April 4, 2019 Docket No. 52-048

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

SUBJECT: NuScale Power, LLC Submittal of Changes to Final Safety Analysis Report, Tier 1 Section 2.1 "NuScale Power Module," Tier 1 Section 3.6 "Ultimate Heat Sink," and Tier 2 Section 14.3 "Certified Design Material and Inspections, Tests, Analyses, and Acceptance Criteria"

REFERENCES: Letter from NuScale Power, LLC to Nuclear Regulatory Commission, "NuScale Power, LLC Submittal of the NuScale Standard Plant Design Certification Application, Revision 2," dated October 30, 2018 (ML18311A006)

Letter from NuScale Power, LLC to Nuclear Regulatory Commission, "NuScale Power, LLC Submittal of Changes to Final Safety Analysis Report, Section 14.2, "Initial Plant Test Program" and Section 14.3, "Certified Design Material and Insoections, Test, Analyses, and Acceptance Criteria," dated February 5, 2019 (ML19036A969)

During several public teleconferences with various NRC Staff, NuScale Power, LLC (NuScale) discussed potential updates to Final Safety Analysis Report (FSAR), Tier 1 Section 2.1 "NuScale Power Module," Tier 1 Section 3.6 "Ultimate Heat Sink," and Tier 2 Section 14.3 "Certified Design Material and Inspections, Tests, Analyses, and Acceptance Criteria." As a result of this discussion, NuScale changed Tier 1 Sections 2.1 and 3.6 and Tier 2 Section 14.3. The Enclosure to this letter provides a mark-up of the FSAR pages incorporating revisions to Tier 1 Sections 2.1 and 3.6 and Tier 2 Section 14.3, in redline/strikeout format. NuScale will include this change as part of a future revision to the NuScale Design Certification Application.

This letter makes no regulatory commitments or revisions to any existing regulatory commitments.

If you have any questions, please feel free to contact Carrie Fosaaen at 541-452-7126 or at cfosaaen@nuscalepower.com.

Sincerely,

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

Distribution: Samuel Lee, NRC, OWFN-8G9A
Gregory Cranston, NRC, OWFN-8G9A
Cayetano Santos, NRC, OWFN-8H12

Enclosure: “Changes to NuScale Final Safety Analysis Report Tier 1 Section 2.1 ‘NuScale Power Module,’ Tier 1 Section 3.6 ‘Ultimate Heat Sink,’ and Tier 2 Section 14.3 ‘Certified Design Material and Inspections, Tests, Analyses, and Acceptance Criteria’”

Enclosure:

"Changes to NuScale Final Safety Analysis Report Tier 1 Section 2.1 'NuScale Power Module,' Tier 1 Section 3.6 'Ultimate Heat Sink,' and Tier 2 Section 14.3 'Certified Design Material and Inspections, Tests, Analyses, and Acceptance Criteria'"

NuScale Power, LLC
1100 NE Circle Blvd., Suite 200 Corvallis, Oregon 97330 Office 541.360-0500 Fax 541.207.3928
www.nuscalepower.com

- The RPV beltline material has a Charpy upper-shelf energy of 75 ft-lb minimum.
- The CNV serves as an essentially leak-tight barrier against the uncontrolled release of radioactivity to the environment.
- The CIV closure times limit potential releases of radioactivity.
- The length of piping shall be minimized between the containment penetration and the associated outboard CIVs.

RAI 08.01-1S1

- The CNTS containment electrical penetration assemblies are sized to power their design loads.
- ~~Physical separation exists between the redundant divisions of the MPS Class 1E instrumentation and control current-carrying circuits, and between Class 1E instrumentation and control current-carrying circuits and non-Class 1E instrumentation and current-carrying circuits. The scope of this commitment includes the cables from the NPM disconnect box to the instrument.~~
- The RPV is provided with surveillance capsule holders to hold a capsule containing RPV material surveillance specimens.
- The CNTS safety-related valves change position under design differential pressure.
- The ECCS safety-related valves change position under design differential pressure.
- The DHRS safety-related valves change position under design differential pressure.
- The CNTS safety-related hydraulic-operated valves fail to their safety-related position on loss of electrical power under design differential pressure.
- The ECCS safety-related RRVs and RVVs fail to their safety-related position on loss of electrical power to their corresponding trip valves under design differential pressure.
- The DHRS safety-related hydraulic-operated valves fail to their safety-related position on loss of electrical power under design differential pressure.
- The CNTS safety-related check valves change position under design differential pressure and flow.

