U.S. NUCLEAR REGULATORY COMMISSION SUMMARY OF THE MAY 3, 2023, PREAPPLICATION MEETING WITH SMR, LLC (A HOLTEC INTERNATIONAL COMPANY) TO DISCUSS AN OVERVIEW OF THE SMR-160 DESIGN

Meeting Summary

The U.S. Nuclear Regulatory Commission (NRC) held an observation public meeting on May 3, 2023, with SMR, LLC (SMR), a Holtec International Company (Holtec), to discuss proprietary preapplication information related to an overview of the SMR-160 design.[1] Specifically, SMR (Holtec) requested the meeting to discuss and receive NRC staff feedback on the SMR-160 design described in its presentation materials.[2, 3] This meeting summary satisfies the SMR (Holtec) request for review and feedback on its preapplication meeting materials.

This hybrid closed preapplication meeting had in-person and remote attendees from SMR, LLC, Holtec, and NRC staff to discuss proprietary information related to the SMR-160 design.

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 meeting was divided into a morning session and an afternoon session, each with time after the last presentation for additional NRC staff questions and comments. After each topic presented, the NRC staff provided feedback and asked questions.

The morning session covered the following topics:

- Organization, Plant Objectives, Design Characteristics & Site Layout
- Containment
- Core Design
- Reactor Coolant System and Steam Generator
- Engineered Safety Features
- Auxiliary Systems
- Instrumentation and Controls & Electrical Systems
- Main Feed, Main Steam, and Power Conversion Systems

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1 Letter from J. Hawkins, "SMR, LLC Preapplication Meeting Materials for May 3, 2023 (Project No. 99902049)," dated April 19, 2023, Agencywide Documents and Access Management System (ADAMS) Accession No. ML23109A002, part of ML23109A001.

2 SMR, LLC, "Enclosure 1: SMR, LLC Morning Meeting Presentation Materials for April 19, 2023 (P)," dated April 19, 2023, ML23109A003 – Proprietary, part of ML23109A001.

3 SMR, LLC, "Enclosure 2: SMR, LLC Afternoon Meeting Presentation Materials for April 19, 2023 (P)," dated April 19, 2023, ML23109A004 – Proprietary, part of ML23109A001.

The afternoon session covered the following topics:

- Operations of the Plant
- Accident Progression
- Probabilistic Safety Analysis (PSA)

The following summarizes the questions and feedback from the NRC, and SMR (Holtec)'s response where applicable, on the presentations from both morning and afternoon sessions:

- The NRC staff requested additional details on how the design would address challenging site characteristics.

- The NRC staff requested additional details on the considerations for the containment structure and containment enclosure design including applicable industry standards and the American Society of Mechanical Engineers (ASME) Code requirements and plans for inspections.

- The NRC staff made observation on the welded connections and the residual stresses at these connections.

- SMR (Holtec) clarified the purpose(s) of the in-core detector.

- The NRC staff provided feedback on future nuclear analysis simulations.

- The NRC staff noted that ASME is considering a code case that addresses the manufacturing of a component without an owner or operator.

- The NRC staff requested details on the design of the steam generator including fluid flow and component internals.

- In response to the NRC staff's question on valve design and configuration, SMR (Holtec) noted that a future discussion is planned.

- In response to the NRC staff's question, SMR (Holtec) provided information on the pipe break size considered in the design of its emergency core cooling system.

- The NRC staff requested details on the thermal insulation used in the design and the evaluation of the potential impact of the insulation on the performance of the emergency core cooling system.

- In response to the NRC staff's question, SMR (Holtec) provided detailed information related to its spent fuel pool design.

- SMR (Holtec) provided additional details regarding the human system interface in its instrumentation and controls design, its control room design, and plans for operator staffing for a future engagement.

- The NRC staff requested clarification on the instrumentation and control architecture, the plant safety system and how the design addresses independence.

- In response to the NRC staff's question, SMR (Holtec) confirmed the availability of battery backup for its instrumentation and control design.

- The NRC staff requested clarification on the operations in the event of a loss-of-offsite power and actions that are credited in the analysis.

- The NRC staff observed that nuclear codes and methods might not be applicable to load following operation.

