



March 14, 2019

Docket No. 52-048

U.S. Nuclear Regulatory Commission
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SUBJECT: NuScale Power, LLC Response to NRC Request for Additional Information No. 505 (eRAI No. 9612) on the NuScale Design Certification Application

REFERENCES: 1. U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 505 (eRAI No. 9612)," dated October 15, 2018
2. Letter from NuScale Power, LLC to U.S. Nuclear Regulatory Commission, "NuScale Power, LLC Submittal of Changes to Part 2, NuScale Final Safety Analysis Report, Part 4, Technical Specifications and Part 7, Exemptions," dated March 14, 2019

The purpose of this letter is to provide the NuScale Power, LLC (NuScale) response to the referenced NRC Request for Additional Information (RAI).

The Enclosure to this letter contains NuScale's response to the following RAI Question from NRC eRAI No. 9612:

- 14.03.09-5

This letter and the enclosed response make no new regulatory commitments and no revisions to any existing regulatory commitments.

If you have any questions on this response, please contact Carrie Fosaaen at 541-452-7126 or at cfosaaen@nuscalepower.com.

Sincerely,

Zackary W. Rad
Director, Regulatory Affairs
NuScale Power, LLC

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Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 9612



Enclosure 1:

NuScale Response to NRC Request for Additional Information eRAI No. 9612

Response to Request for Additional Information Docket No. 52-048

eRAI No.: 9612

Date of RAI Issue: 10/15/2018

NRC Question No.: 14.03.09-5

This is a follow-up RAI to RAI 9412 (ADAMS Accession Number ML18219D571) regarding Remote Shutdown Station (RSS) ITAAC, which is currently unresolved-closed.

Title 10 of the Code of Federal Regulations (CFR) Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," Criterion 19, "Control Room," (GDC 19) requires, in part, that equipment is provided at appropriate locations outside the control room (1) with a design capability for prompt hot shutdown of the reactor, including necessary instrumentation and controls to maintain the unit in a safe condition during hot shutdown, and (2) with a potential capability for subsequent cold shutdown of the reactor through the use of suitable procedures. 10 CFR 52.47(b)(1) requires a design certification application to contain the proposed ITAAC that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a plant that incorporates the design certification is built and should operate in accordance with the design certification, the provisions of the Atomic Energy Act, and the NRC's regulations.

NuScale DCD Tier 2, Section 1.2.2.1, "Main Control Room," states that in the event that the Main Control Room (MCR) becomes uninhabitable, a remote shutdown station in the Reactor Building provides a secondary location for safe shutdown of the reactors. NuScale DCD Tier 2, Section 7.1.1.1, "Design Bases," states that consistent with GDC 19, the equipment within the remote shutdown station provides the controls necessary to place each NuScale Power Module (NPM) in a hot shutdown condition, maintain each NPM in a safe condition during hot shutdown, and to bring each NPM to cold shutdown. NuScale DCD Tier 1, Table 2.5-7, "Module Protection System and Safety Display and Indication System ITAAC," identifies the displays, alarms, and controls that NuScale has selected to be verified by ITAAC. However, DCD Tier 1, Table 2.5-7 does not contain ITAAC to verify any displays, controls or alarms in the RSS.

The staff issued RAI 9412 to understand why the applicant did not include ITAAC to verify any displays, controls or alarms in the RSS. In response to RAI 9412 (ADAMS Accession Number ML18172A320), the applicant explained that there are no ITAAC for RSS HSI displays, alarms and controls for the following reasons:

- There are no safety-related controls at the RSS.
- There are no important human actions performed at the RSS.
- The RSS contains Module Control System and Plant Control System displays and controls identical to those in the main control room.
- During a main control room evacuation, the operators are expected to trip the reactors and initiate decay heat removal and containment isolation for each reactor prior to exiting the main control room.

The staff does not find this explanation to be an adequate justification for excluding ITAAC to verify the remote shutdown capabilities required by GDC 19. The NRC staff understands the design of the main control room and the RSS and the actions required by operators to place the NPMs into a hot shutdown condition. However, GDC 19 requires equipment outside the control room that will place the NPMs into hot shutdown, maintain the NPMs in hot shutdown, and have the potential capability of subsequent cold shutdown of the NPMs through the use of suitable procedures. The NuScale DCD Tier 2 describes the RSS as meeting the above requirements of GDC 19. However, the NuScale DCD Tier 1 does not contain ITAAC to verify the displays, alarms, and controls in the RSS that are used to meet GDC 19 are built and can be operated as designed. The NRC staff requests that NuScale provide the ITAAC for the verification of displays, alarms and controls in the RSS that are used to meet the requirements of GDC 19 and provide reasonable assurance that operators can use the RSS to shut down the plant in an event where the main control room is unavailable or if the operators could not shut down all units and take other required actions prior to evacuating the main control room.

