



March 14, 2019

Docket No. 52-048

U.S. Nuclear Regulatory Commission
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SUBJECT: NuScale Power, LLC Supplemental Response to NRC Request for Additional Information No. 98 (eRAI No. 8894) on the NuScale Design Certification Application

REFERENCES: 1. U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 98 (eRAI No. 8894)," dated July 21, 2017
2. NuScale Power, LLC Response to NRC "Request for Additional Information No. 98 (eRAI No.8894)," dated September 19, 2017

The purpose of this letter is to provide the NuScale Power, LLC (NuScale) supplemental response to the referenced NRC Request for Additional Information (RAI).

The Enclosure to this letter contains NuScale's supplemental response to the following RAI Question from NRC eRAI No. 8894:

- 03.11-15

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 Carrie Fosaaen at 541-452-7126 or at cfosaaen@nuscalepower.com.

Sincerely,

Zackary W. Rad
Director, Regulatory Affairs
NuScale Power, LLC

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Enclosure 1: NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 8894



Enclosure 1:

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 8894

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

eRAI No.: 8894

Date of RAI Issue: 07/21/2017

NRC Question No.: 03.11-15

In FSAR Part 2, Tier 1, Section 2.8, “Equipment Qualification,” and Section 3.14, “Environmental Qualification – Common Equipment,” provide ITAACs for qualification of Class 1E electrical equipment located in harsh environment. FSAR Part 2, Tier 1, Section 2.8.1 and 3.14.1 state that the electrical equipment identified in 10 CFR 50.49 are subject to equipment qualification.

10 CFR 52.47(a)(13) requires that the applicant of a standard design certifications to provide the list of electric equipment important to safety that is required by 10 CFR 50.49(d). The applicant or licensee shall prepare a list of electric equipment important to safety covered by 10 CFR 50.49. Equipment important to safety includes, safety-related equipment, nonsafety-related electric equipment whose failure under postulated environmental conditions could prevent satisfactory accomplishment of safety functions, and certain post-accident monitoring equipment. In FSAR Tier 1, ITAAC No. 2 of Table 3.14-2 and ITAAC No. 2 of Table 2.8-2 are described below

No.	Design Commitment	Inspection, Test, Analyses	Acceptance Criteria
2.	The Class 1E electrical equipment located in a harsh environment, including its connection assemblies, withstands the design basis harsh environmental conditions experienced during normal operations, AOOs,	<ul style="list-style-type: none"> i. A type test or a combination of type test and analysis will be performed of the Class 1E electrical equipment, including its connection assemblies. ii. An inspection will be performed of the Class 1E 	<ul style="list-style-type: none"> i. An EQ record form exists and concludes that the Class 1E electrical equipment listed in Table 2.8-1, including its connection assemblies, performs its function under the environmental conditions specified in the EQ record form for the period of time required

	DBAs, and post- accident conditions and performs its function for the period of time required to complete the function.	as-built electrical equipment, including its connection assemblies.	to complete the function. ii. The Class 1E electrical equipment listed in Table 2.8-1, including its connection assemblies, is installed in its design location in a configuration bounded by the EQ record form.
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Question:

The staff finds that this ITAAC # 2 only covers safety related equipment (Class 1E) and does not include nonsafety-related electric equipment that could prevent satisfactory accomplishment of safety functions and post-accident monitoring equipment. Based on the information contained in the ITAAC, the staff requests the applicant to provide how the environmental qualification of any equipment important to safety such as nonsafety-related electric equipment and post-accident monitoring equipment, is addressed in ITAACs mentioned above.

NuScale Response:

NRC Question a:

The staff reviewed NuScale DCA Rev. 2 and determined that in response to RAI 9134, Question 14.03.03-7, the applicant deleted the sentence “The electrical equipment identified in 10 CFR 50.49 as electric equipment are subject to EQ.” from DCA Part 2 Tier 1, Section 2.8.1 and Section 3.14.1 to clarify that these sections are associated with equipment qualification and not solely environmental qualification. By removing the reference to 10 CFR 50.49, how does the applicant verify mechanical and electrical equipment that are subject to 10 CFR 50.49 are environmentally qualified and that the ITAAC meets the requirement of 10 CFR 52.47(a) (13)?

