NuScaleDCRaisPEm Resource

From:	Cranston, Gregory
Sent:	Friday, November 03, 2017 4:02 PM
To:	RAI@nuscalepower.com
Cc:	NuScaleDCRaisPEm Resource; Lee, Samuel; Chowdhury, Prosanta; Cook, Christopher; White, Jason
Subject:	Request for Additional Information No. 276 RAI No. 9182 (2.3.5)
Attachments:	Request for Additional Information No. 276 (eRAI No. 9182).pdf

Attached please find NRC staff's request for additional information concerning review of the NuScale Design Certification Application.

Please submit your technically correct and complete response within 60 days of the date of this RAI to the NRC Document Control Desk.

If you have any questions, please contact me.

Thank you.

Gregory Cranston, Senior Project Manager
Licensing Branch 1 (NuScale)
Division of New Reactor Licensing
Office of New Reactors
U.S. Nuclear Regulatory Commission
301-415-0546

Hearing Identifier: NuScale_SMR_DC_RAI_Public
Email Number: 302

Mail Envelope Properties (67666f34c9bc45f1b4226c19ea2558d3)

Subject: Request for Additional Information No. 276 RAI No. 9182 (2.3.5)
Sent Date: 11/3/2017 4:02:21 PM
Received Date: 11/3/2017 4:02:25 PM
From: Cranston, Gregory

Created By: Gregory.Cranston@nrc.gov

Recipients:
"NuScaleDCRaisPEm Resource" <NuScaleDCRaisPEm.Resource@nrc.gov>
Tracking Status: None
"Lee, Samuel" <Samuel.Lee@nrc.gov>
Tracking Status: None
"Chowdhury, Prosanta" <Prosanta.Chowdhury@nrc.gov>
Tracking Status: None
"Cook, Christopher" <Christopher.Cook@nrc.gov>
Tracking Status: None
"White, Jason" <Jason.White@nrc.gov>
Tracking Status: None
"RAI@nuscalepower.com" <RAI@nuscalepower.com>
Tracking Status: None

Post Office: R4PWMSMRS03.nrc.gov

Files	**Size**	**Date & Time**
MESSAGE	561	11/3/2017 4:02:25 PM
Request for Additional Information No. 276 (eRAI No. 9182).pdf	99792	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Request for Additional Information No. 276 (eRAI No. 9182)

Issue Date: 11/03/2017
Application Title: NuScale Standard Design Certification - 52-048
Operating Company: NuScale Power, LLC
Docket No. 52-048
Review Section: 02.03.05 - Long-Term Atmospheric Dispersion Estimates for Routine Releases
Application Section: 2.3.5

QUESTIONS

02.03.05-1

Regulatory Background

10 CFR Part 20, "Standards for Protection against Radiation," Subpart D, "Radiation Dose Limits for Individual Members of the Public," Section 20.1301, "Dose limits for individual members of the public," establishes dose limits to members of the public and Appendix B to Part 20, “Annual Limits on Intake and Derived Air Concentrations of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage,” establishes limits on concentrations of radioactive material in effluents to unrestricted areas. Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low As Is Reasonably Achievable' for Radioactive Material in Light Water-Cooled Nuclear Power Reactor Effluents," to 10 CFR Part 50, "Licensing of Production and Utilization Facilities," provides numerical guides for design objectives to meet the requirements that radioactive material in effluents released to unrestricted areas be kept as low as is reasonably achievable.

Pursuant to 10 CFR 52.47(a)(1), a Design Certification (DC) applicant is required to provide site parameters postulated for its design and an evaluation of its design in terms of those site parameters. NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition" (SRP), Section 2.3.5, “Long-Term Atmospheric Dispersion Estimates for Routine Releases,” Subsection III (Review Procedures), Item 5(b), in part, calls for the NRC staff to reach a conclusion that “[t]he applicant has provided a basis for each of the site parameters” and that “[t]he postulated site parameters are representative of a reasonable number of sites that have been or may be considered for a COL application.”

RG 1.111, “Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors,” Revision 1, provides guidance for performing atmospheric dispersion and deposition estimates of radioactive materials in gaseous effluents from routine releases. NUREG/CR-2919, “XOQDOQ Computer Program for the Meteorological Evaluation of Routine Releases at Nuclear Power Stations” describes the NRC-sponsored computer code XOQDOQ, which is used to implement the constant mean wind direction methodology outlined in RG 1.111. Regulatory Position C.2 of RG 1.111 also provides guidance on source configuration evaluations.