RAI 08.01-1S1, RAI 08.01-2

- A CNTS containment electrical penetration assembly is rated to withstand fault currents for the time required to clear the fault from its power source, or a CNTS containment electrical penetration assembly is rated to withstand the maximum fault current for its circuits without a circuit interrupting device.

RAI 14.03.07-1

- The NPM lifting fixture is capable of supporting its rated load.

RAI 14.03.07-1

- The NPM lifting fixture is constructed to provide assurance that a single failure does not result in the uncontrolled movement of the lifted load.

2.1.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.1-4 contains the inspections, tests, and analyses for the NPM.

Table 2.1-4: NuScale Power Module Inspections, Tests, Analyses, and Acceptance Criteria (Continued)

No.	Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
9.	The length of piping shall be minimized between the containment penetration and the associated outboard CIVs.	An inspection will be performed of the as-built piping between containment penetrations and associated outboard CIVs.	The length of piping between each containment penetration and its associated outboard CIV is less than or equal to the length identified in Table 2.1-1.
10.	The CNTS containment electrical penetration assemblies are sized to power their design loads.	i. An analysis will be performed of the CNTS as-designed containment electrical penetration assemblies. ii. An inspection will be performed of CNTS as-built containment electrical penetration assembly.	i. An electrical rating report exists that defines and identifies the required design electrical rating to power the design loads of each CNTS containment electrical penetration assembly listed in Table 2.1-3. ii. The electrical rating of each CNTS containment electrical penetration assembly listed in Table 2.1-3 is greater than or equal to the required design electrical rating as specified in the electrical rating report.
11.	~~Physical separation exists between the redundant divisions of the MPS Class 1E instrumentation and control current-carrying circuits, and between Class 1E instrumentation and control current-carrying circuits and non-Class 1E instrumentation and current-carrying circuits. The scope of this commitment includes the cables from the NPM disconnect box to the instrument~~Not used.	~~An inspection will be performed of the MPS Class 1E as-built instrumentation and control current-carrying circuits~~Not used.	~~i. Physical separation between redundant divisions of MPS Class 1E instrumentation and control current-carrying circuits is provided by a minimum separation distance, or by barriers (where the minimum separation distances cannot be maintained), or by a combination of separation distance and barriers.~~ ~~ii. Physical separation between MPS Class 1E instrumentation and control current-carrying circuits and non-Class 1E instrumentation and control current-carrying circuits is provided by a minimum separation distance, or by barriers (where the minimum separation distances cannot be maintained), or by a combination of separation distance and barriers~~Not used.
12.	The RPV is provided with surveillance capsule holders to hold a capsule containing RPV material surveillance specimens.	An inspection will be performed of the as-built RPV surveillance capsule holders.	Four surveillance capsule holders are installed in the RPV beltline region at approximately 90 degree intervals.
13.	The remotely-operated CNTS containment isolation valves change position under design-basis temperature, differential pressure, and flow conditions.	A test will be performed of the CNTS safety-related valves under preoperational temperature, differential pressure, and flow conditions.	Each remotely-operated CNTS containment isolation valve listed in Table 2.1-2 strokes fully open and fully closed by remote operation under preoperational temperature, differential pressure, and flow conditions.

Design Commitments

- The UHS American Society of Mechanical Engineers (ASME) Code Class 3 piping system listed in Table 3.6-1 complies with ASME Code Section III requirements.
- The UHS Code Class 3 components conform to the rules of construction of ASME Code Section III.
- The spent fuel pool, refueling pool, reactor pool, and dry dock piping and connections are located to prevent the drain down of the SFP water level below the minimum safety water level.

3.6.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 3.6-2 contains the inspections, tests, and analyses for the UHS.

