

August 09, 2017

Docket No. 52-048

U.S. Nuclear Regulatory Commission
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SUBJECT: NuScale Power, LLC Response to NRC Request for Additional Information No. 91 (eRAI No. 8923) on the NuScale Design Certification Application

REFERENCE: U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 91 (eRAI No. 8923)," dated July 10, 2017

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. 8923:

- 20.01-1

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 Steven Mirsky at 240-833-3001 or at smirsky@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. 8923



RAIO-0817-55354

Enclosure 1:

NuScale Response to NRC Request for Additional Information eRAI No. 8923

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

eRAI No.: 8923

Date of RAI Issue: 07/10/2017

NRC Question No.: 20.01-1

10 CFR 52.47(a)(2) requires that a standard design certification applicant provide a description and analysis of the structures, systems, and components (SSCs) of the facility, with emphasis upon performance requirements, the bases, with technical justification therefor, upon which these requirements have been established, and the evaluations required to show that safety functions will be accomplished.

NEI 12-06, Revision 2, Section 3.2.2, "Minimum Baseline Capabilities," Paragraph 17 indicates that the FLEX fluid connections for core and SFP cooling functions are expected to have a primary and an alternate connection or delivery point. Also stated is that these connections must be robust.

FSAR Tier 2, Section 20.1.2.2 states that a robust makeup line with an external connection point for providing inventory to the SFP is available to support SFP makeup following a BDBEE.

Based on the statement above, it appears that NuScale would make use of only one FLEX fluid connection for SFP makeup, which goes against the guidance in NEI 12-06, Revision 2, as endorsed with exceptions, additions, and clarifications, by the NRC in JLD- ISG-2012-01, Revision 1, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events."

The applicant is requested to clarify how the NuScale design is consistent with the NEI guidance relating to having a primary and an alternate connection or delivery point for SFP makeup.

NuScale Response:

The NuScale plant design is consistent with NEI 12-06, Revision 2, as endorsed with exceptions, additions, and clarifications, by the NRC in JLD- ISG-2012-01, Revision 1, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events."



NEI 12-06 Section 3.2.2, Paragraph 17 states that diversity and flexibility should be considered in the connection points for the FLEX strategies. The intention of this guidance is to have permanent, installed connection points for FLEX fluid and electrical equipment. The FLEX fluid connections for core and SFP cooling functions are expected to have a primary and an alternate connection or delivery point (for example, the primary means to put water into the SFP may be to run a hose over the edge of the pool). While the phrase “connection points” may imply multiple permanent, installed connection points for both FLEX fluid and electrical equipment, the NEI 12-06 allows for a “delivery point” rather than a connection. This specifically applies to the addition of inventory to the SFP.

Traditional designs provide one source of normal makeup to the SFP. The normal source is considered unavailable per the initial assumptions of NEI 12-06. Because alternate methods that would be available during a beyond-design-basis event were not included in the original design, a FLEX strategy was developed.

A primary and an alternate method of SFP makeup are recommended in Tables C-3 and D-3 of NEI 12-06, Rev. 2., for example, makeup via hoses on refuel floor and makeup via connection to SFP cooling piping or other alternate location.

The NuScale design provides three separate sources of makeup to the SFP during normal operations.

- Demineralized water system
- Boron addition system
- Liquid radwaste system

All three sources are considered unavailable per the initial assumptions of NEI 12-06. For other than normal conditions, a primary and an alternate method of SFP makeup were incorporated into the design.

In the NuScale design, the Spent Fuel Pool is part of the UHS and is partially separated from the Refuel and Reactor Pools by the weir wall. The weir wall contains a partial opening (or weir) that allows fuel to be moved between the UHS pools during refueling activities. This opening also allows the pool volumes to communicate, and serves as a delivery point of makeup water to the SFP.

The combined volume of the Refuel Pool and Reactor Pool is the primary source of makeup to the Spent Fuel Pool in a beyond-design-basis event. The combined volume provides for a safety-related source of inventory with passive makeup capability that is already installed and immediately available.

The UHS was designed to be large enough to eliminate the need for short-term inventory addition following a beyond-design-basis event that results in an extended loss of AC power. Without any addition of inventory, UHS level remains sufficient to support the three key safety functions (core cooling, containment, and spent fuel pool cooling) for more than 50 days. Without any addition of inventory, the RFP and RP passively provide makeup to the SFP for more than 4 months.



The alternate method of SFP makeup included in the design is the UHS makeup line. The makeup line is designed to be Seismic Category I and is protected from external natural phenomena. The makeup line includes a connection external to the Reactor Building to facilitate the connection of water sources. It routes water directly to the SFP and is sufficiently sized to gravity fill at a rate that exceeds the pool boil off rate.

Strategy Comparison - SFP Cooling

NEI 12-06

SFP makeup via hoses

SFP makeup via piping

Both require

- FLEX pump
- FLEX power supply
- FLEX fuel supply
- Manual deployment

NuScale

SFP makeup from the Reactor and Refuel Pools

- Passive

- Large reserve inventory maintains safety functions for more than 50 days

SFP makeup via external connection to the SFP

- Permanently installed

- Gravity fed

- Simplified manual deployment

The NuScale design is consistent with the NEI guidance, provides more water earlier, and ensures water available to the spent fuel pool far longer than anticipated by the designs considered when developing NEI 12-06. The NuScale design provides a level of safety beyond that suggested by the guidance for current designs regarding the need to having a primary and an alternate connection or delivery point for SFP makeup.

Impact on DCA:

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