Information Request 1:

In FSAR Tier 2, Table 2.0-1, "Site Design Parameters," the applicant lists routine release atmospheric dispersion factors (χ/Q values) and atmospheric deposition factors (D/Q values) at the site boundary and locations of interest. FSAR Tier 2, Section 2.3.5, "Long-Term Atmospheric Dispersion Estimates for Routine Releases," states that these χ/Q and D/Q values are used to calculate the site boundary release concentrations for comparison to the activity release limits in 10 CFR 20 as discussed in Section 11.3. These are the same χ/Q and D/Q values listed in FSAR Tier 2, Table 11.3-6, "GASPAR Code Input

Parameter Values." However, the applicant has neither provided in Section 11.3 nor 2.3.5, any assumptions used in generating these values.

a. Please describe (or provide) the assumptions used to derive each of the χ/Q and D/Q values presented as site parameters in FSAR Tier 2, Table 2.0-1 (i.e., the annual average routine release χ/Q value of 3.64E-04 s/m^3 at the security owner controlled area fence, and the routine release χ/Q and D/Q values of 5.43E-05 s/m^3 and 5.43E-07 m^2, respectively, at the site boundary and locations of interest). If applicable, please also identify the meteorological data set used to generate these χ/Q and D/Q site parameter values. Please revise the FSAR as necessary.

b. Please explain where the annual average routine releases χ/Q site parameter value of 3.64E-04 s/m^3 for the security owner controlled area fence is used in any of the dispersion analyses presented in the FSAR.

c. If an atmospheric dispersion model, such as XOQDOQ, was executed to derive these χ/Q and D/Q site parameter values, please identify all the input parameters used, including:

1. The meteorological data set used to generate the χ/Q and D/Q values
2. All release points
3. For each release point, the distances to the security owner controlled fence, site boundary, and locations of interest
4. For each release point, the assumed vent velocity, vent inside diameter, vent height, adjacent building height, adjacent building minimum cross-sectional area, and vent heat emission rate

Information Request 2:

a. FSAR Tier 2, Section 11.3.3 states the input parameters for the calculation of the maximum individual dose at the exclusion area boundary are tabulated in FSAR Tier 2, Table 11.3-6, “GASPAR Code Input Parameter Values.” This table shows the distance to the bounding offsite dose location as 820 meters, whereas, FSAR Tier 2, Table 2.0-1 lists the minimum exclusion area boundary as the security owner controlled area fence, which is a distance of 400 feet (122 meters) according to FSAR Tier 2, Section 2.3.4. Please explain this apparent discrepancy in distances.

b. Please correct the units shown in FSAR Tier 2, Table 2.0-1, for the routine release χ/Q values at the site boundary and locations of interest from m/s^3 to s/m^3.

Information Request 3:

FSAR Tier 2, Table 2.0-1 provides some routine airborne effluent release point characteristics (i.e., source configuration information) for evaluating atmospheric dispersion and deposition for offsite receptors.

a. Table 2.0-1 identifies the release location as “any point on Reactor Building or Turbine Building Wall.” The tallest structure is the reactor building roof at approximately 24.69 meters. However, Table 2.0-1 also lists:

1. A release height of 37.0 meters

2. An adjacent building height of 0.0 meters

3. An adjacent building cross-sectional area of 0.01 square meters

Please explain what “any point on Reactor Building or Turbine Building Wall” means in relation to release location and height, and clarify the apparent discrepancies in the values shown above.

b. Please revise the FSAR, as necessary,with the release point characteristics for each release point for use by COL applicants in developing their own site-specific routine release χ/Q and D/Q site characteristic values. The revised release point characteristics to be provided should include the following:

1. The assumed vent velocity
2. Vent inside diameter
3. Vent height
4. Adjacent building height
5. Adjacent building minimum cross-sectional area
6. Vent heat emission rate

Information Request 4:

FSAR Tier 2, Section 2.3.5, states that the site boundary annual average χ/Q and D/Q values provided in FSAR Tier 2, Table 2.0-1 are used to calculate the site boundary release concentrations for comparison to the activity concentration limits in 10 CFR Part 20, as discussed in FSAR Tier 2, Section 11.3. FSAR Tier 2, Table 11.3-5 lists normal gaseous effluent releases from both the plant exhaust stack and the condenser air removal system.

Please explain why the same set of χ/Q values is used to model the releases from these two pathways, given the difference in release characteristics for these two pathways.