RAIO-0218-58582

February 08, 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. 323 (eRAI No. 9251) on the NuScale Design Certification Application

REFERENCE: U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 323 (eRAI No. 9251)," 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. 9251:

- 11.04-1

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
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Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 9251

Enclosure 1:

NuScale Response to NRC Request for Additional Information eRAI No. 9251

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

eRAI No.: 9251
Date of RAI Issue: 01/08/2018

NRC Question No.: 11.04-1

11.4 RAI - Waste Generation Rates and Storage Areas

Regulatory Basis:

10 CFR Part 50, Appendix A, GDC 60 and 61 as it relates to understanding the estimated annual volumes of dry and wet solid waste generated by the NuScale design. The staff is seeking this information to support the minimum onsite storage assumption of 30 days, as described by ANSI/ANS-55.1-1992 and BTP 11-3.

Key Issues:

The assumptions in the DCD used in determining the generation of both solid and wet wastes as described in DCD Tables 11.4-2 and 11.4-3 are unclear.

As discussed in the audit, the staff requested the basis of the 450 cubic ft / year of spent resin. Further review of DCD Table 11.4-2 and 11.4-3 indicated that additional details were required to confirm the applicant's assertion of meeting ANSI/ANS-55.1-1992 and BTP 11- 3.

Questions:

1. The staff requests the applicant provide the details of the assumed generation of waste volumes, and any assumptions used to determining the fractions of waste that would be accounted for in the volumes generated by the applicant.
2. Additionally, the staff is seeking information to verify the applicant has sufficient space for storage by identifying the waste storage areas used to store waste within corresponding waste storage areas.

NuScale Response:

Dry Solid Waste

FSAR Table 11.4-2 provides the estimated annual volumes of dry solid waste (DSW) for both Class A and Class B/C. Class A dry solid waste consists of items like HVAC filters (650 ft^3),

used personal protective equipment (PPE), rags, wipes (3000 ft^3), and discarded tools (9 ft^3). Items considered to be Class B/C dry solid waste are items such as failed equipment and parts (7 ft^3).

Class A Dry Solid Waste

The estimated value for HVAC filter waste volume was derived by reviewing the HVAC systems and estimating the size, quantity and change-out frequency of each filter.

Description	Size	Quantity	Volume (ft^3)	Change-out Frequency ($year^{-1}$)	Total Volume (ft^3/yr)
Main Exhaust HEPA Filters	8'x10'x1' (80 ft^3)	8	640	0.5	320
Main Exhaust Pre-Filters	8'x10'x0.33' (24 ft^3)	8	192	1	192
Spent Fuel Pool Exhaust HEPA Filters	8'x10'x1' (80 ft^3)	1	80	0.5	40
Spent Fuel Pool Exhaust Pre-Filters	8'x10'x0.33' (24ft^3)	1	24	1	24
Activated Carbon Filters	10'x12.9'x4.7' (602 ft^3)	1 bank	602	0.1	60
Total Estimated DSW Volume from HVAC Filters					640

The total value of 640 ft^3/year is rounded up to 650 ft^3/year in FSAR Table 11.4-2.

To conservatively estimate the volume of discarded PPE, it is assumed that disposable protective clothing is not used (e.g., OREX or similar). The estimated volume for this category was estimated by considering the refueling outage frequency and estimated personnel usage of PPE.

Item	Basis	Size	Frequency	Quantity	Total Volume (ft^3/year)
Personal PPE (routine)	10 person/day x 1 set/person	0.25 ft^3/set	Daily	3650 sets/year	913
Personal PPE (refueling)	20 person x 2 sets/person/day x 30 day refueling	0.25 ft^3/set	6 refuelings per year	2400 sets/refueling	600
Rags, etc. (routine)	5 person/day x 4 rags/person	0.1 ft^3/rag	Daily	7300 rags/year	730
Rags, etc. (refueling)	10 person x 4 rags/person x 30 day refueling	0.1 ft^3/rag	6 refuelings per year	7200 rags/year	720
Total Estimated DSW Volume from PPE, Rags, etc.					2963

This total value of 2963 ft^3/year is rounded up to 3000 ft^3/year in FSAR Table 11.4-2.

The estimated annual volume of discarded tools is based on a review of the anticipated work and outage frequency.

Items	Basis	Size	Frequency	Quantity	Total Volume (ft3/year)
Contaminated tools for disposal (routine)	2/month	0.1 ft^3/tool	Daily	24 tools/year	2.4
Contaminated tools for disposal (refueling)	10/refueling	0.1 ft^3/tool	6 refuelings per year	60 tools/year	6
Total Estimated DSW Volume from Discarded Tools					8.4

This total value of 8.4 ft^3/year is rounded up to 9 ft^3/year in FSAR Table 11.4-2.

Class B/C Dry Solid Waste

The estimate for the annual volume of Class B/C failed equipment is based on a review of plant equipment and typical failure rates.

Item	Size	Frequency	Total Volume (ft^3/year)
Small equipment (e.g., pump)	2 ft^3	1 failure/year	2
Small valves (i.e., 2 inch)	0.5 ft^3	2 failures/year	1
Large equipment	6 ft^3	0.1 failures/year	0.6
Large valves (i.e., 6 inch)	1.5 ft^3	2 failures/year	3
Total Estimated DSW Volume from Failed Equipment			6.6

This total value of 6.6 ft^3/year is rounded up to 7 ft^3/year in FSAR Table 11.4-2.

