

## NuScaleDCRaisPEm Resource

---

**From:** Cranston, Gregory  
**Sent:** Monday, March 18, 2019 1:40 PM  
**To:** Request for Additional Information  
**Cc:** Lee, Samuel; Dudek, Michael; Lavera, Ronald; Tesfaye, Getachew; Chowdhury, Prosanta; NuScaleDCRaisPEm Resource  
**Subject:** Request for Additional Information No. 519 eRAI No. 9656 (12.03)  
**Attachments:** Request for Additional Information No. 519 (eRAI 9656).pdf

Attached please find NRC staff's request for additional information (RAI) concerning review of the NuScale Design Certification Application.

Please submit your technically correct and complete response by May 12, 2019, to the RAI to the NRC Document Control Desk.

If you have any questions, please contact me.

Thank you.

**Hearing Identifier:** NuScale\_SMR\_DC\_RAI\_Public  
**Email Number:** 567

**Mail Envelope Properties** (BN8PR09MB360306A07C518C7C011B7DEF90470)

**Subject:** Request for Additional Information No. 519 eRAI No. 9656 (12.03)  
**Sent Date:** 3/18/2019 1:39:30 PM  
**Received Date:** 3/18/2019 1:39:38 PM  
**From:** Cranston, Gregory

**Created By:** Gregory.Cranston@nrc.gov

**Recipients:**

"Lee, Samuel" <Samuel.Lee@nrc.gov>  
Tracking Status: None  
"Dudek, Michael" <Michael.Dudek@nrc.gov>  
Tracking Status: None  
"Lavera, Ronald" <Ronald.LaVera@nrc.gov>  
Tracking Status: None  
"Tsfaye, Getachew" <Getachew.Tsfaye@nrc.gov>  
Tracking Status: None  
"Chowdhury, Prosanta" <Prosanta.Chowdhury@nrc.gov>  
Tracking Status: None  
"NuScaleDCRaisPEm Resource" <NuScaleDCRaisPEm.Resource@nrc.gov>  
Tracking Status: None  
"Request for Additional Information" <RAI@nuscalepower.com>  
Tracking Status: None

**Post Office:** BN8PR09MB3603.namprd09.prod.outlook.com

<b>Files</b>	<b>Size</b>	<b>Date &amp; Time</b>
MESSAGE	359	3/18/2019 1:39:38 PM
Request for Additional Information No. 519 (eRAI 9656).pdf		164489

**Options**

**Priority:** Standard  
**Return Notification:** No  
**Reply Requested:** No  
**Sensitivity:** Normal  
**Expiration Date:**  
**Recipients Received:**

## Request for Additional Information No. 519 (eRAI 9656)

Issue Date: 03/18/2019

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 12.03-12.04 - Radiation Protection Design Features

Application Section: 12.3

### QUESTIONS

12.03-63

#### The Regulatory Requirements:

- 10 CFR 52.47(a)(24) requires the applicant to provide a representative conceptual design for those portions of the plant for which the application does not seek certification, to aid the NRC in its review of the FSAR and to permit assessment of the adequacy of the interface requirements.
- 10 CFR 52.47(a)(25) requires the applicant to provide interface requirements to be met by those portions of the plant for which the application does not seek certification. These requirements must be sufficiently detailed to allow completion of the FSAR.
- 10 CFR 52.47(a)(26) requires the applicant to provide justification that compliance with the interface requirements 10 CFR 52.47(a)(25) is verifiable through inspections, tests, or analyses. The method to be used for verification of interface requirements must be included as part of the proposed ITAAC.
- NUREG-0800 Standard Review Plan (SRP) Section 14.3 "Inspections, Tests, Analyses, and Acceptance Criteria," indicates that the "Interface Requirements" section of Tier 1 specifies interface requirements that should be met by the site-specific portions of a facility that are not within the scope of the certified design. The interface requirements in the DCD define the design attributes and performance characteristics that ensure that the site-specific portion of the design is in conformance with the certified design. Interface requirements are defined for: (a) systems that are entirely outside the scope of the design, and (b) the out-of-scope portions of those systems that are only partially within the scope of the standard design. In some cases, the scope of the standard design requires that the DCD contain information that was supplied by a utility in the past. However, simply because design information may be traditionally "licensee-supplied" does not mean that it is "out-of-scope" of the standard design. Top-level interface requirements are specified in Tier 1, more detailed interface requirements may be specified in Tier 2, but they should be consistent with the Tier 1 information.
- NuScale DSRS Section 12.3 "Radiation Protection Design Feature," states in the specific acceptance criteria that areas inside the plant structures should be subdivided into radiation zones, with maximum design dose rate zones and the criteria used in selecting maximum dose rates identified.

#### Background:

In RAI-9295 Question 12.03-55 dated 30 April 2018, NuScale DCD Tier 2, the staff identified that DCD Revision 0, Figure 12.3-1g "Reactor Building Radiation Zone Map - 100' Elevation," shows that the area between column lines RX4 and RX6 (east and west of the reactor pool), RXA and RXB (north of the reactor pool) and between column lines RXD and RXE (south of the reactor pool) as depicted on DCD Figure 1.2-216, "Reactor Building 100'-0" Elevation" as Steam Galleries, Rooms 010- 411 and 010-418 respectively, are labelled as a Radiation Zone 0. DCD Tier 2, Revision 0, Table 12.3-1 "Normal Operation Radiation Zone Designations," shows that areas designated as radiation Zone 0 have dose rates  $\leq 0.05$  mrem/hr. However, NuScale DCA Tier 2, Revision 0, Table 3C-6: "Normal Operating Environmental Conditions," states that the 60 Years Integrated N Dose (rads) for the area outside of the containment vessel and under the bioshield is  $1.85E6$  rads (3.7 rads/hour). Figure 12.3-1g depicts the areas under the bioshield as a radiation Zone VI (dose rates  $\geq 1$  rad/hr and  $\leq 500$  rad/hr from Table 12.3-1.)

