

U.S. NUCLEAR REGULATORY COMMISSION SUMMARY OF THE SEPTEMBER 13, 2023,
OBSERVATION PREAPPLICATION PUBLIC MEETING
WITH SMR, LLC (A HOLTEC INTERNATIONAL COMPANY)
TO DISCUSS THE SMR-160 INSTRUMENTATION AND CONTROL TWO
DIVISION DESIGN CONFORMANCE TO PORTIONS OF STANDARD IEEE 603

Meeting Summary

The U.S. Nuclear Regulatory Commission (NRC) held an observation preapplication public meeting on September 13, 2023, with SMR, LLC (SMR), a Holtec International Company (Holtec), to discuss the SMR-160 Instrumentation and Control (I&C) Two Division Design Conformance to Portions of Institute of Electrical and Electronics Engineers (IEEE) Standard 603.¹ SMR (Holtec) provided presentation slides to support the discussion during the public meeting,^{2,3} and white paper JEXK-0143-1049-P(R0),⁴ with accompanying affidavit⁵ pursuant to 10 CFR 2.390. This meeting summary satisfies the SMR (Holtec) request for review and feedback on its preapplication meeting materials.

This virtual observation preapplication meeting had attendees from SMR (Holtec) and NRC staff. There were no members of the public observing the meeting. During the closed session of the meeting, SMR (Holtec) and NRC staff discussed proprietary information.

Preapplication engagements, including this meeting, provide an opportunity for the NRC staff to engage in early discussions with a prospective applicant to offer licensing guidance and to identify potential licensing issues early in the licensing process. No decisions or commitments were made during the preapplication meeting.

The following summarizes the discussion during the open session of the meeting:

The open session started at 1:30 PM.

- Following the NRC staff's opening remarks and introductions, SMR (Holtec) opened its presentation with the meeting agenda and purpose of the meeting. The purpose was listed to, familiarize NRC staff with I&C architecture of the SMR-160, focusing on the

¹ Letter from A. Brenner, "SMR, LLC Preapplication Meeting Materials for September 13, 2023 (Project No. 99902049)," dated September 6, 2023, Agencywide Documents and Access Management System (ADAMS) Accession No. ML23249A107, part of ML23249A106.

² SMR, LLC, Enclosure 1: "Two Division Safety System Compliance with Applicable Rules and Regulations," August 13, 2023, ML23249A108- Proprietary, part of ML23249A106.

³ SMR, LLC, Enclosure 2: "Two Division Safety System Compliance with Applicable Rules and Regulations," September 13, 2023, ML23249A109, part of ML23249A106.

⁴ SMR, LLC, Enclosure 3: JEXK-0143-1049-P(R0), "SMR, LLC, Mitsubishi Electric Corp., Two Division Safety System Compliance with Applicable Rules and Regulations," August 25, 2023, ML23249A110, part of ML23249A106.

⁵ SMR, LLC, Enclosure 4: "Affidavit Pursuant To 10 CFR 2.390," September 6, 2023, ML23249A111, part of ML23249A106.

two-division design and how it complies with IEEE 603-1991.⁶ SMR (Holtec)'s stated desired outcome was to obtain feedback from the NRC staff on their approach for complying with current, as well as planned future revisions, to guidance and regulations in this area.

- SMR (Holtec)'s stated licensing strategy for SMR- 160 I&C is following the 10 CFR Part 50⁷ process, particularly following DNRL-ISG-2022-01⁸, which provides guidance for I&C content. SMR (Holtec) added that 10 CFR 50.55a (sub-paragraph h, "Protection and Safety") requires conformance to IEEE 603-1991, and provided a summary of requirements of said standard, the compliance of which are detailed in the white paper.
- The NRC staff stated three options are currently being evaluated by the staff on how 10 CFR 50.55a will endorse or incorporate the criteria in the latest version of IEEE 603 (version 2018, or 603-2018), and possibly other standards. The standard is revised every 10 years by the IEEE working group, who's membership includes NRC staff, and the next revision is planned to be issued in about 5 years. The NRC staff pointed out that developers can use newer versions of the IEEE standard (versions 1998, 2009 or 2018) or other standards, domestic or foreign. However, the criteria in IEEE 603-1991 are the regulatory requirements and they would be used for determining acceptability. There are references to other standards from within IEEE 603-1991, but these references are not treated as requirements, but rather just guidance (example IEEE 7-4.3.2-2016⁹).
- The NRC staff outlined the options being considered for endorsing or incorporating the latest criteria of IEEE 603 as follows:
 1. Revise the Regulatory Guide (RG) 1.153¹⁰ that endorses IEEE 603-1991, which is a limited option in that it would only endorse additional criteria that was added in IEEE 603-2018,
 2. conduct rulemaking to revise 10 CFR 50.55a to endorse the criteria of IEEE 603- 2018 for future licenses, and maintain the incorporation by reference of IEEE 279-1971¹¹ and IEEE 603-1991 for current license holders, or
 3. no change to the regulation or the guidance but issue a generic communication (perhaps a regulatory information summary) that explains and clarifies current NRC policy, as described above, that developers can use any standard for I&C designs, but the final design will be evaluated by, and should meet, the regulatory criteria in IEEE 603-1991. NRC staff has been following this policy for several years now and is limited in that there would be no new endorsements.

