U.S. NUCLEAR REGULATORY COMMISSION SUMMARY OF THE MARCH 22, 2023, OBSERVATION PREAPPLICATION PUBLIC MEETING WITH SMR, LLC (A HOLTEC INTERNATIONAL COMPANY) TO DISCUSS QUESTIONS RELATED TO THE SMR 160 MAIN CONTROL ROOM STAFFING

Meeting Summary

The U.S. Nuclear Regulatory Commission (NRC) held an observation public meeting on March 22, 2023, with SMR, LLC (SMR), a Holtec International Company (Holtec), to discuss preapplication information related to the SMR-160 design.[1] Specifically, SMR (Holtec) requested the meeting to discuss questions regarding the SMR-160 main control room staffing. SMR (Holtec) provided presentation slides for the public and non-public meeting.[2] 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), NRC staff, and members of the public. The NRC staff and the applicant discussed proprietary information during the closed session.

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 and resolve 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:

- SMR (Holtec) provided an overview of an exemption path from the requirements of 10 CFR 50.54(m), “Conditions of licenses,” regarding the minimum requirements per shift for on-site staffing of nuclear power units by licensed reactor operators and senior reactor operators in the control room (CR).

- SMR (Holtec) stated that the SMR-160 units could operate safely during normal and post-accident scenarios with fewer licensed operators in the CR because of key attributes associated with the SMR-160 which include: up to four units can be monitored and operated from one CR; an advanced digital system for automated controls will reduce operator workload; minimum important human actions expected; passive safety systems reduce the requirements for operator action such that operator action is not required or credited to respond to design-basis accidents.

- SMR (Holtec) stated that the SMR-160 will have a simulator to conduct multi-unit simulations with requested staffing levels for multi-unit operating scenarios, including normal and post-accident scenarios, to evaluate workload and operator performance. Minimum staffing validations will be conducted that contain multi-unit scenarios for workload evaluation.

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1 Letter from J. Hawkins, “SMR, LLC Preapplication Meeting Materials for March 22, 2023 (Project No. 99902049),” dated March 13, 2023, Agencywide Documents and Access Management System (ADAMS) Accession No. ML23072A002, part of ML23072A001.

2 SMR-160, Control Room Staffing (10 CFR 50.54(m)) dated March 22, 2023, part of ML23072A001.

- SMR (Holtec) stated that they would use NUREG-1791, "Guidance for Assessing Exemption Requests from the Nuclear Power Plant Licensed Operator Staffing Requirements Specified in 10 CFR 50.54(m)," which depicts a multi-step approach for determining the acceptability of an exemption request from 10 CFR 50.54(m). Part of this approach incorporates review of human factors engineering (HFE) milestones, including operating experience review, functional requirement's analysis/function allocation, and task analysis.

SMR (Holtec) also provided specific questions to the NRC prior to the public meeting which were discussed during the meeting. The questions and the NRC responses are provided below.

Question: Is there guidance on the scope of multi-unit simulation required for (1) minimum staff validation and (2) operating initial licensing?

NRC Response:

- The methodology that the NUREG-1791 process is designed around is fundamentally capable of addressing staffing analyses, including validation activities, within the context of multi-unit, SMR CRs. As such, it should be a primary source of guidance.

    - In a supplemental manner, HFE related considerations for multi-unit operations are also contained under NUREG/CR-7202, "NRC Reviewer Aid for Evaluating the Human-Performance Aspects Related to the Design and Operation of Small Modular Reactors," and under NUREG/CR-7126, "Human-Performance Issues Related to the Design and Operation of Small Modular Reactors."

- NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Chapter 18, Attachment B, "Methodology to Assess the Workload of Challenging Operational Conditions in Support of Minimum Staffing Level Reviews," provides additional guidance that includes considerations relevant to multi-unit SMRs.

- From a simulator adequacy standpoint, Regulatory Guide (RG) 1.149, "Nuclear Power Plant Simulation Facilities for Use in Operator Training, License Examinations, and Applicant Experience Requirements," provides guidance on an acceptable means of meeting 10 CFR 55.46, Simulation facilities," though application of the American National Standards Institute/American Nuclear Society Standards 3.5, "Nuclear Power Plant Simulators For Use In Operator Training And Examination." NUREG-0711, "Human Factors Engineering Program Review Model," Chapter 11 also references this standard in its consideration of the suitability of validation testbeds.

