NuScaleDCRaisPEm Resource

From: Cranston, Gregory
Sent: Sunday, July 30, 2017 8:42 AM
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Cc: NuScaleDCRaisPEm Resource; Lee, Samuel; Chowdhury, Prosanta; Wang, George; Vera Amadiz, Marieliz; Samaddar, Sujit
Subject: Request for Additional Information No. 112, RAI 8983 (3.5.3)
Attachments: Request for Additional Information No. 112 (eRAI No. 8983).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.

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Licensing Branch 1 (NuScale)
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Office of New Reactors
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301-415-0546

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Request for Additional Information No. 112 (eRAI No. 8983)

Issue Date: 07/30/2017
Application Title: NuScale Standard Design Certification - 52-048
Operating Company: NuScale Power, LLC
Docket No. 52-048
Review Section: 03.05.03 - Barrier Design Procedures
Application Section: 3.5.3

QUESTIONS

03.05.03-1

10 CFR Part 50, Appendix A, GDC 2 requires, in part, that SSCs important to safety shall be designed to withstand the effects of natural phenomena such as tornadoes and hurricanes without loss of capability to perform their safety functions. Also, 10 CFR Part 50, Appendix A, GDC 4 requires, in part, that SSCs important to safety shall be appropriately protected against dynamic effects, including the effects of missiles, pipe whipping, and discharging fluids that may result from equipment failures and from events and conditions outside the nuclear power unit.

In DCD Section 3.5.3.1.1 "Concrete Barrier," DCD Table 3.5-1 lists the concrete thickness to preclude perforation or scabbing from the design basis hurricane and tornado pipe and sphere missiles, but this table does not include the massive high-kinetic-energy missile, such as an automobile, which is one of the missile threats to the barrier design. Therefore, the staff requests the applicant to include the design basis hurricane and tornado automobile missile in DCD Table 3.5-1.

03.05.03-2

10 CFR Part 50, Appendix A, GDC 2 requires, in part, that SSCs important to safety shall be designed to withstand the effects of natural phenomena such as tornadoes and hurricanes without loss of capability to perform their safety functions. Also, 10 CFR Part 50, Appendix A, GDC 4 requires, in part, that SSCs important to safety shall be appropriately protected against dynamic effects, including the effects of missiles, pipe whipping, and discharging fluids that may result from equipment failures and from events and conditions outside the nuclear power unit.

a. In DCD Section 3.5.3.1.2 "Steel Barriers," the applicant used the Stanford Formula and Ballistic Research Laboratory Formula to determine steel thickness for a steel barrier to prevent perforation of the missile through the barrier. Because 'penetration' and 'perforation' are both discussed in Section 3.5.3.1.2, the staff requests the applicant clarify the use of these terms throughout the section. For example, the sentence below the heading "Stanford Formula for Penetration" refers to the perforation of a steel plate. Similarly, under the heading "Ballistic Research laboratory Formula for Penetration," t_p is defined for perforation.
b. In DCD Section 3.5.3.1.2, the applicant showed the relationship between the critical kinetic energy required for perforation E and target plate thickness T in the Stanford Formulas, the staff requests the applicant to explain whether T is perforation thickness or designed plate thickness?
c. In DCD Section 3.5.3.1.1, the applicant described that concrete barrier thickness calculated using the equations in this section for perforation and scabbing are increased by 20%. The staff requests the applicant to provide how much calculated steel barrier thickness will be increased using the equations in DCD Section 3.5.3.1.2 for perforation.
d. In DCD Section 3.5.3.1.2, the staff identified apparent errors in the ranges provided for the Stanford Formula (e.g., "W/T" in the range "0.2<W/T<1.0" should be "W/L"; "70<V<400" shall be

changed into “70<V_c<400”, and V_c is not defined.) The staff requests the applicant to verify all the parameters in the formulas and ensure that all the parameters are defined.

03.05.03-3

10 CFR Part 50, Appendix A, GDC 2 requires, in part, that SSCs important to safety shall be designed to withstand the effects of natural phenomena such as tornadoes and hurricanes without loss of capability to perform their safety functions. Also, 10 CFR Part 50, Appendix A, GDC 4 requires, in part, that SSCs important to safety shall be appropriately protected against dynamic effects, including the effects of missiles, pipe whipping, and discharging fluids that may result from equipment failures and from events and conditions outside the nuclear power unit.

a. In DCD Section 3.5.3.2 “Overall Damage Prediction,” the applicant used an alternative approach to that specified in SRP Acceptance Criterion 3.5.3.II.2. Therefore, the staff requests the applicant to identify differences between proposed alternative approach and acceptable procedure specified in SRP Acceptance Criterion 3.5.3.II.2, and to provide justification how the proposed alternative provides an acceptable method of complying with the relevant NRC requirements.
b. In DCD Section 3.5.3.2, the staff did not find the analysis procedure to address the design basis sphere missile. The staff requests the applicant to address the design basis sphere missile in DCD Section 3.5.3.2.
c. In DCD Section 3.5.3.2, the applicant used AISC N690 2006 code in DCD Section 3.5.4 references. However, the applicant lists AISC N690 2012 as a referenced code in the DCD Section 3.8.4. The staff requests the applicant to clarify which code shall be used in the DCD.