RAIO-0818-61452

August 17, 2018

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 Response to NRC Request for Additional Information No. 322 (eRAI No. 9239) on the NuScale Design Certification Application

REFERENCE: U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 322 (eRAI No. 9239)," dated January 08, 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. 9239:

- 11.02-2

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 Response to NRC Request for Additional Information eRAI No. 9239

Enclosure 1:

NuScale Response to NRC Request for Additional Information eRAI No. 9239

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

eRAI No.: 9239
Date of RAI Issue: 01/08/2018

NRC Question No.: 11.02-2
11.2 RAI - Determining the basis for the dilution flow rates.

Regulatory Basis: 10 CFR Part 20, Appendix B; 10 CFR Part 50, Appendix I
10 CFR Part 20, Appendix B, Table 2 provides concentration limits for airborne and liquid effluents released to the general environment. 10 CFR Part 50, Appendix I provides the numerical guidance for design objectives and limiting conditions for operation.

Key Issue:

There is not sufficient information in the DCD regarding the dilution flows that are needed to determine effluent concentrations released are within regulatory limits

Questions

1. In review of DCD section 11.2.3.3, the staff requests additional information for the stated dilution flows referenced by the applicant in DCD Section 11.2.3.3, and DCD Table 11.2-4. The dilution flows are needed to determine the effluent concentrations released by the applicant for compliance with 10 CFR Part 20, Appendix B; and 10 CFR Part 50, Appendix I.

As discussed during the audit, the applicant references 5.56 cfs for the UWS dilution flow, and 740 cfs for the offsite dilution factor. DCD section 11.2.3.3 provides a pointer to DCD section 9.2.9, but the staff is unable to find any stated flow rates that feed into the 5.56 cfs dilution flow value. The staff requests explanation for the basis of the flow rates used for both 10 CFR Part 20 Appendix B Table 2, and 10 CFR Part 50 Appendix I compliance. In the audit it was discussed that the 740 cfs values was based on an assumed river dilution. The staff would need such assumptions to be stated in the DCD for the staff to understand the basis for the developed dilution flows.

2. The staff requests the applicant to provide and list the flow rate inputs used in DCD Section 11.2 to determine the 5.56 cfs flow rate value from the UWS. In addition, the staff requests the applicant to clearly state the assumption for the 740 cfs flow rate value as

was discussed during the audit. The staff request the applicant clearly state assumptions in the DCD and provide a markup of the DCD in response to this RAI.

NuScale Response:

During the effort to respond to this RAI, errors were discovered that impact some of the flow rate values listed below. These values have been corrected and the FSAR has been updated accordingly.

As described in FSAR Section 11.2.3.3, the utility water system (UWS) is credited for a dilution flow of 5.34 cubic feet per second (2398 gpm), which is the total normal volumetric flow rate to the UWS single point discharge, as summarized below.

UWS Discharge Inputs	Normal Flow Rate (gpm)
Cooling Tower A blowdown	1060
Cooling Tower B blowdown	1060
Site Cooling Water Tower blowdown	211
BOP Drain Collection Tank	55
Treated Sanitary discharge	10
LRWS discharge	1.3
TOTAL =	**2398**

The assumed offsite dilution flow of 270 cfs is the minimum required additional flow from an offsite water source (e.g., river) to ensure compliance with 10 CFR 50 Appendix I, for liquid effluents from a NuScale facility.

Impact on DCA:

FSAR Section 11.2.3.3 Table 11.2-7 and Table 11.2-8 have been been revised as described in the response above and as shown in the markup provided in this response.

11.2.3.3 Dilution Factors

The liquid effluent from LRWS is discharged through the discharge header and ties into the UWS as shown in Figure 11.2-1g. The UWS receives discharge water from multiple sources that provides dilution for the LRWS discharge in the discharge basin (Section 9.2.9). The UWS also provides a signal to LRWS in the event that dilution flow reduces to an unacceptable level to automatically close the LRWS discharge header isolation valves (Section 11.5.2.1).

RAI 02.03.01-2, RAI 02.03.05-1, RAI 11.02-2

A dilution factor of ~~5.56~~5.34 cfs of the LRWS discharge is assumed in the calculation of the ~~site boundary (Section 2.3.4 and Figure 1.2-4)~~discharge concentrations, as shown in Table 11.2-4. This ensures that the discharge ~~site boundary~~ concentrations are within 10 CFR 20 Appendix B, Table 2, limits. The ~~offsite~~unrestricted area doses are calculated using an additional dilution factor of ~~740~~270 cfs (e.g., river), which results in the ~~offsite~~unrestricted area doses being within 10 CFR 50, Appendix I, limits.