Table 3.6-1: Ultimate Heat Sink Piping System and Mechanical Equipment

Piping System Description		ASME Code Section III Class
Make-up line from the exterior of the RXB to the SFP.		3
Mechanical Equipment		
Equipment Name	Equipment Identifier	ASME Code Section III Class
UHS make-up line isolation valve	HV-0001	3

Table 3.6-2: Ultimate Heat Sink Piping System Inspections, Tests, Analyses, and Acceptance Criteria

No.	Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1	The ultimate heat sink ASME Code Class 3 piping system listed in Table 3.6-1 complies with ASME Code Section III requirements.	An inspection will be performed of the ultimate heat sink ASME Code Class 3 as-built piping system Design Report required by ASME Code Section III.	The ASME Code Section III Design Report (NCA-3550) exists and concludes that the ultimate heat sink ASME Code Class 3 as-built piping system meets the requirements of ASME Code Section III.
2	The UHS Code Class 3 components conform to the rules of construction of ASME Code Section III.	An inspection will be performed of the UHS ASME Code Class 3 as-built component Data Report required by ASME Code Section III.	ASME Code Section III Data Report for the UHS ASME Code Class 3 component listed in Table 3.6-1 and interconnecting piping exists and concludes that the requirements of ASME Code Section III are met.
~~2~~3	The spent fuel pool, refueling pool, reactor pool, and dry dock piping and connections are located to prevent the drain down of the SFP and reactor pool water level below the minimum safety water level.	An inspection will be performed of the as-built SFP, RFP, reactor pool and dry dock piping and connections.	There are no gates, openings, drains, or piping within the SFP, RFP, reactor pool, and dry dock that are below 80 ft building elevation (55 ft pool level) as measured from the bottom of the SFP and reactor pool.

Table 14.3-1: Module-Specific Structures, Systems, and Components Based Design Features and Inspections, Tests, Analyses, and Acceptance Criteria Cross Reference(1) (Continued)

ITAAC No.	System	Discussion	DBA	Internal/External Hazard	Radiological	PRA & Severe Accident	FP
02.01.11	~~NPM~~	~~Sections 7.1.2, Independence, discusses the independence of the MPS Class 1E instrumentation and control current-carrying circuits per the guidance of RG 1.75, which endorses Institute of Electrical and Electronics Engineers (IEEE) Std. 384-1992. Physical separation is provided to maintain the independence of Class 1E I&C current-carrying circuits so that the safety functions required during and following any design basis event can be accomplished. Minimum separation distance (as defined in IEEE Std. 384-1992), or barriers or any combination thereof may achieve physical separation as specified in IEEE Std. 384-1992.~~ ~~Separate ITAAC inspections are performed to verify the independence provided by physical separation and the independence provided by electrical isolation. This ITAAC verifies the independence of Class 1E current-carrying circuits by physical separation. The scope of this commitment includes the cables from the NPM disconnect box to the instrument. An ITAAC inspection is performed of physical separation of the MPS Class 1E current-carrying circuits. The physical separation ITAAC inspection results verify that the following physical separation criteria are met:~~ ~~i. Physical separation between redundant divisions of the MPS Class 1E I&C current-carrying circuits is provided by a minimum separation distance, or by barriers (where the minimum separation distances cannot be maintained), or by a combination of separation distance and barriers; and such physical separation satisfies the criteria of RG 1.75. The configuration of each as-built barrier agrees with its associated as-built drawing.~~ ~~ii. Physical separation between the MPS Class 1E I&C current-carrying circuits and non-Class 1E I&C current-carrying circuits is provided by a minimum separation distance, or by barriers (where the minimum separation distances cannot be maintained), or by a combination of separation distance and barriers; and such physical separation satisfies the criteria of RG 1.75. The configuration of each as-built barrier agrees with its associated as-built drawing~~Not used.	~~X~~				

Table 14.3-1: Module-Specific Structures, Systems, and Components Based Design Features and Inspections, Tests, Analyses, and Acceptance Criteria Cross Reference[(1)] (Continued)