⁶ IEEE Standard 603-1991, "Standard Criteria for Safety Systems for Nuclear Power Generating Stations," December 31, 1991, <https://ieeexplore.ieee.org/document/159411>.

⁷ Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, "Domestic Licensing of Production and Utilization Facilities."

⁸ U.S. NRC, Interim Staff Guidance, DNRL-ISG-2022-01 "Safety Review of Light-Water Power-Reactor Construction Permit Applications," October 31, 2023, ML22189A099.

⁹ IEEE Standard 7-4.3.2-2016, "IEEE Standard Criteria for Programmable Digital Devices in Safety Systems of Nuclear Power Generating Stations," August 25, 2016, <https://ieeexplore.ieee.org/document/7552419>

¹⁰ U.S. NRC, Regulatory Guide RG 1.153, "Criteria for Safety Systems," June 1996, ML003740019.

¹¹ IEEE Standard IEEE 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations," June 12, 1971, <https://ieeexplore.ieee.org/document/8383728>.

- The NRC staff stated that the timing of updates to guidance and regulations will depend upon which option the NRC staff ultimately chooses. The longest path is the rulemaking path, which could take several years, the shortest path is the generic communication path, and the mid-length path would be the RG revision, which could take about one to one and a half years.
- The NRC staff recommended SMR (Holtec) to attend a virtual public meeting on September 14, 2023, going over the options for endorsing the latest version of the IEEE 603 standard, to seek industry input on alternative options, and seek input on the scope changes and clarification of criteria for the next version of the IEEE 603 standard.¹²
- The NRC staff acknowledged the SMR (Holtec) proposal to remove the incorporation by reference to IEEE 603-1991 as an option but added that the NRC staff is concerned about potential issues to current licensees that may come from this option.
- There were no questions or comments from the public.

The open session ended at 1:58 PM.

The following summarizes the closed session discussion:

- SMR (Holtec) presented details on their proposed SMR-160 I&C two division architecture and a review of their overall planned I&C submission schedule. The white paper references features in the Mitsubishi Electric Corporation (MELCO) platform Topical Report (TR), JEXU-1041-1008 (R3), and provides details on the two division architecture.
- The NRC staff stated that for the MELCO TR there is an application specific Action Item-5.2.13, which states that the MELCO platform is capable of satisfying the criteria of IEEE 603, however the performance requirements criteria must be fully met at the construction application stage. The SMR-160+ design would have to address this action item.
- The NRC staff cautioned that IEEE 603 has specific meaning to the words “channel” and “division”, and it appears that the meaning of these terms as slightly different in the meeting slides and the white paper. It is recommended that SMR (Holtec) clearly define these, and any other specific terms from standards and regulations, if they are in fact different from the definition in IEEE 603.
- I&C independence was one of the main topics of discussion and the NRC staff indicated that evidence (such as validation test reports, standardized interface design, or architectural drawings), and not just statements of intent, of IEEE 603 regulatory criteria being met would need to be on the docket to serve as the basis for NRC staff’s safety findings on the operating license application. Admittedly how to provide evidence of independence is the subject of much consideration and discussion in current NRC staff reviews.

¹² U.S. NRC, “09/14/2023 Proposed Path Forward for Industry’s Use of Institute of Electrical and Electronics Engineers Standard (IEEE) 603-2018, Criteria for Safety Systems,” dated August 30, 2023, ML23242A169

- SMR (Holtec) indicated they are using the guidance in DI&C-ISG-04 (ISG-04)¹³. NRC staff pointed out that ISG-04 is going away, so by the time SMR (Holtec) submits their application it will need to meet the IEEE 7-4.3.2 standard, which incorporated the criteria from ISG-04.
- The NRC staff reminded SMR (Holtec) that preapplication engagement via review of a white paper would be for providing general feedback, without passing any regulatory finding, and to point to relevant criteria, regulations, or guidance.
- The NRC staff pointed out that TRs should be approved before they are referenced in a construction permit application (CPA). The staff cautioned that while there have been cases of TRs and CPAs being submitted for parallel review, this is an inefficient process and poses risks in that issues that come up in the TR could affect the application and could potentially delay processing in both reviews. NRC staff advised that allowing TRs to be approved before referencing them in subsequent applications is cleaner, more efficient, and the preferred path.

The closed session ended at 3:24 PM.

¹³ U.S. NRC, Interim Staff Guidance DI&C-ISG-04, Revision 1, "Interim Staff Guidance on Highly-Integrated Control Rooms – Communications Issues (HICRc)," March 2009, ML083310185