January 31, 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. 52 (eRAI No. 8855) on the NuScale Design Certification Application

REFERENCES:

1. U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 52 (eRAI No. 8855)," dated June 02, 2017
2. NuScale Power, LLC Response to NRC "Request for Additional Information No. 52 (eRAI No.8855)," dated August 29, 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. 8855:

- 03.06.02-14

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,

Carrie Fosaaen
Supervison, Licensing
NuScale Power, LLC

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Enclosure 1: NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 8855

Enclosure 1:

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 8855

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

eRAI No.: 8855
Date of RAI Issue: 06/02/2017

NRC Question No.: 03.06.02-14

To ensure the compliance with GDC 4 requirements for protecting SSCs important to safety against the dynamic effects of postulated pipe ruptures, the NRC staff in SRP Section 3.6.2 Section III.2.A provides its guidance for evaluating the dynamic response of the fluid system piping when pipe ruptures are postulated. Specifically, SRP Section 3.6.2 Section III.2.A states that an analysis of the dynamic response of the pipe run or branch should be performed for each longitudinal and circumferential postulated piping break. The loading condition (e.g., internal pressure, temperature, etc.) of a pipe run or branch, prior to the postulated rupture, should be used in the evaluation for postulated breaks. For piping pressurized during operation at power, the initial condition should be greater of the contained energy at hot standby or at 102 percent power. The NRC staff found no information (or pointer) in FSAR Section 3.6 which addresses the initial condition assumed for evaluating the dynamic response of the postulated breaks. Clarify the piping system initial conditions assumed in the pipe motion and dynamic effects of postulated breaks analysis and compare this with the NRC guidance as delineated in SRP Section 3.6.2 Section III.2.A.

NuScale Response:

During a followup public telecon with NRC on January 3, 2019, an inconsistency was identified between the initial response to this question (NuScale letter RAIO-0818-61622, August 29, 2018) and the content of the Pipe Rupture Hazards Analysis (PRHA) technical report TR-0818-61384 Section 3.4, submitted by NuScale letter LO-1218-63871 dated December 20, 2018. The inconsistency involves the initial loading conditions (e.g., internal pressure, temperature, etc.) of a pipe run or branch, prior to the postulated rupture, to be used in the evaluation for postulated breaks. The PRHA TR Section 3.4, Break Characteristics, summarized that the initial conditions are selected to bound system conditions for any power level, 102% thermal power or hot standby operation, for which the NuScale equivalent is referred to as hot shutdown.

The response to RAI 8855 Question 03.06.02-14, and the FSAR Table 3.6-4 referenced in the response, stated that the initial conditions are based on full power operation, but did not clarify that conditions at 102% thermal power were bounded.

This inconsistency is corrected by this supplemental response.

The response to RAI 8855 Question 03.06.02-14 is to be replaced in its entirety by the following.

FSAR Table 3.6-4, NuScale Power Module Piping Systems Design and Operating Parameters, provides the initial conditions assumed for dynamic response to pipe breaks. The initial conditions are selected to bound system conditions for any power level, 102% thermal power and hot standby operation, for which the NuScale equivalent is referred to as hot shutdown. During hot shutdown, main steam system (MSS) pressure and temperature are approximately 300 psia and 420ºF, respectively, and primary pressure and temperature are approximately 1850 psia and 420ºF, respectively. For MSS HELBs, normal operating conditions produce higher calculated thrust loads that bound those at hot shutdown. For chemical and volume control system (CVCS) and reactor coolant system (RCS) HELBs, calculated thrust loads at normal operating conditions do not bound those at hot shutdown, because the jet thrust load is dependent, in part, on the thrust coefficient, which is 2.0 for nonflashing blowdown vs. 1.26 for steam. The higher subcooling margin at hot shutdown conditions could result in a nonflashing blowdown. However, using normal operating rather than hot shutdown conditions does not change the conclusions of whether an RCS line in the CNV will whip or whether its trajectory impacts a vulnerable target. In the area under the bioshield, HELBs are precluded by design to satisfy BTP 3-4 B.A.(ii) and (iii) break exclusion criteria. For CVCS HELBs in the RXB, the most limiting (maximum pressure and temperature) system conditions for pipe whip of various pipe segments are considered, and are outlined in FSAR Table 3.6-4.

Impact on DCA:

The FSAR Tier 2, Section 3.6 Table 3.6-4 has been revised as described in the response above and as shown in the markup provided in this response.

RAI 03.06.02-6, RAI 03.06.02-14S1, RAI 06.02.01.01.A-18S1

Table 3.6-4: NuScale Power Module Piping Systems Design and Operating Parameters

Process System (NuScale System)	ASME Code	NPS Size	Design		Operating(4)	
			Press. (psia)	Temp. (°F)	Press. (psia)	Temp. (°F)
CVCS (RCS)	Class 1	2	2100	650	1870(2)	625(2)
CVCS (CNTS, CVCS)	Class 3(1)	2(1)	2100	650	1870(2)	625(2)
MSS (steam generator system, CNTS)	Class 2	8 & 12	2100	650	500	585
FWS (steam generator system, CNTS)	Class 2	4 & 5	2100	650	550	300
DHRS	Class 2	2 & 6	2100	650	1400	635(3)
RCCWS (CRDS)	Class 2	2	165	200	80	121
RCCWS (CNTS)	Class 2	4	1000(5)	550	80	121
CFDS (CNTS-inside CNV)	Class 2	2	165	300	85	100
CFDS (CNTS-outside CNV)	Class 2	4	1000(5)	550	85	100
CES (CNTS)	Class 2	4	1000(5)	550	0.037	100

Notes

(1) The weld between the CIV and the safe-end is NPS 4 SCH 160 and is designated as a Class 1 piping weld

(2) Represents the highest normal operating pressure for the injection line and highest normal operating temperature for the RPV high point degasification line.

(3) Conservatively represents the highest normal operating temperature for the steam portion (i.e., NPS 6 portion) of the DHRS.

(4) The initial conditions are ~~based on full-power operation rather than on~~selected to bound system conditions for any power level, 102% thermal power and hot standby operation, for which the NuScale equivalent is referred to as hot shutdown. During hot shutdown, MSS pressure and temperature are approximately 300 psia and 420°F, respectively, and primary pressure and temperature are approximately 1850 psia and 420°F, respectively.

(5) CNV design pressure (minimum of 1000 psia)