NuScaleDCRaisPEm Resource

From:	Cranston, Gregory
Sent:	Saturday, August 05, 2017 12:08 PM
To:	RAI@nuscalepower.com
Cc:	NuScaleDCRaisPEm Resource; Lee, Samuel; Chowdhury, Prosanta; Karas, Rebecca; Thurston, Carl; Franovich, Rani
Subject:	Request for Additional Information No. 139, RAI 8833 (09.01.05)
Attachments:	Request for Additional Information No. 139 (eRAI No. 8833).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

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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
"Karas, Rebecca" <Rebecca.Karas@nrc.gov>
Tracking Status: None
"Thurston, Carl" <Carl.Thurston@nrc.gov>
Tracking Status: None
"Franovich, Rani" <Rani.Franovich@nrc.gov>
Tracking Status: None
"RAI@nuscalepower.com" <RAI@nuscalepower.com>
Tracking Status: None

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Request for Additional Information No. 139 (eRAI No. 8833)

Issue Date: 08/05/2017
Application Title: NuScale Standard Design Certification - 52-048
Operating Company: NuScale Power, LLC
Docket No. 52-048
Review Section: 09.01.05 - Overhead Heavy Load Handling Systems
Application Section: DCD Tier 2 Section 9.1.5

QUESTIONS

09.01.05-1

10 CFR 52.47(a)(2) requires that a standard design certification applicant provide a description and analysis of the structures, systems, and components (SSCs) of the facility, with emphasis upon performance requirements, the bases, with technical justification therefor, upon which these requirements have been established, and the evaluations required to show that safety functions will be accomplished.

NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants," and SRP 9.1.5 Part III.4 provide guidance for ensuring each heavy load handling equipment is designed to be highly reliable or demonstrated by analysis that the potential consequence of a dropped load is acceptably low.

FSAR Tier 2, Subsection 9.1.5.2.2, "Component Descriptions," states, in part, " … Slings that are used to handle heavy loads in the vicinity of the NPMs or the SFP are designed in accordance with the requirements of ASME B30.9. Slings having a load rating of twice that required for non-critical loads or dual or redundant slings are used for handling critical loads. Slings are constructed of metallic material such as chain or wire rope … "

The applicant is requested to identify where and when slings are used for heavy load handling.

09.01.05-2

10 CFR 52.47(a)(2) requires that a standard design certification applicant provide a description and analysis of the structures, systems, and components (SSCs) of the facility, with emphasis upon performance requirements, the bases, with technical justification therefor, upon which these requirements have been established, and the evaluations required to show that safety functions will be accomplished.

10 CFR 52.47(c)(2) requires that a standard design certification of "a nuclear power reactor design that … uses simplified, inherent, passive, or other innovative means to accomplish its safety functions must provide an essentially complete nuclear power reactor design except for site-specific elements such as the service water intake structure and the ultimate heat sink, and must meet the requirements of 10 CFR 50.43(e)."

FSAR Tier 2, Subsection 9.1.5.2.3, "System Operation," states, in part, " … Traveling wall-mounted jib cranes are provided along the walls above the NPM bay areas to support refueling operations. The jib cranes are used to lift spool pieces when disconnecting and connecting the NPM. The cranes are also used to lift any heavy tooling or equipment required to support the disconnection and connection of the NPM to the NPM platform, including removal and installation of the RXM insulation. These jib cranes are ASME NUM-I, Type II cranes with single-failure-proof underhung hoists and Seismic Category II … "

The staff finds the above description incomplete in that the rated capacity of the hoist and the weight of the associated loads are not provided to allow a complete assessment by the staff of the adequacy of the crane design.

The applicant is requested to provide the weight of any lifted load of more than 900 lbs and include the rated capacity for these wall-mounted jib cranes in the FSAR, preferably in FSAR Tier 2, Table 9.1.5-1.

09.01.05-3

10 CFR 52.47(a)(2) requires that a standard design certification applicant provide a description and analysis of the structures, systems, and components (SSCs) of the facility, with emphasis upon performance requirements, the bases, with technical justification therefor, upon which these requirements have been established, and the evaluations required to show that safety functions will be accomplished.

FSAR Tier 2, Subsection 9.1.5.2.3, "System Operation," states, in part, " … The RBC [reactor building crane] is capable of lifting and transporting a loaded spent fuel cask. The weight of a loaded cask is bounded by the weight of the NPM [NuScale power module]. The wet hoist is used with the RBC to lift the spent fuel cask and transport it to and from the cask loading area in the refueling pool … "

The staff finds the above bounding statement is not sufficient to support the adequacy of the wet hoist design because the main hoist (with rated capacity of 850 tons) is used for the NPM, while the wet hoist (with rated capacity of only 250 tons) is used for the loaded cask.