Additionally, the staff is seeking this information to better understand the redundant means of shutting down the plant in the event that the main control room becomes uninhabitable. The RAI 9412 response assumes that these actions can be completed prior to evacuation, but no evidence has been provided to support that claim. The NRC staff is concerned that in the event that a control room evacuation is necessary, the operators may not be able to successfully complete all the tasks necessary to shut down the plant without a redundant means of doing so that is spatially separate from the main control room. As a result, the NRC staff requests NuScale to identify any necessary updates to the application regarding how the NuScale design satisfies the remote shutdown capabilities required by GDC 19.

NuScale Response:

NRC Question 1: The NRC staff requests that NuScale provide the ITAAC for the verification of displays, alarms and controls in the remote shutdown station (RSS) that are used to meet the requirements of GDC 19 and provide reasonable assurance that operators can use the RSS to shut down the plant in an event where the main control room is unavailable or if the operators could not shut down all units and take other required actions prior to evacuating the main control room.

NuScale Response 1:

NuScale has requested an exemption from the portions of GDC 19 related to equipment outside the control room with a design capability for cold shutdown. NuScale's PDC 19 requires a design capability for remote safe shutdown. The NuScale main control room (MCR) is designed specifically with the ability to place and maintain the reactors in safe shutdown in the event of a MCR evacuation event. Each module contains two divisions of independent, redundant, safety-related, hard-wired switches in order to shut down the reactor and establish the conditions required to passively achieve safe shutdown. NuScale credits operation of these switches consistent with the guidance in regulatory guide (RG) 1.189, Section 5.4.4, Control Room Fires. Further, the NuScale design precludes the need for operator action outside of the MCR. Additionally, the operation of the MCR switches described above is verified by ITAAC 02.05.01 and 02.05.13.

There are no displays, alarms, or controls in the remote shutdown station (RSS) that are credited to meet the requirements of PDC 19. The controls and indications provided in the RSS are not required to 1) place the NPM in a hot shutdown condition, 2) maintain the NuScale Power Module (NPM) in a safe condition during hot shutdown, or 3) bring the NPM to safe shutdown. The actions taken by the control room operators prior to evacuating the MCR provide for all three. Therefore, RSS displays, alarms, and controls do not require verification through ITAAC.

NRC Question 2 - Additionally, the staff is seeking this information to better understand the redundant means of shutting down the plant in the event that the main control room becomes uninhabitable. The RAI 9412 response assumes that these actions can be completed prior to evacuation, but no evidence has been provided to support that claim. The NRC staff is concerned that in the event that a control room evacuation is necessary, the operators may not be able to successfully complete all the tasks necessary to shut down the plant without a



redundant means of doing so that is spatially separate from the main control room. As a result, the NRC staff requests NuScale to identify any necessary updates to the application regarding how the NuScale design satisfies the remote shutdown capabilities required by GDC 19.

NuScale Response 2:

While there is no postulated condition in which operators are assumed to not successfully complete the actions of tripping the reactor, actuating DHRS and isolating containment prior to leaving the control room, the equipment that operators have available outside of the control room to complete a reactor trip, DHRS actuation or containment isolation is located at the applicable MPS equipment locations within individual fire rated MPS equipment rooms. The MPS rooms are located outside of the MCR within the Reactor Building, but not at the remote shutdown station (reference FSAR Tier 2, Figures 1.2-14 and 1.2-15). A reactor trip, DHRS actuation and containment isolation can be initiated at the MPS equipment locations in the Reactor Building by performing the following: 1) placing the associated safety function modules in an out-of-service/trip condition, 2) opening the reactor trip breakers (trips reactor only). Once these local actions have been performed for a module, no other active control is required to place and maintain the module in a safe shutdown condition. The passive core cooling systems (i.e., DHRS) establish and maintain safe shutdown conditions for the reactors with no additional operator actions required. No instrumentation is necessary outside the MCR to achieve or maintain the NPM in a safe condition during hot shutdown or to bring the NPM to safe shutdown (i.e., Mode 3 where $k_{eff} < 0.99$ and all NPM reactor coolant temperatures are $< 420^{\circ}\text{F}$). The RSS does not provide design capabilities credited for PDC 19 compliance. The conforming changes to the DCA concerning this response are included in NuScale letter LO-0319-64751, March 14, 2019.

Impact on DCA:

There are no impacts to the DCA as a result of this response.