NuScale Response to Question a:

10 CFR 50.49 requires a program to be established for qualifying the electric equipment identified using the criteria of 50.49 paragraph (b). A list of electrical equipment identified per 50.49(b) criteria will be included in the Environmental Qualification Program. This list, not ITAAC, satisfies compliance with 10 CFR 52.47(a)(13). Tier 2 Section 3.11 describes the methodology for Environmental Qualification (EQ) of equipment and identifies the equipment



that is within the scope of 10 CFR 50.49 in Table 3.11-1. Additionally, the Environmental Qualification Program is addressed via the following COL Items:

- COL Item 3.11-1: A COL applicant that references the NuScale Power Plant design certification will submit a full description of the environmental qualification program and milestones and completion dates for program implementation.
- COL Item 3.11-2: A COL applicant that references the NuScale Power Plant design certification will develop the equipment qualification database and ensure equipment qualification record files are created for the structures, systems, and components that require environmental qualification.

NRC Question b:

The staff reviewed DCA Part 2 Tier 2, Table 3.11-1, “List of Environmentally Qualified Electrical/I&C and Mechanical Equipment Located in Harsh Environments,” to verify if the list includes safety-related equipment, non-safety related electrical or post-accident monitoring instruments. The staff reviewed the list and identified safety-related equipment and post-accident monitoring instruments are contained in the table.

DCA Tier 1, ITAAC No. 2 of Table 2.8-2, only verifies safety-related equipment are qualified and does not include post-accident monitoring equipment. Please provide clarity on how equipment subject to the requirements of 10 CFR 50.49 in Tier 2, Table 3.11-1 will be verified to meet the requirements of 10 CFR 52.47(b)(1) and 10 CFR 52.47(a)(13).

NuScale Response to Question b:

As discussed in the NuScale Question a response, a list of electrical equipment identified per 50.49(b) criteria will be included in the Environmental Qualification Program. This list, not ITAAC, satisfies compliance with 10 CFR 52.47(a)(13). However, of the more than 100 line items in Tier 2 Table 3.11-1 associated with post-accident monitoring (PAM), all but 15 are found in Tier 1 Tables 2.8-1 and 3.14-1, and are subject to environmental qualification ITAAC 02.08.02 (module-specific equipment) or 03.14.02 (shared equipment) as follows:

- The Design Commitment for ITAAC 02.08.02 states:
The module-specific electrical equipment located in a harsh environment, including associated connection assemblies, withstand the design basis harsh environmental conditions experienced during normal operations, AOOs, DBAs, and post-accident conditions and performs its function for the period of time required to complete the function. The scope of equipment for this design commitment is module-specific, Class 1E equipment

located within a harsh environment, and module-specific, nonsafety-related equipment with an augmented equipment qualification design requirement located within the boundaries of the NuScale Power Module.

- The Design Commitment for ITAAC 03.14.02 states:
The common electrical equipment located in a harsh environment, including its connection assemblies, withstands the design basis harsh environmental conditions experienced during normal operations, anticipated operational occurrences, DBA, and post-accident conditions and performs its function for the period of time required to complete the function. The scope of equipment for this design commitment is nonsafety-related equipment that provides monitoring of the UHS water level and the non-safety -related electrical equipment on the fuel handling machine and reactor building crane used to physically support irradiated fuel.

These components were selected to be verified by ITAAC, not because they are associated with PAM, but rather because they met one or more of the selection criteria identified in Tier 1 Sections 2.8.1 and 3.14. Because 10 CFR 52.47(b)(1) requires a DC application contain a set of ITAAC that are “sufficient to provide reasonable assurance,” the verification of environmental qualification through ITAAC does not include all equipment in the Environmental Qualification program, but rather a subset of that equipment which meet the selection criteria. The criteria for selecting equipment for which ITAAC is used to verify the *equipment* qualification Design Commitments consists of the following:

Module-Specific Equipment

- Safety-related electrical, mechanical, and digital I&C equipment
- Nonsafety-related mechanical and electrical equipment located within the boundaries of the NuScale Power Module that has an augmented Seismic Category I or environmental qualification design requirement
- Nonsafety-related mechanical and electrical equipment that performs a credited function in Chapter 15 analyses (secondary main steam isolation valves (MSIV), feedwater regulating valves (FWRV) and secondary feedwater check valves)

Shared Equipment

- RPV support stand (the only common, safety-related equipment)
- Nonsafety-related equipment that has augmented Seismic Category I or environmental qualification requirements, and provides one of the following nonsafety-related functions:
 - Provides physical support of irradiated fuel (fuel handling machine, spent fuel storage racks, reactor building crane, and module lifting adapter)
 - Provides a path for makeup water to the UHS

- Provides containment of the UHS water
- Monitors UHS water level

It is important to note that for both module-specific and shared equipment, categorization of equipment as PAM Type-A was also included in the selection criteria. However, because the NuScale design does not contain any PAM Type-A variables, this criterion was not listed to avoid confusion.