COL Item 11.2-4: A COL applicant that references the NuScale Power Plant design certification will perform a site-specific evaluation using the site-specific dilution flow.

11.2.3.4 Site-Specific Cost-Benefit Analysis

COL Item 11.2-5: A COL applicant that references the NuScale Power Plant design certification will perform a cost-benefit analysis as required by 10 CFR 50.34a and 10 CFR 50, Appendix I, to demonstrate conformance with regulatory requirements. This cost-benefit analysis is to be performed using the guidance of Regulatory Guide 1.110.

11.2.4 Testing and Inspection Requirements

The LRWS preoperational tests are described in Section 14.2 and include the applicable testing and inspection requirements from RG 1.143.

Inspection and testing provisions are incorporated to enable periodic evaluation of the operability and required functional performance of active components of the system.

11.2.5 Instrumentation and Controls

The LRWS waste collection is operated in the automatic mode and LRWS processing is operated in a batch-type mode. For normal operation, automated and manual valves are aligned to collect the waste from other systems, hold it until processed, and discharge or recycle treated waste.

The LRWS processing functions that use mobile radioactive waste processing equipment and interfacing-permanent-plant LRWS equipment are controlled and monitored from the WMCR by an operator. Mobile radioactive waste processing equipment skids are controlled from local control panels.

The permanent plant controls and indications for filling waste collection tanks are automatic and are controlled by the plant control system with indication in the WMCR. The

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Table 11.2-7: LADTAP II Inputs

Parameter	Value
Source term	Table 11.2-6
Shore-width factor	1.0
Discharge flow rate	~~740~~270 ft^3/sec
Impoundment reconcentration model	None
Irrigation rate	100 liters/m^2-month
Dilution factor for aquatic food, boating, shoreline, swimming and drinking water	1
Dilution factor for irrigation water usage location	1
Site type	Freshwater
Exposure Pathway:	
• Transit time - aquatic food	0
• Transit time - boating	0
• Transit time - swimming	0
• Transit time - shoreline	0
• Transit time - drinking water	0
• Transit time - irrigated crops	0
• Transit time - milk/meat animal water usage	0
Fraction of crops irrigated using non-contaminated water	0
Fraction of milk/meat animal feed irrigated using non-contaminated water	0
Fraction of milk/meat animal drinking water from non-contaminated water	0

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Table 11.2-8: ~~Liquid Effluent Dose Results for 10 CFR 50 Appendix I~~