- In a follow-up question on the potential impact of insulation on recirculation, SMR (Holtec) stated that it is still completing its evaluation.

- The NRC staff requested additional details on the passive fuel cooling system and crediting of non-safety-related equipment.

- In response to the NRC staff's question, SMR (Holtec) provided an overview of its initial plans for obtaining major mechanical components.

- The NRC staff requested details on whether different design rules would be applied to low-safety significant components other than ASME BPV Code, Section III requirements. SMR (Holtec) responded that it plans a future engagement on the Regulatory Treatment of Non-Safety Systems.

- With respect to the NRC staff's questions on aspects of the design related to radiation protection, SMR (Holtec) described its design considerations.

- In its presentation of emergency planning considerations, SMR (Holtec) noted a future meeting on the topic.

- The NRC staff requested additional details on the analysis for reactor startup and SMR (Holtec) responded with a description of the analysis completed and planned, and additional details on its initial plans for fuel management.

- In response to the NRC staff's question, SMR (Holtec) described its design to support its loss-of-coolant accident (LOCA) analysis and non-LOCA analysis including consideration of non-condensable gases.

- SMR (Holtec) clarified that it has developed a PSA method for the low power and shutdown states.

- The NRC staff encouraged future engagements related to the other fire protection considerations that would affect the PSA.

- At the end of the PSA discussion, the NRC staff requested additional details related to the bounding analysis for the design and 10 CFR Part 100 requirements for a construction permit application and credited passive systems in the design.[4]

[4] Title 10 of the *Code of Federal Regulations*, Part 100, "Reactor site criteria." https://www.nrc.gov/reading-rm/doc-collections/cfr/part100/full-text.html

- In response to the NRC staff's question, SMR (Holtec) provided details on the containment structural analysis completed and indicated future analysis is pending. SMR (Holtec) also confirmed its seismic margins assessment process.

- In reference to the SMR (Holtec) bounding analysis approach in its high wind PSA, the NRC staff requested additional details on how beyond-design-basis winds are considered and how the seismic design-basis is used in the seismic analyses.

- SMR (Holtec) confirmed consideration of diverse and flexible coping strategies to address potential consequences of beyond-design-basis external events.

- In response to the NRC staff's question, SMR (Holtec) confirmed plans to engage the NRC staff on cybersecurity in the future.

- Before the meeting ended, SMR (Holtec) provided an overview of its potential projects and timelines.

After the meeting, the NRC staff provided the following clarifications:

- During the afternoon discussion on PSA, SMR (Holtec) provided information on how it used PSA to analyze the orientation of its turbine. The NRC staff noted that Regulatory Guide (RG) 1.115 provides probabilities for both low trajectory and high trajectory missiles and outlines acceptable methods of protection for the two groups of missiles resulting from turbine failure, i.e., high-trajectory missiles and low-trajectory missiles.[5] Both low trajectory and high trajectory missiles apply to unfavorable turbine orientation while high trajectory missile apply to favorable turbine orientation. As discussed in RG 1.115, "…plants with favorable turbine orientation should also protect the systems, structures and components from high-trajectory missiles by controlling the turbine missile generation frequency or by using barriers," and therefore the probabilities for high trajectory missiles still apply for a favorable turbine orientation related to PSA.

- The NRC staff observed that passing water through a relief valve that is qualified for steam discharge has been observed to result in high leakage rates after closure. SMR (Holtec) indicated that the relief valves would be part of a feed-and-bleed flowpath for beyond-design-basis events. The NRC staff encouraged SMR (Holtec) to consider the failure of the relief valves to reseal after feed-and-bleed evolutions.

- The NRC staff observed that there may be a direct line-of-sight from the steam lines to the steam generator tubes, and operating experience has shown that steam-line acoustics can cause significant loading on components in the flow path. The NRC staff asked about the plans for acoustic monitoring in the steam lines during the initial startup activities.

The meeting adjourned at 3:10 PM.

[5] U.S. Nuclear Regulatory Commission, Regulatory Guide 1.115, "Protection Against Turbine Missiles," Revision 2, January 2012. https://www.nrc.gov/docs/ML1016/ML101650675.pdf