RAIO-0817-55458

August 16, 2017

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 Response to NRC Request for Additional Information No. 73 (eRAI No. 8910) on the NuScale Design Certification Application

REFERENCE: U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 73 (eRAI No. 8910)," dated June 27, 2017

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

The Enclosure to this letter contains NuScale's response to the following RAI Question from NRC eRAI No. 8910:

- 06.02.02-2

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 Marty Bryan at 541-452-7172 or at mbryan@nuscalepower.com.

Sincerely,

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

Distribution: Gregory Cranston, NRC, OWFN-8G9A
Omid Tabatabai, NRC, OWFN-8G9A
Samuel Lee, NRC, OWFN-8G9A

Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 8910

Enclosure 1:

NuScale Response to NRC Request for Additional Information eRAI No. 8910

NuScale Power, LLC
1100 NE Circle Blvd., Suite 200 Corvalis, Oregon 97330, Office: 541.360.0500, Fax: 541.207.3928
www.nuscalepower.com

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

eRAI No.: 8910
Date of RAI Issue: 06/27/2017

NRC Question No.: 06.02.02-2

GDC 39 requires, in part, that the containment heat removal system shall be designed to permit appropriate periodic inspection of important components to assure the integrity and capability of the system.

NuScale's exemption request for GDC 40 states that periodic inspections of the containment heat removal surfaces will assess surface fouling or degradation that could potentially impede heat transfer from the containment, and that further details of these inspections and the conformance with GDC 39 is provided in FSAR Section 6.2.2. FSAR Section 6.2.2 makes a similar statement and refers to the performance of "periodic inservice inspection of the containment heat removal surfaces", but no reference to these inspections are made elsewhere, such as in a technical specification surveillance. FSAR Section 6.6, "Inservice Inspection and Testing of Class 2 and 3 Systems and Components" does not appear to govern the inspection of the containment vessel for fouling, as the containment vessel is specified as a Class I component in Tier 1, Table 2.1-2, "NuScale Power Module Mechanical Equipment".

The staff requests NuScale to provide a programmatic assurance that establishes the requirement to perform periodic inspection of the containment heat removal surfaces. Additionally, provide updated FSAR pages to include the additional detail and reflect the current design and programs."rovide updated FSAR pages to include the additional detail and reflect the current design and programs.

NuScale Response:

FSAR Sections 6.2.1.6, 6.2.2.4, and Table 6.2-3 have been revised to include additional detail that reflects the programmatic assurance to perform periodic visual inspections of containment heat removal surfaces to ensure compliance with GDC 39.

Impact on DCA:

FSAR Section 6.2 and Table 6.2-3 have been revised as described in the response above and as shown in the markup provided in this response.

The CNV is hydrostatically tested in accordance with ASME BPVC Section III, Subsection NB-6000 at a minimum test pressure (highest point) of 1250 psig and maximum test pressure (lowest point) of 1325 psig. Piping installed inside the CNV during hydrostatic testing is vented to the CNV to preclude a net external pressure on the piping during the test.

RAI 06.02.02-2

Based on the high pressure and the safety functions of a NuScale CNV, enhanced inspection requirements are provided for the CNV in excess of the Class MC requirements of ASME BPVC, Section XI, Subsection IWE. The CNV augmented inspections are based on Class 1 requirements of ASME BPVC, Section XI. Specifically, rather than just a visual examination as required for an ASME Class MC containment, many of the NuScale CNV pressure boundary welds are required to have a volumetric or surface examination performed per ASME BPVC, Section XI, Subsection IWB.

RAI 06.02.02-2

Periodic inservice inspection of the containment heat removal surfaces is performed to ensure compliance with GDC 39 to assess for surface fouling or degradation that could potentially impede heat transfer from the CNV.

The CNV inspection elements are provided in Table 6.2-3. An inspection element is a combination of a component and the inspection requirements.

A description of the ISI requirements for Class 2 and 3 components is provided in Section 6.6.

6.2.1.7 Instrumentation Requirements

Instrumentation is provided to monitor the conditions inside the containment and to actuate the appropriate engineered safety features, should those conditions exceed predetermined levels. Instruments are provided to measure containment pressure, temperature, and water level. Instrumentation to monitor RCS leakage into containment and compliance with RG 1.45 is described in subsection 5.2.5.

Containment pressure instrumentation is provided for continuous control room indication to monitor containment pressure boundary integrity, RCS pressure boundary integrity and ECCS performance and to support the actuation of critical safety functions (reactor trip, decay heat removal actuation, CVCS isolation and containment isolation functions).