~~Pathway~~	~~Total Body (mrem/yr) [Limit]~~	~~GI Tract (mrem/yr) [Limit]~~	~~Bone (mrem/yr) [Limit]~~	~~Liver (mrem/yr) [Limit]~~	~~Kidney (mrem/yr) [Limit]~~	~~Thyroid (mrem/yr) [Limit]~~	~~Lung (mrem/yr) [Limit]~~	~~Skin (mrem/yr) [Limit]~~
~~Drinking~~	-	-	-	-	-	-	-	-
~~Adult~~	~~1.41E-01~~ ~~[3]~~	~~1.50E-01~~ ~~[10]~~	~~3.58E-02~~ ~~[10]~~	~~1.54E-01~~ ~~[10]~~	~~1.20E-01~~ ~~[10]~~	~~1.52E-01~~ ~~[10]~~	~~1.08E-01~~ ~~[10]~~	-
~~Teen~~	~~9.32E-02~~ ~~[3]~~	~~1.06E-01~~ ~~[10]~~	~~3.43E-02~~ ~~[10]~~	~~1.21E-01~~ ~~[10]~~	~~8.87E-02~~ ~~[10]~~	~~1.14E-01~~ ~~[10]~~	~~7.81E-02~~ ~~[10]~~	-
~~Child~~	~~1.60E-01~~ ~~[3]~~	~~1.71E-01~~ ~~[10]~~	~~9.92E-02~~ ~~[10]~~	~~2.37E-01~~ ~~[10]~~	~~1.71E-01~~ ~~[10]~~	~~2.40E-01~~ ~~[10]~~	~~1.50E-01~~ ~~[10]~~	-
~~Infant~~	~~1.50E-01~~ ~~[3]~~	~~1.56E-01~~ ~~[10]~~	~~9.99E-02~~ ~~[10]~~	~~2.57E-01~~ ~~[10]~~	~~1.70E-01~~ ~~[10]~~	~~2.96E-01~~ ~~[10]~~	~~1.50E-01~~ ~~[10]~~	-
~~Fish~~	-	-	-	-	-	-	-	-
~~Adult~~	~~2.16E+00~~ ~~[3]~~	~~7.27E-01~~ ~~[10]~~	~~3.03E+00~~ ~~[10]~~	~~2.96E+00~~ ~~[10]~~	~~9.62E-01~~ ~~[10]~~	~~2.29E-02~~ ~~[10]~~	~~3.19E-01~~ ~~[10]~~	-
~~Teen~~	~~1.25E+00~~ ~~[3]~~	~~5.33E-01~~ ~~[10]~~	~~3.25E+00~~ ~~[10]~~	~~3.05E+00~~ ~~[10]~~	~~9.77E-01~~ ~~[10]~~	~~2.10E-02~~ ~~[10]~~	~~3.77E-01~~ ~~[10]~~	-
~~Child~~	~~5.39E-01~~ ~~[3]~~	~~2.01E-01~~ ~~[10]~~	~~4.09E+00~~ ~~[10]~~	~~2.67E+00~~ ~~[10]~~	~~8.26E-01~~ ~~[10]~~	~~2.13E-02~~ ~~[10]~~	~~2.98E-01~~ ~~[10]~~	-
~~Shoreline~~	-	-	-	-	-	-	-	-
~~Adult~~	~~1.95E-02~~ ~~[3]~~	~~1.95E-02~~ ~~[10]~~	~~1.95E-02~~ ~~[10]~~	~~1.95E-02~~ ~~[10]~~	~~1.95E-02~~ ~~[10]~~	~~1.95E-02~~ ~~[10]~~	~~1.95E-02~~ ~~[10]~~	~~2.28E-02~~ ~~[10]~~
~~Teen~~	~~1.09E-01~~ ~~[3]~~	~~1.09E-01~~ ~~[10]~~	~~1.09E-01~~ ~~[10]~~	~~1.09E-01~~ ~~[10]~~	~~1.09E-01~~ ~~[10]~~	~~1.09E-01~~ ~~[10]~~	~~1.09E-01~~ ~~[10]~~	~~1.27E-01~~ ~~[10]~~
~~Child~~	~~2.27E-02~~ ~~[3]~~	~~2.27E-02~~ ~~[10]~~	~~2.27E-02~~ ~~[10]~~	~~2.27E-02~~ ~~[10]~~	~~2.27E-02~~ ~~[10]~~	~~2.27E-02~~ ~~[10]~~	~~2.27E-02~~ ~~[10]~~	~~2.66E-02~~ ~~[10]~~
~~Vegetables~~	-	-	-	-	-	-	-	-
~~Adult~~	~~2.97E-01~~ ~~[3]~~	~~3.29E-01~~ ~~[10]~~	~~2.13E-01~~ ~~[10]~~	~~3.76E-01~~ ~~[10]~~	~~1.75E-01~~ ~~[10]~~	~~9.62E-02~~ ~~[10]~~	~~1.07E-01~~ ~~[10]~~	-
~~Teen~~	~~2.97E-01~~ ~~[3]~~	~~4.03E-01~~ ~~[10]~~	~~3.55E-01~~ ~~[10]~~	~~5.85E-01~~ ~~[10]~~	~~2.56E-01~~ ~~[10]~~	~~1.24E-01~~ ~~[10]~~	~~1.53E-01~~ ~~[10]~~	-
~~Child~~	~~3.13E-01~~ ~~[3]~~	~~3.81E-01~~ ~~[10]~~	~~8.42E-01~~ ~~[10]~~	~~9.77E-01~~ ~~[10]~~	~~4.12E-01~~ ~~[10]~~	~~2.10E-01~~ ~~[10]~~	~~2.37E-01~~ ~~[10]~~	-
~~Leafy Vegetables~~	-	-	-	-	-	-	-	-
~~Adult~~	~~3.68E-02~~ ~~[3]~~	~~4.16E-02~~ ~~[10]~~	~~2.65E-02~~ ~~[10]~~	~~4.67E-02~~ ~~[10]~~	~~2.17E-02~~ ~~[10]~~	~~1.78E-02~~ ~~[10]~~	~~1.31E-02~~ ~~[10]~~	-
~~Teen~~	~~2.00E-02~~ ~~[3]~~	~~2.76E-02~~ ~~[10]~~	~~2.39E-02~~ ~~[10]~~	~~3.93E-02~~ ~~[10]~~	~~1.72E-02~~ ~~[10]~~	~~1.30E-02~~ ~~[10]~~	~~1.02E-02~~ ~~[10]~~	-
~~Child~~	~~1.58E-02~~ ~~[3]~~	~~1.95E-02~~ ~~[10]~~	~~4.27E-02~~ ~~[10]~~	~~4.90E-02~~ ~~[10]~~	~~2.07E-02~~ ~~[10]~~	~~1.76E-02~~ ~~[10]~~	~~1.19E-02~~ ~~[10]~~	-
~~Meat~~	-	-	-	-	-	-	-	-
~~Adult~~	~~4.25E-02~~ ~~[3]~~	~~1.33E+00~~ ~~[10]~~	~~4.28E-02~~ ~~[10]~~	~~4.85E-02~~ ~~[10]~~	~~6.34E-02~~ ~~[10]~~	~~1.68E-02~~ ~~[10]~~	~~1.97E-02~~ ~~[10]~~	-
~~Teen~~	~~2.31E-02~~ ~~[3]~~	~~8.26E-01~~ ~~[10]~~	~~3.55E-02~~ ~~[10]~~	~~3.56E-02~~ ~~[10]~~	~~4.91E-02~~ ~~[10]~~	~~1.01E-02~~ ~~[10]~~	~~1.31E-02~~ ~~[10]~~	-

