RAIO-0218-58727

February 16, 2018

Docket No. 52-048

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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11555 Rockville Pike
Rockville, MD 20852-2738

SUBJECT: NuScale Power, LLC Response to NRC Request for Additional Information No. 349 (eRAI No. 9284) on the NuScale Design Certification Application

REFERENCE: U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 349 (eRAI No. 9284)," dated January 29, 2018

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 Questions from NRC eRAI No. 9284:

- 12.03-29
- 12.03-30

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 Steven Mirsky at 240-833-3001 or at smirsky@nuscalepower.com.

Sincerely,

Zackary W. Rad
Director, Regulatory Affairs
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Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 9284

Enclosure 1:

NuScale Response to NRC Request for Additional Information eRAI No. 9284

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

eRAI No.: 9284
Date of RAI Issue: 01/29/2018

NRC Question No.: 12.03-29

Regulatory Basis

10 CFR 52.47(a)(5) requires applicants to identify the kinds and quantities of radioactive materials expected to be produced in the operation and the means for controlling and limiting radiation exposures within the limits of 10 CFR Part 20. 10 CFR 20.1101(b) and 10 CFR 20.1003 require the use of engineering controls to maintain exposures to radiation as far below the dose limits in 10 CFR Part 20 as is practical. 10 CFR 20.1701 requires the use of process or engineering controls to minimize the potential for internal exposure to radioactive material.

10 CFR 52.47(a) (22) requires applicants to demonstrate how the operating experience insights have been incorporated into the plant design.

Appendix A to Part 50—General Design Criteria (GDC) for Nuclear Power Plants, Criterion 61—“Fuel storage and handling and radioactivity control,” requires systems which may contain radioactivity to be designed with suitable shielding for radiation protection and with appropriate containment, confinement, and filtering systems.

The DSRS Acceptance Criteria section of NuScale DSRS section 12.3-12.4, “Radiation Protection Design Features,” states that the applications should describe how operating experience insights have been incorporated into the plant design, to reduce maintenance and improve reliability.

Regulatory Guide (RG) 1.206 section C.1.12.3.1, "Facility Design Features," notes that the Applicant should identify features that reduce the potential for exposure by reducing source build up and reducing activation product generation. RG 8.8 Position C2, notes that the applicant should provide design features that reduce the potential for exposure by the selection of materials and finishing of the material surfaces for the purpose of minimizing facilitating decontamination and reducing deposition.

Background

DCD Tier 2 Revision 0 Section 12.3.1, “Facility Design Features,” describes facility design features that implement as low as reasonably achievable (ALARA) principles to minimize occupation radiation exposure (ORE.) DCD section 12.3.1.1, “Equipment Design,” provides

specific design features for component types that aid in maintaining occupational exposures ALARA. However, there is no description of the design features of the dry dock provided to minimize ORE.

DCD Tier 2 Revision 0 Subsection 9.1.2.1, “Design Bases,” of Section 9.1.2, “New and Spent Fuel Storage,” states that smooth and nonporous surfaces prevent the buildup of radioactive material. DCD Subsection 9.1.2.3.7, “Radiation, Shielding, and Maintaining Doses as Low as Reasonably Achievable,” states that the surface finishes of the components for the fuel storage racks and spent fuel pool (SFP) liner are smooth to minimize accumulation of radioactive materials and to facilitate surface decontamination.

Electric Power Research Institute (EPRI) technical report (TR) 016780, "Advanced Light Water Reactor Utility Requirements Document" (URD), subsection 2.3.1.3.1.2 states "The refueling pool wall liner shall be surface finished to reduce the adherence of contamination and increase the efficiency of refueling pool decontamination activities after draining. The liner plate shall have a No. 4 surface finish or better and the liner plate welds shall be ground smooth." The reason given in the URD for this specification is that past LWR refueling experience has shown that a smooth surface finish on the wall liners reduces the amount and depth of crevices which can accumulate contamination. NUREG-1242, “NRC Review of Electric Power Research Institute’s Advanced Light Water Reactor Utility Requirements Document,” Volume 3, Parts 1 2, documented the NRC staff’s safety evaluation of the URD.