Wet Solid Waste

FSAR Table 11.4-3 provides the estimated annual volumes of wet solid waste (WSW) for both Class A and Class B/C. Class A wet solid waste comes from various spent resins, filters, charcoal and other sources. Class B/C wet solid waste is composed of chemical and volume control system (CVCS) and pool cleanup system (PCUS) spent resins and cartridge filters. FSAR Table 11.4-3 has been revised to reflect the information provided below, and a markup is provided with this response.

Class B/C Wet Solid Waste

Details for the estimated annual volume of Class B/C spent resins from the CVCS and PCUS are provided in the NuScale response to RAI 12.02-7 (eRAI 9267).

The volume of wet solid Class B/C wastes from the CVCS and PCUS cartridge filters was estimated by reviewing the CVCS and PCUS design and estimating the filter size and change-out frequency.

Description	Filter Radius (ft)	Filter Height (ft)	Filter Volume (ft^3)	Change-out Frequency ($year^{-1}$)	Total Volume (ft^3/year)
CVCS filter cartridge	0.54	4	3.7	12	45
PCUS filter cartridge (7 cartridges/filter)	0.25	5	6.9	1	7
Total Estimated WSW Volume from Class B/C Filters					52

Class A Wet Solid Waste

Details for the estimated annual volume of Class A spent resins from the liquid radioactive waste system (LRWS) and CVCS deborating demineralizers is provided in the NuScale response to RAI 12.02-21 (eRAI 9271).

Charcoal waste from the LRWS granulated activated carbon (GAC) is estimated by assuming

that the two 50 ft^3 carbon beds are replaced every 5 years (typical operating plants replace these every 5-10 years). Assuming a replacement every 5 years yields an effective annual rate of 20 ft^3/year.

Other Class A wet solid waste volume estimates were developed from typical industry experience related to tubular ultrafiltration (TUF) and reverse osmosis (RO) equipment, plus LRWS detergent filter cartridges, oily waste, and mixed waste.

Item	Volume (ft^3)	Total Volume (ft^3/year)
LRWS filter	0.3	1
TUF filter membranes	5	5
RO membranes	7	7
Total Estimated Class A WSW Volume from Miscellaneous Sources		13 (20)
Mixed Waste		14
Oily Waste		14
GAC charcoal	50	20

Packaged Waste Storage Space

The space available in the Radioactive Waste Building (RWB) to store packaged waste was evaluated using the above solid waste generation rates. The number of storage containers needed to package these estimated annual waste volumes is provided in FSAR Table 11.4-2 and 11.4-3. Oily wastes are stored in the oil separator rooms, and therefore are not included in the estimates for storage space needed in the storage room. Volumes for mixed wastes that can be stored in the oil separator room or shipped offsite are not included in the storage space estimate.

Class B/C Container Storage

The required floor space for the Class B/C containers is summarized as follows:

Container Type	Number of Containers per Year	Floor Space Required per Container (ft^2)	Total Floor Space per Year (ft^2/year)
HIC	6 (resin)	25	150
HIC	1 (filter)	25	25
Drum	1	4	4
Total floor space needed for Class B/C containers			179

Because there is more than 1,000 ft^2 of available space for Class B/C storage on the 71' elevation of the Radioactive Waste Building, there is sufficient storage space to meet the storage assumption of 30 days, as described by ANSI/ANS-55.1-1992 and BTP 11-3.

Class A Container Storage

The required floor space for the Class A container is summarized as follows:

Container Type	Number of Containers per Year	Floor Space Required per Container (ft^2)	Total Floor Space per Year (ft^2/year)
HIC	2	25	50
Drum	7	4	28
B25 box	40	23/2 (boxes are double stacked)	460
Total floor space needed for Class A containers			538

Because there is more than 1,000 ft^2 of available space for Class A storage on the 100' elevation of the Radioactive Waste Building, there is sufficient storage space to meet the storage assumption of 30 days, as described by ANSI/ANS-55.1-1992 and BTP 11-3.

Impact on DCA:

FSAR Table 11.4-3 been revised as described in the response above and as shown in the markup provided in this response.

Table 11.4-3: Estimated Annual Volumes of Wet Solid Waste

Waste Classification	Sources	Volume Generated (ft^3/yr)	Container Type	Container Volume (ft^3)	No. of Containers (rounded up)
Class B/C	CVCS and PCUS spent resins	~~450~~600	8-120 HIC	~~120~~112	~~4~~6 HICs
Class B/C	cartridge filters from CVCS and PCUS	52	8-120 HIC	~~120~~112	1 HIC
Class A	LRWS spent resins and CVCS deborating spent resins	~~200~~170	8-120 HIC	~~120~~112	2 HICs
	LRWS filter cartridges, TUF filter rejects, RO rejects, membranes, and misc.	20	55 gal drum	7.3	3 drums
Class A	oily waste	14	55 gal drum	7.3	2 drums
	mixed waste	14	55 gal drum	7.3	2 drums
	charcoal (from GAC) (replaced every 5 years)	~~10~~20 (avg)	8-120 HIC	~~120~~112	1 HIC every five years