NuScaleDCRaisPEm Resource

From:	Cranston, Greg
Sent:	Thursday, October 3, 2019 7:59 AM
To:	Request for Additional Information
Cc:	Lee, Samuel; Chowdhury, Prosanta; Karas, Rebecca; Nolan, Ryan; NuScaleDCRaisPEm Resource
Subject:	Request for Additional Information No. 526 eRAI No. 9719
Attachments:	Request for Additional Information No. 526 (eRAI No. 9719).pdf

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

Please submit your technically correct and complete response by October 23, 2019, to the RAI to the NRC Document Control Desk.

If you have any questions, please contact me.

Thank you.

Hearing Identifier: NuScale_SMR_DC_RAI_Public
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Request for Additional Information No. 526 (eRAI No. 9719)

Issue Date: 10/03/2019
Application Title: NuScale Standard Design Certification - 52-048
Operating Company: NuScale Power, LLC
Docket No. 52-048
Review Section: 06.03 - Emergency Core Cooling System
Application Section: 6.3, and 14.2

QUESTIONS

06.03-8

Title 10 of the *Code of Federal Regulations* (10 CFR) Section 52.47, "Contents of applications; technical information," requires that an application for a design certification must include performance requirements and design information sufficiently detailed to permit its acceptance by the U.S. Nuclear Regulatory Commission (NRC). Specifically, §52.47(a)(2)(iii), states, in part, that the NRC will take into consideration the following reactor design characteristics that include, "the extent to which the reactor incorporates unique, unusual or enhanced safety features having a significant bearing on the probability or consequences of accidental release of radioactive materials."

10 CFR 50, Appendix A, GDC 37 requires, in part, the emergency core cooling system to be designed to permit appropriate functional testing to assure "the operability of the system as a whole and, under conditions as close to design as practical, the performance of the full operational sequence that brings the system into operation, including operation of applicable portions of the protection system."

The staff is seeking an as-built performance test of the ECCS to demonstrate the system meets fundamental design requirements of the safety analysis. The integrated functionality of a full scale NuScale ECCS system has not been tested and demonstrated. Although the staff has confidence that NuScale analytical codes have been adequately validated within the existing state of practice, performance of the full scale, as-built ECCS system can be impacted by the geometry and functional arrangement of key components, variations in as-built parameters, and uncertainties associated with complex thermal hydraulic phenomena, especially when considering the integrated system. Functional testing of the full scale ECCS would provide assurance that the as-built system response conforms to analytical predictions.

To date the staff held approximately eleven public meetings where the adequacy of the proposed ECCS performance test (Test #47) was at least one of the topics discussed. The most recent meeting was held on September 11, 2019. Currently, NuScale DCA Part 2, Tier 2, Table 14.2-47, Revision 3 identifies the acceptance criteria for ECCS Test #47 as:

i. RPV riser level remains above the top of the core

ii. CNV pressure remains below design pressure identified in Table 6.2-1

iii. CNV temperature remains below design temperature identified in Table 6.2-1

The proposed acceptance criteria above are not sufficient to demonstrate the as-built performance capability of the ECCS to satisfy design requirements because the stored energy during test conditions is significantly less than the full power stored energy corresponding to the proposed test acceptance criteria (accident acceptance criteria). Therefore, the applicant is requested to modify an existing ECCS test or develop a new test to demonstrate acceptable performance of the as-built ECCS, based on predicted system response under expected test conditions, to ensure the system as a whole meets fundamental design requirements of the safety analysis.

Given the fundamental purpose of this type of test – to confirm the performance of a first-of-a-kind safety system and verify the conservatism in the safety analyses in calculating the performance of a novel design feature – and expected standardization of the NuScale power module design and construction, the requested test is an appropriate candidate for a first-of-a-kind test to be performed for at least the first module only.