RAIO-0219-64450

February 06, 2019

Docket No. 52-048

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

SUBJECT: NuScale Power, LLC Supplemental Response to NRC Request for Additional Information No. 42 (eRAI No. 8836) on the NuScale Design Certification Application

REFERENCES:
1. U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 42 (eRAI No. 8836)," dated June 02, 2017
2. NuScale Power, LLC Response to NRC "Request for Additional Information No. 42 (eRAI No.8836)," dated January 25, 2019

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. 8836:

- 03.06.02-2

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
NuScale Power, LLC

Distribution: Gregory Cranston, NRC, OWFN-8H12
Samuel Lee, NRC, OWFN-8H12
Marieliz Vera, NRC, OWFN-8H12

Enclosure 1: NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 8836

Enclosure 1:

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 8836

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

eRAI No.: 8836
Date of RAI Issue: 06/02/2017

NRC Question No.: 03.06.02-2

To address its compliance with GDC 4 requirements, in NuScale FSAR Tier 2, Section 3.6, the applicant describes the criteria used in the NuScale design for determining the postulated rupture locations. In NuScale FSAR Tier 2, Sections 3.6.2.1.2 and 3.6.2.5, the applicant identifies at certain locations where some design and inspection criteria are employed to preclude the need for breaks to be postulated. Those locations as identified in the FSAR Section 3.6.2.1.2 include the welds between the valve and the safe-end for CVCS RCS injection, RCS discharge, pressurizer spray, high point vent line and two FW lines. The NuScale design provides two isolation valves in a single valve body outside of containment welded to a CNV nozzle safe-end. The applicant states that the benefits of this approach include eliminating piping between valves and between the vessel and the valve. The applicant also states that the piping and valves are designed to preclude a breach of containment integrity in conformance with SRP 3.6.2 and its associated BTP 3-4.

In FSAR Section 3.6.2.1.2, the applicant also states that breaks are not postulated in the ASME Class 1 piping (i.e., the four CVCS reactor coolant system lines) from the CNV head to the first isolation valve, and the ASME Class 2 FW piping from containment to the first isolation valve in accordance with the staff's guidelines delineated in BTP 3-4, Part B, Item A(ii). In the FSAR, the applicant describes its specific design and inspection provision for those piping segments. Similarly, in the FSAR Section 3.6.2.5, the applicant describes how the break exclusion criteria are applied to the segments of piping between the MS and FW lines from containment to the penetration at the reactor pool wall (including tees to the DHRS) and the DHRS piping outside containment.

It should be noted that the NRC staff guidance as delineated in BTP 3-4 is intended to present a means of compliance with the requirements of GDC 4 for the design of nuclear power plants SSCs. For the fluid system piping in containment penetration areas (i.e., those portions of

piping from containment wall to and including the inboard or outboard isolation valves), the NRC staff guidance as described in BTP 3-4, Part B, Item A(ii) provides certain design and inspection provisions to ensure an extremely low probability of pipe failure in these areas and allow breaks and cracks to be excluded from the design basis for those portions of piping.

Based on its review of the FSAR information described above, the NRC staff determined that the applicant has not provided adequate justification for its application of the break exclusion in the areas described above. In certain cases, the applicant expands the break exclusion area beyond those portions of piping in containment penetration areas as delineated in BTP 3-4, Part B, Item A(ii). It should be noted that FSAR Sections 3.6.2.1.2 and 3.6.2.5 primarily address the NuScale design and inspection requirement for system piping within the break exclusion area. To support the NRC staff's safety determination on the acceptability of the NuScale break exclusion areas identified in the above FSAR sections, the applicant should provide the following information to justify the departure from the pertinent BTP 3-4 staff guidance, particularly, how the FSAR break exclusion area design provisions are considered and applied to the results of the design of these portions of system piping including any associated welds:

a. For those portions of system piping in the break exclusion area, the applicant is to provide a figure for the detailed geometric configuration including the approximate length, any bends in the piping, welds, valves, and welded features and discuss how overall length is minimized to reduce the size of the break exclusion area and how piping bends and piping welds are utilized/minimized to reduce piping stress.

b. For those portions of system piping in the break exclusion area, the applicant is to provide a detailed piping analysis to demonstrate that for the piping and the associated welds, the design stress and the cumulative usage factor (for ASME Class 1 piping only) do not exceed the relevant stress and fatigue limit as delineated in FSAR Sections 3.6.2.1.2 and 3.6.2.5.

