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November 05, 2018

Docket No. 52-048

U.S. Nuclear Regulatory Commission
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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 April 03, 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. 8836:

- 03.06.02-12

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

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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.: 03.06.02-12

NuScale FSAR Tier 2, Section 3.6.1.2 states that moderate-energy piping is evaluated for through wall leakage cracks and analyzed for flooding and environmental effects. It also states that through wall leakage cracks are as defined in BTP 3-4, Revision 2. However, it is not clear whether the applicant's criteria for postulating through wall leakage in moderate- energy piping are consistent with the NRC staff's guidelines delineated in BTP 3-4 Part B Item, B(ii), B(iii), and B(iv). Although an allowable stress of 0.4(1.8Sh + Sa) is listed in the last column of FSAR Table 3.6-7, which is the stress limit specified in BTP 3-4 Part B, Item B(iii) for determining the location of leakage cracks in moderate-energy piping, the NRC staff found no other discussion (pointer) in FSAR Section 3.6 which discusses this stress limit. In addition, it is not clear whether the applicant's criteria for evaluating moderate-energy fluid systems in proximity to high-energy fluid systems are consistent with the BTP 3-4 guidelines such that leakage cracks need not be postulated in moderate-energy fluid system piping located in an area in which a break in high-energy fluid system piping is postulated, provided such leakage cracks would not result in more limiting environmental conditions than the high-energy pipe break. The applicant is requested to provide the above information/clarification.

NuScale Response:

In a May 5, 2018 follow-up public meeting for this RAI response, the NRC questioned the text revision to FSAR Section 3.6.2.1.8, Moderate-Energy Leakage Cracks. The statement 'Where leakage cracks are postulated in high- and moderate-energy lines, the following criteria from BTP 3-4 C(iii) are applied or are shown to be bounded:' should include the corrected bullet.

- For high-energy piping, the leakage cracks should be postulated to be in the circumferential locations that result in the most severe environmental consequences. For moderate-energy piping, leakage cracks should be postulated at axial and circumferential locations that result in the most severe environmental consequences (per BTP 3-4 B(iii)(2)).

This revision has been made to FSAR Section 3.6.2.1.8 as requested.

Impact on DCA:

The FSAR Tier 2, Section 3.6.2.1 has been revised as described in the response above and as shown in the markup provided in this response.

most severe environmental consequences. Environmental conditions are based upon the leakage cracks of the worst case (typically largest or hottest) line in the proximity of safety-related SSC. For flooding analysis, full circumferential breaks in piping larger than NPS 2 in a room where they are located are used to evaluate flooding. Environmental effects are discussed in Section 3.11 and flooding analysis is described in Section 3.4.

RAI 03.06.02-12, RAI 03.06.02-13

Per BTP 3-4 C(iii)(1) leakage cracks in high- and moderate-energy lines need not be postulated in NPS 1 and smaller piping. Where leakage cracks are postulated in high- and moderate-energy lines, the following criteria from BTP 3-4 C(iii) are applied or are shown to be bounded:

RAI 03.06.02-6, RAI 03.06.02-12, RAI 03.06.02-12S1, RAI 03.06.02-13

- ~~For high- and moderate-energy piping, the leakage cracks should be postulated to be in the circumferential locations that result in the most severe environmental consequences.~~For high-energy piping, the leakage cracks should be postulated to be in the circumferential locations that result in the most severe environmental consequences. For moderate-energy piping, leakage cracks should be postulated at axial and circumferential locations that result in the most severe environmental consequences (per BTP 3-4 B(iii)(2)).
- Fluid flow from a leakage crack should be based on a circular opening of area equal to that of a rectangle one-half pipe diameter in length and one-half pipe wall thickness in width. The flow from a leakage crack should be assumed to result in an environment that wets the unprotected components within the compartment with consequent flooding in the compartment and communicating compartments. Flooding effects should be determined on the basis of a conservatively estimated time period necessary to effect corrective actions.

RAI 03.06.02-6

3.6.2.2 Effects of High- and Moderate-Energy Line Breaks

RAI 03.06.02-6

In accordance with SRP Section 3.6.2, the dynamic and environmental effects of postulated line break are evaluated using the methodology as described in this section.

RAI 03.06.02-6

3.6.2.2.1 Blast Effects

RAI 03.06.02-6

The potential for a blast wave to occur depends on the surrounding environment. Key factors include the timing of the break and the initial system thermodynamic conditions. The timing of opening of the break and the initial, intact system thermodynamic conditions also are key factors. Although pipe rupture times of less than a millisecond are unlikely, break opening time is assumed to be instantaneous, maximizing blast formation. The formation and effects of a blast