The staff noted that there are several large penetrations (e.g., main steam line, feedwater, ventilation ducts) that penetrate the Bioshield shielding wall that could lead to higher dose rates in the RXB Steam Gallery area as a result of radiation streaming effects. The staff asked the applicant to explain/justify the methods, models, and assumptions used to calculate the radiation sources that were used to determine the radiation zones depicted in

DCD Chapter 12.3, and to provide appropriate and sufficient information, including shielding, absorption, and attenuation effects, to justify significant decreases in dose in the adjacent radiation zones (e.g., the RXB Steam Galleries).

The applicant's response to RAI-9295 Question 12.03-55 dated 8 May 2018 (ADAMS Accession No. ML18128A390), stated:

- FSAR Figures 3.6-16 and 3.6-17 are labeled as "Postulated" and "COL applicant scope" because the actual pipe routing and penetration shielding has not yet been finalized, and has been identified as COLA scope.
- FSAR Section 12.3.1.2.3 Penetrations and FSAR Section 12.3.2.2 Design Considerations, state that shield wall penetrations may be configured and shielded, as necessary, to prevent excessive radiation streaming into accessible spaces.
- The details of the NuScale penetrations and penetration shielding design are not finalized, but will be finalized during a future design phase. The NuScale design is not unique in this respect and the detailed design of shield wall penetration compensatory measures will utilize standard industry practices to ensure the design complies with the FSAR.

The applicant's supplemental response to RAI-9295 Question 12.03-55 dated 23 August 2018 (ADAMS Accession No. ML18235A648), proposed adding COL Item 12.3-8, stating:

*"A COL applicant that references the NuScale Power Plant design certification will describe the radiation shielding design measures used to compensate for the main steam and main feedwater piping penetrations through the Reactor Building pool wall between the NuScale Power Module bays and the Reactor Building steam galleries near the 100 ft elevation."*

They also included this new proposed COL Item in Table 1.8-2: "Combined License Information Items."

Key Issue:

In a supplemental response to RAI 9295, Question 12.03-55 dated 23 August 2018 (ADAMS Accession No. ML18235A648), NuScale states that the portion of the shielding referenced is the responsibility of the COL applicant. In the DCA, NuScale provides COL Item 12.3-8. In reviewing the RAI response and the proposed COL item, the staff did not identify an applicable regulatory requirement in 10 CFR 52.79 that would provide the regulatory basis for the review of the subject shielding in a subsequent COL application. Instead, NuScale's acknowledgement that the details of the design of the wall, including penetration locations and sizing, will be finalized at a later time after the design certification, appears to align with the concept of a conceptual design item (CDI) in accordance with 10 CFR 52.47(a)(24). 10 CFR 52.47(a)(25) requires that an interface requirement be established for CDIs. NuScale has provided Table 1.8-1: "Summary of NuScale Certified Design Interfaces with Remainder of Plant listing the interface requirements for its design."

In addition, the staff notes that the proposed COL Item 12.3-8, only addresses the Main Steam and Main Feedwater lines, and does not address the large HVAC duct penetrations.

The applicant stated that the portion of the shielding referenced within RAI 9295 is the responsibility of the COL Applicant, and will be finalized during a future design phase. However, the applicant did not provide the Interface Requirements, as described in SRP Section 14.3 and as required by 10 CFR 52.47(a)(25), and would need to address 10 CFR 52.47(a)(26) for any interface requirements developed.

Question:

To facilitate staff understanding of the application information in support of its reasonable assurance review regarding the identification of radiation shielding design interfaces consistent with 10 CFR 52.47(a)(24), 10 CFR 52.47(a)(25) and 10 CFR 52.47(a)(26) and 10 CFR 52.79:

A. Option 1

- Revise proposed COL Item 12.3-8 to include the HVAC duct penetrations and/or other penetrations as appropriate, in addition to the Main Steam and Main Feedwater lines already identified.
- Provide the regulatory basis in 10 CFR 52.79 that supports the proposed COL Item that will facilitate the staff's review during the COL application review.

B. Option 2

- Revise proposed COL Item 12.3-8 to include the HVAC duct penetrations and/or other penetrations as appropriate, in addition to the Main Steam and Main Feedwater lines already identified.
- Identify this shielding as an interface requirement in accordance with 10 CFR 52.47(a)(24) and revise DCD Tier 2 Section 12.3 to indicate which portions of the application are considered outside of the scope of the design,
- Consistent with the requirements of 10 CFR 52.47(a)(25) and 10 CFR 52.47(a)(26) to provide interface requirements to be met by those portions of the plant for which the application does not seek certification and the associated method to be used for verification of the interface requirement, revise DCD Tier 2 Table 1.8-1: "Summary of NuScale Certified Design Interfaces with Remainder of Plant listing the interface requirements for its design," to include the proposed interface requirement.

C. Option 3

- Provide the penetration shielding design information, and the associated methods, models, and assumptions, to support the radiation zone designations for the reactor building steam gallery area.