   NuScale FSAR Section 3.12 states that complete piping analyses have been performed for the class 1 RCS discharge line (NPS 2) and the class 2 FW (NPS 5) line up to the first 6-way rigid restraint beyond the containment isolation valve. FSAR 3.12 also implies that preliminary analyses have only been performed for the Class 1 RCS injection (NPS 2), the Class 2 MS (NPS 12) up to the first 6-way rigid restraint beyond the containment isolation valve and the DHRS lines. The applicant's preliminary analyses consider only deadweight, thermal expansion and seismic loads and does not consider the occasional loads including

plant system operating transient loads. It should be noted that one of the design criteria for piping in the break exclusion area as described in FSAR Sections 3.6.2.1.2 and 3.6.2.5 is that calculated stresses due to sustained, occasional load, and thermal expansion, including an OBE event (if applicable) should not exceed 80% of allowable value per ASME Section III, NC Eqs. (9) + (10) which is consistent with the pertinent staff guidance delineated in BTP 3-4. With respect to the seismic loads, for NuScale design, the OBE is 1/3 of the SSE and therefore, the OBE is not included as design loading in ASME Section III, NC Eq. 9. With the elimination of OBE load, the applicable loads in NC Eq. 9 are pressure, dead weight, and any applicable occasional loads including plant system operating transient loads while the applicable loads in NC Eq. 10 are due to thermal expansion. The applicant is to justify why performing only preliminary piping analysis with the consideration of dead weight and thermal expansion (i.e., not considering any applicable occasional loads) is consistent with the NuScale FSAR break exclusion criteria as delineated in FSAR Sections 3.6.2.1.2 and 3.6.2.5.

c. NuScale FSAR Section 3.6.2.1.2 Item 1(c) states that for ASME Class 1 piping, the maximum stress, as calculated by Eq. 9 in Section III of the ASME NB-3652 under the loading resulting from a postulated piping rupture beyond these portions of piping, does not exceed 2.25 Sm and 1.8 Sy. This is consistent with the pertinent staff guidance delineated in BTP 3-4, Part B.A(ii)(1)(c), except that the FSAR criteria do not address the potential impact on the valve . For those portions of system piping in the break exclusion area, the applicant is to perform a detailed piping analysis to demonstrate that the piping design meets FSAR Section 3.6.2.1.2 Item 1(c) and the applicable valve design requirement is met in accordance with the criteria specified in SRP Section 3.9.3. Similarly, the applicant is to provide a detailed piping analysis for ASME Class 2 system piping identified in FSAR Sections 3.6.2.1.2, and 3.6.2.5

d. NuScale FSAR Sections 3.6.2.1.2 and 3.6.2.5 Item 7 refer to the ISI program for the weld inspection in the break exclusion area. However, it is not clear whether access provisions are made in the NuScale design to permit a 100% volumetric inservice examination of all the welds in the break exclusion area conducted during each inspection interval as defined in ASME Section XI, IWA-2400 as delineated in BTP 3-4, Part B, Item A(ii)(7). The applicant is to describe and clarify the access provision for the applicable weld examination as described above.

e. The applicant is to provide a discussion to clarify whether the break exclusion only applies to the pertinent main piping (i.e., breaks are postulated for its associated branch piping, if any). If branch piping is included in the break exclusion area, then items (a) through (d) above should be addressed for these piping segments as well.

NuScale Response:

The recently submitted response to RAI 8836 Question 03.06.02-2 (RAIO-0119-64304, dated January 25, 2019) contained a typographical error that requires correction.

Accordingly, the NuScale response for sub-question b) is to be replaced in its entirety by the following:

b) The ASME Class 1, 2, and 3 portions of the piping systems in the break exclusion area are evaluated to the relevant stress and fatigue limits as delineated in FSAR Section 3.6.2.1.2, as summarized in Attachment 1.

The remainder of the original response, including the answers for sub-questions a, c, d, and e, and the associated FSAR markups, is not affected by this correction.

Impact on DCA:

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