RAIO-0618-60513

June 18, 2018

Docket No. 52-048

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

SUBJECT: NuScale Power, LLC Response to NRC Request for Additional Information No. 453 (eRAI No. 9500) on the NuScale Design Certification Application

REFERENCE: U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 453 (eRAI No. 9500)," dated May 01, 2018

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

The Enclosure to this letter contains NuScale's response to the following RAI Question from NRC eRAI No. 9500:

- 15-10

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 Paul Infanger at 541-452-7351 or at pinfanger@nuscalepower.com.

Sincerely,

Zackary W. Rad
Director, Regulatory Affairs
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Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 9500

Enclosure 1:

NuScale Response to NRC Request for Additional Information eRAI No. 9500

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

eRAI No.: 9500
Date of RAI Issue: 05/01/2018

NRC Question No.: 15-10

General Design Criterion 10, "*Reactor design,*" requires that the reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences. NuScale DSRS Section 15.0 directs the staff to ensure that the range of values for plant parameters used in the safety evaluation is sufficiently broad to cover the predicted fuel cycle ranges and assumes the appropriate conditions, within the operating band, as initial conditions for transient analysis.

Final Safety Analysis Report (FSAR) Table 15.0-6 establishes the range of initial conditions that are assumed in the Section 15 transient and accident analyses. The values presented in Table 15.0-6 are common to all Chapter 15 events except where noted in the individual sections. In general, Table 15.0-6 establishes the range of conditions at hot full power conditions as these are typically the limiting initial conditions relative to the acceptance criteria. While generally true, the staff notes that some FSAR Section 15 events are evaluated at hot zero power (HZP) conditions with no corresponding entry in Table 15.0-6. Since the minimum HZP flow rate is determined by either decay heat or the Module Heatup System (MHS) in this design, the staff seeking justification for not including a minimum HZP reactor coolant system flow rate in FSAR Table 15.0-6, or a revision to the table.

NuScale Response:

The minimum reactor coolant system (RCS) flow rate associated with the hot zero power condition is established by the low RCS flow analytical limit. This limit is used to establish the minimum RCS loop transit time. The specified flow rate is not related to control deadband or instrumentation uncertainty. The NuScale Final Safety Analysis Report, Table 15.0-6 has been revised to include the relevant information.

Impact on DCA:

FSAR Table 15.0-6 has been revised as described in the response above and as shown in the markup provided in this response.

RAI 15-10

Table 15.0-6: Module Initial Conditions Ranges for Design Basis Event Evaluation

Plant Parameter	Units	Value	Uncertainty (Bias)	Basis
Design core power	%	100	+2	Maximum initial core power is assumed to be 102% power due to uncertainty. Rated power is 160 MW.
RCS T_{avg} at operating conditions.	°F	545	± 10	This value is a function of reactor power.
RCS T_{avg} at startup	°F	420 - 555	N/A	The minimum temperature for criticality is 420° F. The temperature range is given as the minimum temperature for criticality up to the RCS T_{avg} at operating conditions plus the high bias (545+10).
Pressurizer Pressure	psia	1850	± 70	Nominal operating pressure is 1850 psia in the pressurizer. The analysis range is 70 psia from the nominal condition.
Pressurizer level at core power ≥15% Rated thermal power (RTP)	%	60	± 8	Hot full power (HFP) pressurizer level is 60%. The analysis range of ±8% is applied to the HFP level.
Pressurizer level at core power ≤15% RTP	%	37 - 68	N/A	Nominal level is 40% at hot zero power (HZP). A low range of 3% is applied to the nominal HZP level. The upper level is defined as the level at HFP plus the high bias (60+8).
Containment pressure	psia	2.0	N/A	Nominal operating pressure is less than 1 psia. For analysis purposes, a high initial pressure of 2.0 psia is conservatively assumed.
Main steam pressure at 100% RTP	psia	500	± 35	This value is a function of reactor power.
Feedwater temperature at 100% RTP	°F	300	± 10	This value is a function of reactor power.
RCS flow at 100% RTP	lbm/s	1180 - 1480*	N/A	Flow range intended to slightly bound the minimum and maximum flowrates calculated. RCS natural circulation flow is primarily a function of operating power and the loop hydraulic resistances. The specified flow range is not related to control deadband or instrumentation uncertainty.
RCS flow minimum	ft^3/s	1.7	N/A	Minimum flow rate for low power operation. This flow rate ensures a minimum RCS loop time. The specified flow rate is not related to control deadband or instrumentation uncertainty.

Note:

*Flow rate 535-670 kg/s converted to lbm/s.