Key Issue 1:

While DCD Chapter 12 and Chapter 9 do indicate that surfaces should be “smooth,” the information is provided in a manner subject to interpretation. The application does not describe the specification for the surface finish of those portions of the facility (i.e., the dry dock) that, when dry, may increase ORE resulting from direct radiation exposure from surface deposits of radioactive material or from airborne radioactive material, resulting from the suspension of radioactive material remaining on the pool wall surface following dry dock drain down.

Question 1:

To facilitate staff understanding of the application information sufficient to make appropriate regulatory conclusions with respect to ORE, the staff requests that the applicant:

- As necessary, revise the DCD Section 12.3-12.4 to include information related to finish specifications for wetted surfaces of the pools,

OR

Provide the specific alternative approaches used and the associated justification.

NuScale Response:

10 CFR 20.1101(b) and 10 CFR 20.1003 allow the use of both procedures and engineering

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controls to maintain exposures to radiation as far below the dose limits in 10 CFR Part 20 as is practical. As in the case of operating licensed nuclear power plants and previously NRC-approved design certification applications, the facility's design features work in concert with the radiation protection programs and procedures to comply with this regulation. Operational procedures are frequently relied upon to comply with regulations.

Also, the RAI includes a reference to 10 CFR 52.47(a)(22), which requires applicants to demonstrate how operating experience insights have been incorporated into the plant design, as another part of the regulatory basis. Regulatory Guide 1.206 and NUREG-0800 define operating experience insights specifically as NRC generic letters and bulletins issued after the most recent revision of the applicable standard review plan and six months prior to the docket date of the application. None of the cited references meet the definition of operating experience. The Electric Power Research Institute (EPRI) Utility Requirements Document (URD) and NUREG-1242 are included in NuScale DSRS Section 12.3-12.4. Many of the URD specific design features have been incorporated into the NuScale design, but there is no regulatory requirement to incorporate any particular URD design feature.

Consistent with GDC 61, FSAR Section 9.2.5.3 states that the water level in the dry dock is adjusted to provide radiation shielding, and FSAR Section 9.1.3.3.8 states that the pool cleanup system is used to clean the water in the dry dock to reduce the radionuclide concentrations.

Consistent with Regulatory Guide 8.8, FSAR Section 12.3.6.1.3 and Table 12.3-42 state that the surfaces of the ultimate heat sink liner (which includes the dry dock liner) will be smooth to minimize contamination and facilitate decontamination. In addition, as stated in FSAR Section 9.4.2 and 12.3.3.3, the Reactor Building HVAC system provides an elevated flow rate in this area to reduce airborne activity.

These radiation protection design features demonstrate compliance with both GDC 61 and Regulatory Guide 8.8.

While the potential for airborne contamination is present in the dry dock, especially during drain down conditions, the COL applicant's operational procedures (as part of the Radiation Protection and ALARA Programs; COL Items 12.5-1 and 12.1-1) will require plant staff to conduct radiation dose surveys, perform decontamination, and institute other radiation protection measures, as necessary, to ensure compliance with 10 CFR 20 exposure limits and the ALARA principle. The aforementioned actions are similar to those that are performed at licensed pressurized water reactor fuel transfer canals during refueling. Therefore, the NuScale design meets the requirements of 10 CFR 20.1101(b).

Impact on DCA:

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

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

eRAI No.: 9284
Date of RAI Issue: 01/29/2018

NRC Question No.: 12.03-30

Regulatory Basis and Background in RAI 9284 Question 31035

Key Issue 2:

There is no discussion in DCD Chapters 3, DCD Chapter 5 or DCD Chapter 12 about the surface finish of the exterior containment vessel (CNV). Like the dry dock wall, when dry, ORE results from direct radiation exposure from surface deposits of radioactive material, or from airborne radioactive material, resulting from the suspension of radioactive material remaining on the large wetted surface area of the CNV wall following dry dock drain down.

Question 2:
To facilitate staff understanding of the application information sufficient to make appropriate regulatory conclusions with respect to ORE, the staff requests that the applicant:

- As necessary, revise the DCD Section 12.3-12.4 to include information related to finish specifications for wetted surfaces of the CNV,
  OR
  Provide the specific alternative approaches used and the associated justification.

NuScale Response:

See the response to RAI 12.03-29.

Impact on DCA:

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