The applicant is requested to include the weight information for a loaded spent fuel cask or justify such omission from the FSAR.

09.01.05-4

10 CFR 52.47(a)(2) requires that a standard design certification applicant provide a description and analysis of the structures, systems, and components (SSCs) of the facility, with emphasis upon performance requirements, the bases, with technical justification therefor, upon which these requirements have been established, and the evaluations required to show that safety functions will be accomplished.

10 CFR 52.47(c)(2) requires that a standard design certification of "a nuclear power reactor design that … uses simplified, inherent, passive, or other innovative means to accomplish its safety functions must provide an essentially complete nuclear power reactor design except for site-specific elements such as the service water intake structure and the ultimate heat sink, and must meet the requirements of 10 CFR 50.43(e)."

FSAR Tier 2, Subsection 9.1.5.3, "Safety Evaluation," states, in part, " … The load path analysis includes transfer speeds, weights, and dimensions of anticipated loads and the geometric arrangement relative to other plant features. The RBC load path analysis provides safe load handling during normal operations and off-normal conditions in which loads are placed in safe and stable conditions. Design and code requirements are identified to demonstrate the load path analysis is adequate for the components. Physical limits and administrative controls are included to ensure safe handling of critical loads. Thus, the design of the OHLHS, in conjunction with safe load paths and heavy load exclusion zones, allows for moving an NPM or other equipment without impacting the operation of the other NPMs, including safe shutdown and cooldown … "

The staff noted that a safe load path for handling of a loaded spent fuel cask was not clearly defined in FSAR Tier 2, Section 9.1.5.

The applicant is requested to revise the FSAR to include discussion of a safe load path for handling a loaded spent fuel cask, or justify such omission from the FSAR.

09.01.05-5

10 CFR 52.47(a)(2) requires that a standard design certification applicant provide a description and analysis of the structures, systems, and components (SSCs) of the facility, with emphasis upon performance requirements, the bases, with technical justification therefor, upon which these requirements have been established, and the evaluations required to show that safety functions will be accomplished.

10 CFR 52.47(c)(2) requires that a standard design certification of "a nuclear power reactor design that … uses simplified, inherent, passive, or other innovative means to accomplish its safety functions must provide an essentially complete nuclear power reactor design except for site-specific elements such as the service water intake structure and the ultimate heat sink, and must meet the requirements of 10 CFR 50.43(e)."

NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants," and SRP Part 9.1.5.III.4 provide guidance for ensuring each heavy load handling equipment is designed to be highly reliable or demonstrated by analysis that the potential consequence of a dropped load is acceptably low.

FSAR Tier 2, Subsection 9.1.5.2.2, "Component Descriptions," states, in part, " … Special lifting devices for critical and non-critical loads are designed to meet the applicable requirements of ANSI N14.6. The load rating is based on the combined maximum static and dynamics loads that can be imparted to the [lifting device]. Compliance with this requirement ensures that lifting devices that are used to handle heavy loads in the vicinity of the NPMs or the SFP are designed with stress factors that provide required margin to support operation."

It is unclear to the staff if any special lifting device other than the module lifting adapter, is used for heavy load handling (e.g., transporting a loaded spent fuel cask).

The applicant is requested to identify and describe in details, including applicable loads, any special lifting device other than the module lifting adapter for handling heavy loads.

09.01.05-6

10 CFR 52.47(a)(2) requires that a standard design certification applicant provide a description and analysis of the structures, systems, and components (SSCs) of the facility, with emphasis upon performance requirements, the bases, with technical justification therefor, upon which these requirements have been established, and the evaluations required to show that safety functions will be accomplished.

SRP 9.1.5 and NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants," provide guidance for ensuring safe operation of heavy load handling equipment.

FSAR Tier 2, Subsection 9.1.5.3, "Safety Evaluation," states, in part, " … Operator training, handling, handling system design, load handling instructions, and equipment inspection provide reasonable assurance of a reliable operation of the handling system … "

Further, the applicant includes combined operating license (COL) Item 9.1-7 which states as follows:

> "The COL applicant that references the NuScale Power Plant design certification will provide a description of the program governing heavy loads handling. The program should address:
> • operating and maintenance procedures

- inspection and test plans
- personnel qualification and operator training"

The staff noted that the above COL Item descrption does not include several key elements for a safe heavy load handling program as outlined in Section 5.1.1 of NUREG-0612 regarding safe load paths and specific reference to ASME B30.2 Standard as guidance for establishing a safe heavy load handling program.

The applicant is requested to consider guidance in Section 5.1.1 of NUREG-0612 for programmatic controls governing heavy load handling as part of COL Item 9.1-7 description or, otherwise, clearly justify the different approach taken in the proposed COL Item.