- From an operator licensing standpoint, a fundamental component of the program that will need to be developed will be a knowledge and abilities catalog. This list evolves out of the broader task analysis that will need to be conducted as part of both the HFE design process and licensed operator training program development. In conducting this task analysis (refer to NUREG-0711), tasks such as normal, abnormal, and emergency operations that are specific to the multi-unit concept of operations will need to be identified and should subsequently inform the content of the developed knowledge and abilities list. The operator licensing examination process bases its composition upon a representative sampling of this knowledge and abilities list, thereby linking the exam

content back to design-specific tasks. It must be emphasized that a rigorous and high-quality task analysis is essential to making this process work effectively.

- Last, it may be helpful to look back at the publicly available materials that are available from the NRC's review of the NuScale SMR staffing approach, with the understanding that there are some licensing process differences between the NuScale design certification (DC) and a construction permit (CP). For additional information, see the following:

    - NuScale DC application, Part 7 (Exemptions): ML20224A521
        - NRC's safety evaluation (SE) (Chapter 18) of above: ML20023B605

    - NuScale staffing plan topical report (TR): ML20352A473
        - NRC SE of above: ML21012A363

Question: What are the expectations from the NRC regarding content in the CP application supporting an exemption request given 10 CFR 50.54(m) details licensing conditions for the operating license (OL)?

NRC Response:

- In short, nothing specific is required in this area at the CP stage and, from a practical standpoint, the state of design development at time of CP submittal might not be conducive to completing the performance-based testing of NUREG-1791. Broadly speaking, granting a 10 CFR 50.54 exemption cannot occur until an OL is issued to the facility licensee. What must occur then (within the context of a CP/OL facility licensing process) is that the information needed to support that exemption request will need to be established in a docketed form that the staff can evaluate. There are options for how to do this. One approach would be to embed the information needed to support the exemption within the OL application itself; the material would be evaluated by the staff in conjunction with the OL application review and the facility licensee would then simply have to reference that material within their exemption request. Another approach could be to submit the exemption justification in the form of a TR separately from the OL application; this would allow the staff to evaluate that material outside of the OL application review itself. A staff evaluated TR could then be incorporated by reference into the subsequent exemption request.

- Please keep in mind that 10 CFR 50.34(a)(6) still requires Preliminary Safety Analysis Reports to contain "A preliminary plan for the applicant's organization, training of personnel, and conduct of operations." Guidance regarding aspects of such content can be found in both NUREG-0800, Chapter 13 and RG 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)."

Question: Are the Result Summary Reports (RSRs) sufficient justification or shall the exemption request contain portions of each report itself that supports the minimum staffing analysis?

NRC Response:

- When the NRC staff make a finding under a licensing action that finding needs to be based upon docketed information. Beyond that, the staff also audit non-docketed material of a confirmatory nature and use those audit observations to provide added support to their findings. Broadly speaking, the staffing-related exemption request evaluation process reflects this general approach. More specifically, what's expected to happen under an OL application process is that the Implementation Plans described under NUREG-0711 would be expected to be included as part of the application and be docketed (although they could potentially be submitted earlier if desired by the applicant, such as via a TR). Subsequently, the RSRs described under NUREG-0711 would then need to be submitted prior to the completion of the staff's evaluation of the OL application. RSRs are typically non-docketed material that the staff audits to support their findings. With all that in mind, the key point is that the exemption request will need to contain (or reference) sufficient docketed material for the staff to be able to make a finding on whether it can be granted. So, while the OL application process itself would normally not necessarily require the docketing of the RSRs, the exemption request process will require some subset of the RSRs' contents (but not necessarily the RSRs in their entirety) to be docketed in order to support the request. This points to the answer to the question being that the exemption request needs to contain enough information from the RSRs such that the docketed body of information will support a finding.

There were no comments or questions from members of the public. The public meeting was concluded, and a closed session was conducted. During the closed portion of the meeting the applicant discussed proposed staffing levels to operate up to four units from a single CR.

The meeting was adjourned at 3:30 pm.