RAIO-1217-57637

December 12, 2017

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. 229 (eRAI No. 9101) on the NuScale Design Certification Application

REFERENCES:
1. U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 229 (eRAI No. 9101)," dated September 14, 2017
2. NuScale Power, LLC Response to NRC "Request for Additional Information No. 229 (eRAI No.9101)," dated November 10, 2017

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. 9101:

- 09.02.02-4

This supplemental response supersedes the response provided by Reference 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 Carrie Fosaaen at 541-452-7126 or at cfosaaen@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. 9101

Enclosure 1:

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9101

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

eRAI No.: 9101
Date of RAI Issue: 09/14/2017

NRC Question No.: 09.02.02-4

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.

10 CFR 52.47(c)(2) requires that a standard design certification of "a nuclear power reactor design that … uses simplified, inherent, passive, or other innovative means to accomplish its safety functions must provide an essentially complete nuclear power reactor design except for site-specific elements such as the service water intake structure and the ultimate heat sink, and must meet the requirements of 10 CFR 50.43(e)."

FSAR Tier 2, Table 9.2.2-1 specifies the design heat load for the reactor component cooling water system (RCCWS) to be 21 MBtu/hr and the design flow rate for the RCCWS pumps to be 660 gpm.

FSAR Tier 2, Figure 9.2.2-1, identifies that the RCCWs provides cooling to the following heat loads:

- Control rod drive mechanism (CRDM) Cooling Coils
- Chemical and volume control system (CVCS) non-regenerative heat exchangers (NRHX)
- Containment Evacuation System (CES) condensers and vacuum pumps
- Process sampling system (PSS) coolers and analyzer cooler temperature control units (TCUs)

To clarify that the RCCWS flow and heat load specified in Table 9.2.2-1 is sufficient to provide the necessary cooling for the RCCW heat loads identified in Figure 9.2.2-1, the applicant is requested to:

- Provide the heat loads of all the above systems
- Provide the flow rate required to each of the specified heat loads
- Discuss how the operators could know that there is insufficient heat removal capability in the RCCWS and what procedures would be required for the operators to take.

NuScale Response:

First and second bullet response regarding heat loads and flow rates:

As noted in FSAR Section 9.2.2.1, the RCCWS provides no safety-related function, is not credited for mitigation of design basis accidents, and has no safe shutdown functions. Also, as noted in FSAR Section 9.2.2.3, RCCWS cooling is not required for any safety-related or risk-significant components to perform their functions. While the CRDMs are safety-related due to their function of safe shutdown of the reactor, the electromagnetic drive coils and rod position indication that are cooled by RCCWS are part of the control rod drive system and do not impact the ability to safely shut down the reactor. The RCCWS heat removal information (heat loads and flow rates) was not provided originally in the FSAR because it does not affect the safety functions.

The two tables below contain preliminary expected heat loads and flow rates for components of the RCCWS. Table 1 contains heat loads and flow rates expected for normal operating condition while Table 2 contains heat loads and flow rates used for the purpose of sizing the equipment. Table 2 contains expected heat loads that could be experienced during operation evolutions that need to be included in the system sizing so that plant operation would not be limited by the RCCWS capacity. If the heat loads and flow rates in Tables 1 and 2 were to change, the revised heat loads and flow rates are not required to be provided in a revised RAI response as this information does not serve any safety or important to safety function.

Table 1. Normal Operation RCCWS Flow Rates and Heat Loads

Component	Qty	Operating Condition	Flow Rate (gpm) ea.	Heat Load (BTU/hr) ea.	Temp. In (°F)	Temp Out (°F)
CRDM	96	Normal	2	40,200	80	120.5
CVCS NRHX	6	CVCS 22 gpm (purification, no makeup or letdown)	20	551,000	80	135.5
PSS Coolers	6	One continuous analyzer per module	12	116,000	80	99.5
PSS TCU	1	One continuous TCU for 6 modules	17	60,000	80	87.2
CE Condenser	6	Normal	8	90,000	80	102.7
CE Vacuum Pump	6	Normal	2	35,830	80	116.1
		TOTAL	461	8,676,180		

Table 2. Sizing Basis RCCWS Flow Rates and Heat Loads

Component	Qty	Operating Condition	Flow Rate (gpm) ea.	Heat Load (BTU/hr) ea.	Temp. In (°F)	Temp Out (°F)
CRDM	96	Normal	2	40,200	100	140.5
CVCS NRHX (fouled)	2	CVCS 42 gpm (22 gpm purif. + 20 gpm letdown, no makeup)	240	3,575,000	100	130
CVCS NRHX (fouled)	4	CVCS 22 gpm (300°F RHX outlet)	90	1,877,000	100	142
PSS Coolers	6	One continuous analyzer per module	12	116,000	100	119.5
PSS TCU	1	One continuous TCU for 6 modules	17	60,000	100	107.2
CE Condenser	6	Normal	8	90,000	100	122.7
CE Vacuum Pump	12	Normal	2	35,830	100	136.1
		TOTAL	1,193	20,243,160		

Third bullet response regarding what procedures would be required for the operators to take:

The RCCWS contains temperature and flow indication for every component heat load. Operating procedures will provide the operator with the ability to diagnose and respond to malfunctions.

The Plant Control System continuously monitors the components cooled by the RCCWS and sends that information to the Control Room Human-System Interface (HSI). If the RCCWS fails to cool any or multiple components, automatic actions (automated procedure) will occur to mitigate the abnormal occurrence and restore sufficient heat removal capability. If automatic actions fail to mitigate the abnormal event the operator will follow prescribed steps in alarm response procedures and abnormal system operating procedures until the event is mitigated and sufficient heat removal capability is restored.

With regards to operations procedure development, COL Item 13.5-2 requires that the applicant describe the site-specific procedures that operators use in the main control room and locally in the plant, including normal operating procedures, abnormal operating procedures, and emergency operating procedures.

Impact on DCA:

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