ITAAC No.	System	Discussion	DBA	Internal/External Hazard	Radiological	PRA & Severe Accident	FP
02.01.21	NPM	The CNTS safety-related check valves are tested to demonstrate the capability to perform their function to transfer open and transfer closed (under forward and reverse flow conditions, respectively) under preoperational temperature, differential pressure, and flow conditions. Check valves are tested in accordance with the requirements of the ASME OM Code, ISTC-5220, Check Valves. In accordance with Table 14.2-43, a preoperational test demonstrates that the CNTS check valves listed in Tier 1 Table 2.1-2 strokes fully open and closed under forward and reverse flow conditions, respectively. Preoperational test conditions are established that approximate design basis temperature, differential pressure and flow conditions to the extent practicable, consistent with preoperational test limitations.	X				
02.01.22	NPM	The CNTS electrical penetrations listed in Tier ~~2~~1 Table 2.1-3 may be one of two types, one with or without a circuit interrupting device. An ITAAC confirms that each type of penetration is evaluated to confirm it can withstand its maximum fault current. A circuit interrupting device coordination analysis confirms and concludes in a report that the as-built containment electrical penetration assembly listed in Tier 1 Table 2.1-3 that has a circuit interrupting device can withstand fault currents for the time required to clear the fault from its power source. 8.3.1.2.5 Containment Electrical Penetration Assemblies discusses electrical penetration assemblies that are not equipped with protection devices whose maximum fault current in these circuits would not damage the electrical penetration assembly if that fault current was available indefinitely. An analysis of a CNTS as-built containment penetration without a circuit interrupting device confirms and concludes in a report that the maximum fault current is less than the current carrying capability of the CNTS containment electrical penetration.	X				

Table 14.3-2: Shared/Common Structures, Systems, and Components and Non-Structures, Systems, and components Based Design Features and Inspections, Tests, Analyses, and Acceptance Criteria Cross Reference(1) (Continued)

ITAAC No.	System	Discussion	DBA	Internal/External Hazard	Radiological	PRA & Severe Accident	FP
03.06.02	UHS	The ASME Code Section III requires that documentary evidence be available at the construction or installation site before use or installation to ensure that ASME Code Class 1, 2 and 3 components conform to the requirements of the Code. As defined in NCA-9000, a component can be a vessel, pump, pressure relief valve, line valve, storage tank, piping system, or core support structure that is designed, constructed, and stamped in accordance with the rules of Section III. The UHS ASME Code Class 3 components require a Data Report as specified by NCA-1210. The Data Report is prepared by the certificate holder or owner and signed by the certificate holder or owner and the inspector as specified by NCA-8410. The type of individual Data Report forms necessary to record the required code data is specified in Table NCA-8100-1. An ITAAC inspection is performed of the Data Reports for UHS ASME Code Class 3 as-built components listed in Tier 1 Table 3.6-1 and interconnecting piping to (1) ensure that the appropriate Data Reports have been provided as specified in Table NCA-8100-1, (2) ensure that the certificate holder or owner and the authorized nuclear inspector have signed the Data Reports, and (3) verify that the requirements of ASME Code are met.				X	
03.06.03~~2~~	UHS	Section 9.1.2.2.2, Spent Fuel Storage, Section 9.1.3.2.1, Spent Fuel Pool Cooling System, and Section 9.1.3.2.2, Reactor Pool Cooling System, discuss spent fuel pool (SFP) and reactor pool cooling. No piping, openings, doors, or penetrations through the SFP, refueling pool, reactor pool and dry dock walls are installed below the minimum water level required for shielding, spent fuel cooling, DHRS cooling, or containment cooling. Gates, openings, or drains, permanently connected mechanical or hydraulic systems (piping), and other features that by maloperation or failure could reduce the coolant inventory to unsafe levels are not included in the design. An ITAAC inspection is performed to verify that the SFP, refueling pool, reactor pool and dry dock include no drains, piping or other systems below 80 ft building elevation (55 ft pool level as measured from the bottom of the SFP and reactor pool). This inspection is performed by physical measurements in the as-built SFP and reactor pool.	X				