reliable process in place to make DI&C modifications more predictable. In the near future, industry wants to get a DI&C LAR package through approval to demonstrate a successful regulatory review. The NRC staff indicated that it is ready right now to receive such an application and to demonstrate that efficiencies have already been gained through lessons learned from the DI&C-ISG-06 pilot program.

The final discussion at the meeting was devoted to receiving input from members of the public. A member of the public stated that he was very pleased with the meeting and that he was glad CCF was being discussed.

The meeting identified the following action items:

- NEI and the NRC staff will clarify the coping analysis discussed on Slide 16 of NEI's presentation on NEI 01-01.
- A public meeting will be scheduled following the issuance of the draft EPRI report supporting preparation of NEI 96-07, Appendix D.
- NEI and the NRC staff will coordinate their two roadmap efforts to address 1) what is needed to solve DI&C modification, and 2) how to resolve the topics identified.
- NEI and the NRC staff will establish working groups to focus on how to use approved TRs.
- NEI and the NRC staff will schedule the next periodic DI&C meeting for mid to late February 2016.

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