Table 11.2-8: ~~Liquid Effluent Dose Results for 10 CFR 50 Appendix I (Continued)~~

~~Pathway~~	~~Total Body (mrem/yr) [Limit]~~	~~GI Tract (mrem/yr) [Limit]~~	~~Bone (mrem/yr) [Limit]~~	~~Liver (mrem/yr) [Limit]~~	~~Kidney (mrem/yr) [Limit]~~	~~Thyroid (mrem/yr) [Limit]~~	~~Lung (mrem/yr) [Limit]~~	~~Skin (mrem/yr) [Limit]~~
~~Child~~	~~2.41E-02 [3]~~	~~5.09E-01 [10]~~	~~6.58E-02 [10]~~	~~4.51E-02 [10]~~	~~6.31E-02 [10]~~	~~1.26E-02 [10]~~	~~1.57E-02 [10]~~	~~-~~
~~Milk~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~
~~Adult~~	~~2.31E-01 [3]~~	~~7.59E-02 [10]~~	~~1.62E-01 [10]~~	~~3.01E-01 [10]~~	~~1.28E-01 [10]~~	~~8.11E-02 [10]~~	~~7.18E-02 [10]~~	~~-~~
~~Teen~~	~~2.38E-01 [3]~~	~~9.54E-02 [10]~~	~~2.89E-01 [10]~~	~~5.04E-01 [10]~~	~~2.04E-01 [10]~~	~~1.16E-01 [10]~~	~~1.13E-01 [10]~~	~~-~~
~~Child~~	~~2.26E-01 [3]~~	~~1.16E-01 [10]~~	~~6.90E-01 [10]~~	~~8.42E-01 [10]~~	~~3.28E-01 [10]~~	~~2.07E-01 [10]~~	~~1.75E-01 [10]~~	~~-~~
~~Infant~~	~~2.12E-01 [3]~~	~~1.06E-01 [10]~~	~~6.95E-01 [10]~~	~~9.11E-01 [10]~~	~~3.25E-01 [10]~~	~~2.55E-01 [10]~~	~~1.74E-01 [10]~~	~~-~~
~~Total~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~
~~Adult~~	~~2.93E+00 [3]~~	~~2.67E+00 [10]~~	~~3.53E+00 [10]~~	~~3.91E+00 [10]~~	~~1.49E+00 [10]~~	~~4.06E-01 [10]~~	~~6.58E-01 [10]~~	~~2.28E-02 [10]~~
~~Teen~~	~~2.03E+00 [3]~~	~~2.10E+00 [10]~~	~~4.09E+00 [10]~~	~~4.44E+00 [10]~~	~~1.70E+00 [10]~~	~~5.07E-01 [10]~~	~~8.54E-01 [10]~~	~~1.27E-01 [10]~~
~~Child~~	~~1.30E+00 [3]~~	~~1.42E+00 [10]~~	~~5.86E+00 [10]~~	~~4.85E+00 [10]~~	~~1.85E+00 [10]~~	~~7.32E-01 [10]~~	~~9.10E-01 [10]~~	~~2.66E-02 [10]~~
~~Infant~~	~~3.63E-01 [3]~~	~~2.62E-01 [10]~~	~~7.95E-01 [10]~~	~~1.17E+00 [10]~~	~~4.95E-01 [10]~~	~~5.51E-01 [10]~~	~~3.24E-01 [10]~~	~~0.00E+00 [10]~~

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Table 11.2-9: Liquid Effluent Dose Results for 10 CFR 50 Appendix I

Type of Dose	Calculated Dose (mrem/yr)	10 CFR 50, Appendix I ALARA Design Objective (mrem/yr)
Total Body	2.8	3
Individual Organ	9.8 (child bone)	10