RAIO-0219-64445

February 06, 2019

Docket No. 52-048

U.S. Nuclear Regulatory Commission
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11555 Rockville Pike
Rockville, MD 20852-2738

SUBJECT: NuScale Power, LLC Supplemental Response to NRC Request for Additional Information No. 403 (eRAI No. 9362) on the NuScale Design Certification Application

REFERENCES:
1. U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 403 (eRAI No. 9362)," dated March 29, 2018
2. NuScale Power, LLC Response to NRC "Request for Additional Information No. 403 (eRAI No.9362)," dated May 29, 2018
3. NuScale Power, LLC Supplemental Response to NRC "Request for Additional Information No. 403 (eRAI No. 9362)," dated September 17, 2018
4. NuScale Power, LLC Supplemental Response to NRC "Request for Additional Information No. 403 (eRAI No. 96462)," dated December 10, 2018

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

The Enclosure to this letter contains NuScale's supplemental response to the following RAI Question from NRC eRAI No. 9362:

- 03.08.02-15

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 Marty Bryan at 541-452-7172 or at mbryan@nuscalepower.com.

Sincerely,

Zackary W. Rad
Director, Regulatory Affairs
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Enclosure 1: NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9362

Enclosure 1:

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9362

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

eRAI No.: 9362
Date of RAI Issue: 03/29/2018

NRC Question No.: 03.08.02-15S3

Follow-up to RAI 8858, Question 03.08.02-1

10 CFR 52.47, "Contents of applications; technical information," requires the design certification applicant to include a description and analysis of the structures, systems, and components with sufficient detail to permit understanding of the system designs.

In relation with RAI 9315, Question 03.08.02-14, the DCD should be updated to include a drawing that clearly shows entire CNV pressure boundary, showing how it extends beyond the main CNV body to include the ECCS trip and reset solenoid valve assembly.

NuScale Response:

In response to staff feedback, provided December 14, 2018, a supplemental response to RAI 9362 Question 03.08.02-15 is provided to correct the reference to 10 CFR 50.55a in FSAR Tier 2, Sections 5.4.2.4 and 6.1.1.2.

Socket welds are not used on lines greater than or equal to 3/4 inch NPS and any socket weld used on piping less than 3/4 inch NPS conforms to 10 CFR 50.55a(b)(1)(ii) and ASME B16.11.

Impact on DCA:

FSAR Tier 2, Sections 5.4.2.4 and 6.1.1.2 have been revised as described in the response above and as shown in the markup provided in this response.

piping supports the functional aspects of the chemical volume and control system (CVCS) as summarized in Section 9.3.4.

5.4.2.4 Tests and Inspections

RAI 03.08.02-15S1, RAI 03.08.02-15S2, RAI 03.08.02-15S3

Preservice and ISI requirements associated with ASME Class 1 components, which include the RCS piping, are summarized in Section 5.2. Socket welds are not used on lines greater than or equal to 3/4 inch NPS and any socket weld used on piping less than 3/4 inch NPS conforms to 10 CFR 50.55a(b)(1)(ii) and ASME B16.11 (Reference 5.4-8).

5.4.2.5 Reactor Coolant System Piping Materials

Descriptions of the RCPB and materials associated with the RCS piping are provided in Section 5.2.

RAI 05.02.01.01-7

Refer to Section 5.2.3 and Section 5.2.4 for additional description of material compatibility, fabrication and process controls, welding controls and inspections related to the ASME Class 1 components.

5.4.3 Decay Heat Removal System

5.4.3.1 Design Basis

RAI 05.04.07-6

The DHRS provides cooling for non-LOCA design basis events when normal secondary-side cooling is unavailable or otherwise not utilized. The DHRS is designed to remove post-reactor trip residual and core decay heat from operating conditions and transition the NPM to safe shutdown conditions without reliance on external power. The DHRS is designed to cool the RCS at a rate such that specified acceptable fuel design limits and the design conditions of the reactor coolant pressure boundary are not exceeded during a return to power event as described in Section 15.0.6.

The safety-related DHRS function is an engineered safety feature of the NPM design. Reliability of DHRS is evaluated using the reliability assurance program described in Section 17.4 and risk significance is determined using the guidance described in Chapter 19. The DHRS classification and risk categories are included in Table 3.2-1.

RAI 09.03.06-2S1

The DHRS design ensures the RCS average temperature is below 420 degrees F within 36 hours after an initiating event without challenging the RCPB or uncovering the core. An RCS average temperature of 420 degrees F was chosen based on the safe shutdown temperature proposed by EPRI for passive plant designs in the EPRI Advanced Light Water Reactor Utility Requirements Document (Reference 5.4-3) and determined to be acceptable by the Nuclear Regulatory Commission as documented in SECY-94-084.

The DHRS consists of two redundant trains, each including a passive condenser with piping. With the exception of some portions of the steam side piping, the DHRS is immersed within the reactor pool. The DHRS piping including the portion that penetrates the CNV boundary is designed to ASME Class 2 criteria. The DHRS piping material internal and external to the CNV is selected to be compatible with the secondary fluid in contact with the DHRS components and with borated water present in the reactor coolant system and the reactor pool. A more detailed discussion and description of the DHRS is provided in Section 5.4.

Over the life of the plant, the interior and exterior surfaces of ESF components, with the exception of the CNV head exterior, and the non-ESF piping and components within the CNV are routinely exposed to borated reactor coolant or borated reactor pool water. The CNV is partially immersed and DHRS condensers as well as the ECCS valve actuator assemblies are submerged in the reactor pool.

RAI 03.08.02-15S2, RAI 03.08.02-15S3

Socket welds are not used on lines greater than or equal to 3/4 inch NPS in Table 6.1-1 and any socket weld used on piping less than 3/4 inch NPS conforms to 10 CFR 50.55a(b)(1)(ii) and ASME B16.11. Socket welds are not used for piping in Table 6.1-2, including piping of NPS 2 or less in size.

During normal power operations the interior environment of the CNV is maintained dry, at a partial vacuum. The CNV is partially flooded with reactor pool water during cooldown prior to the movement of an NPM for refueling operations.

Emergency core cooling for the NuScale plant is facilitated by the reactor coolant discharged into the CNV. Reactor coolant chemistry is maintained consistent with the guidance found in the EPRI PWR Primary Water Chemistry Guidelines. As a result, during transients or accidents that result in reactor coolant discharge into the CNV, interior components are exposed to the same chemistry controlled coolant that is used in day- to-day operations. ESF component materials that are exposed to primary reactor coolant (internally or externally) are selected to be compatible with reactor coolant chemistry and the NuScale design prohibits the use of materials within the CNV that could significantly alter post-accident coolant chemistry. Additional information on reactor coolant water chemistry is located in Section 5.2.3.

The materials for ESF components that are partially immersed within the reactor pool are selected to be compatible with the reactor pool chemistry conditions maintained in the pool. No significant corrosion is expected based on the purity of the reactor pool water outside of the CNV. Section 9.1.3 describes operation of the pool cleanup system that maintains reactor pool water chemistry within the expected range of values shown on Table 9.1.3-2. A corrosion allowance is not included for ESF materials exposed to process fluids or reactor pool chemistry.

Piping, supports and components associated with CFDS and located in the CNV interior but defined as part of the CNTS are designed to be compatible with the reactor coolant chemistry that would be present under operation of ECCS conditions. The CNTS piping, fittings, pipe supports and components are constructed of austenitic stainless steel Type 304/304L with a carbon content not exceeding 0.03 percent to mitigate