These selection criteria were developed using the methodology described in Tier 2 Section 14.3. The following list provides summary statements of important concepts of that methodology used during the development of the selection criteria:

- Not all design features are included in the design descriptions. Only the top-level design features are contained in the appropriate design description and verified by ITAAC.
- The selection of the top-level design features for Tier 1 is based on the safety significance of SSC, their importance in various safety analyses, and their functions for defense-in-depth considerations.
 - Tier 1 contains the top-level design features that were developed based upon results of the following plant safety analyses:
 - transient and accident analyses
 - internal and external hazards analyses
 - radiological analyses
 - risk-significant design features as determined by the results of a PRA
 - design features necessary or important to severe accident mitigation
 - fire protection
 - The top-level design features contained in Tier 1 design descriptions are:
 - reactor coolant pressure boundary
 - containment pressure boundary
 - Seismic Category I Reactor Building (RXB) and Control Building (CRB)
 - Radwaste Category RW-IIa Radioactive Waste Building (RWB)
 - control room envelope (CRE)
 - safety-related equipment qualification
 - safety-related component performance
 - SSC providing protection of safety-related components
 - safety-related protection system (reactor trip and engineered safety features actuation systems (ESFAS))
 - components providing radiation protection for personnel and safety-related equipment

- new and spent fuel storage
- security system physical components
- The ITAAC are an important part of the NRC construction verification program, but do not verify every design and construction feature included in the certified design. The ITAAC are not meant to be a one-for-one check of detailed design and construction features that are verified by the normal construction quality programs.

Because there are no operator actions required to maintain the plant in safe shutdown for Chapter 15 or Chapter 20 analyses, the nonsafety-related function of providing information for post-accident monitoring is not a top-level design feature, and was not used as criterion for selecting equipment subject to equipment qualification ITAAC. However, as noted earlier, the majority of the equipment identified in Tier 2 Table 3.11-1 is subject to environmental qualification verification through ITAAC. When considering all of the table entries, and not just those associated with PAM, more than 75 percent are included in Tier 1 Tables 2.8-1 and 3.14-1.

NRC Question c:

In response to RAI 8894, Question 03.11-15, the applicant states NuScale's design does not require the use of non-safety related electric equipment to accomplish any safety functions. However, in DCA Tier 1, ITAAC No. 2 of Table 2.8-2, the applicant refers to nonsafety-related equipment with an augmented equipment qualification design requirement in the design commitment.

Please clarify whether NuScale has nonsafety-related electric equipment affecting safety functions that is required to be qualified per 10 CFR 50.49. If so, please identify which equipment are nonsafety-related and how this equipment will be verified to meet the requirements of 10 CFR 52.47(b)(1) and 10 CFR 52.47(a)(13). Additionally, please clarify what is "augmented equipment qualification design requirement," as stated in the ITAAC.

NuScale Response to Question c:

The NuScale design does not include nonsafety-related electric equipment affecting safety functions that is required to be qualified per 10 CFR 50.49.

Augmented equipment qualification design requirements are those requirements specified for those SSCs that are by definition nonsafety-related as defined in 10 CFR 50.2. The selection of augmented requirements is based on a consideration of the important functionality to be



performed by the nonsafety-related SSC and regulatory guidance applicable to the functionality. The augmented design requirements, if applicable, are identified in Tier 2 Table 3.2-1.

NRC Question d:

The staff identified several electrical and mechanical equipment in DCA Part 2 Tier 2, Table 3.11-1 was removed from DCA Part 2 Tier 1, Table 2.8-1, “Module Specific Mechanical and Electrical/I&C Equipment,” and DCA Part 2 Tier 1, Table 13.4-1, “Mechanical and Electrical/Instrumentation and Controls Shared Equipment.” Please clarify why there are discrepancies between Tier 1, Table 2.8-1 and Table 13.4-1 and Tier 2, Table 3.11-1.

NuScale Response to Question d:

Tier 2 Table 3.11-1 and Tier 1 Tables 2.8-1 and 13.4-1 provide different information, and are not intended to be duplicate. Table 3.11-1 provides a list of environmentally qualified equipment located in harsh environments, while the Tier 1 tables provide lists of equipment which has its equipment qualification Design Commitments verified via ITAAC. As described in the NuScale Part b. response, the selection criteria for the equipment contained in the Tier 1 tables includes environmental qualification considerations in addition to others. As a result, a subset of the equipment listed in the Tier 2 table was selected to have its environmental qualifications verified through ITAAC. That equipment which did not satisfy the ITAAC selection criteria identified in the System Descriptions of Tier 1 Sections 2.8.1 and 3.14.1 was excluded.

Impact on DCA:

There are no impacts to the DCA as a result of this response.