Containment pressure is measured and monitored by four narrow range, Class 1E, instruments and two wide range non-Class 1E instruments. The narrow range sensors (transducer/transmitter type) are located inside the CNV wall enclosure near the top of containment. There are four independent channels of narrow range CNV pressure instrumentation. The wide range sensors (transducer/transmitter type) are located inside the CNV wall enclosure near the top of containment. There are two independent channels of wide range CNV pressure instrumentation.

6.2.2.4 Testing and Inspection

Information is provided in Section 6.2.1.6 on the test programs for the CNV for preservice and initial plant testing (preoperational and startup). After startup, operability and performance of the passive containment heat removal function is ensured through inspection in accordance with GDC 39. Periodic inservice inspection of the containment heat removal surfaces is performed to assess for surface fouling or degradation that could potentially impede heat transfer from the CNV. The inspections ensure the continuing operability of the containment surfaces that perform the heat removal function.

RAI 06.02.02-2

Inspection of the CNV heat removal surfaces is addressed in Section 6.2.1.6.

Testing and inspection for the UHS are addressed in Section 9.2.5.5.

6.2.2.5 Instrumentation Requirements

Instrumentation for the CNV is addressed in Section 6.2.1.7 and for the UHS in Section 9.2.5.6.

6.2.3 Secondary Containment Functional Design

The NuScale Power Plant is not a dual containment design (i.e., the design does not require a secondary containment function) facility. The design of the NuScale CNV is described in Section 3.8.2, Section 6.1 and Section 6.2.1.

6.2.4 Containment Isolation System

The RXB has up to 12 NPMs, and each NPM has a containment system (CNTS) with a containment boundary designed to prevent or limit the release of radioactive materials under postulated accident conditions. The containment boundary is formed by the CNV and by the containment isolation valves (CIVs) and the passive containment isolation barriers that are used to prevent releases through the penetrations in the CNV. Although a "containment isolation system" is not defined for a NuScale Power Plant, the CIVs for an NPM are similar to such a system for existing light water reactor plants.

Figure 3.8.2-1 provides an overview of the CNTS showing the CNV components surrounding an RPV. Figure 6.2-1 has a cutaway view of an NPM. Figure 6.2-2a and Figure 6.2-2b show the CNV top head and side penetrations. Figure 6.2-3a and Figure 6.2-3b show and list the penetrations by nozzle number. Figure 3.8.2-4 identifies the process flow for each of the CNV top head mechanical penetrations. Figure 3.8.2-5 identifies electrical, I&C, and access penetrations in the CNV top head.

Table 6.2-4 lists the 40 penetration openings in the CNV. As shown in the table, there are the following types of penetrations:

- mechanical penetrations for process fluids or gases - 20 total with 12 on the top head for process flows and 8 on the side with 6 penetrations for ECCS valve actuator assemblies and 2 penetrations for DHRS process flows

RAI 06.02.02-2

Table 6.2-3: Containment Vessel Inspection Elements

Component Description	Examination Category	Examination Method	Notes
CNV Shell and Head Welds			
Bottom head to core region shell	B-A	Volumetric	
Core region shell to lower transition shell	B-A	Volumetric	
Lower transition shell to lower flange	B-A	Volumetric	
Upper flange to RPV support lug shell	B-A	Volumetric	
RPV support lug shell to steam plenum access shell	B-A	Volumetric	
Steam plenum access shell to upper shell	B-A	Volumetric	
Upper shell to top head	B-A	Volumetric	
Support Welds			
Support skirt ring to support skirt	F-A	Visual	
Support skirt to bottom head	B-K	Surface or volumetric	
CNV shipping/storage support lug	B-K	Surface	
CNV support lug	B-A	Volumetric	
Alignment pin to threaded insert	B-K	Surface	
Instrument enclosure base to CNV	None	None	Exempted by IWF-1230
CNV Nozzle to Shell Welds			
Feedwater lines	B-D	Volumetric	
Main steam lines	B-D	Volumetric	
CRDS return line	B-D	Volumetric	
CVCS makeup line	B-D	Volumetric	
CVCS pressurizer spray line	B-D	Volumetric	
I&C Divisions	B-D	Not required	See Table IWB-2500-1 (B-D) Note 1
Containment evacuation system line	B-D	Volumetric	
Containment flood and drain system line	B-D	Volumetric	
CRDS supply line	B-D	Volumetric	
CVCS letdown line	B-D	Volumetric	
RPV high point degasification line	B-D	Volumetric	
Pressurizer heater power (Elect-1 and 2)	B-D	Not required	See Table IWB-2500-1 (B-D) Note 1
I&C channels A-D	B-D	Not required	See Table IWB-2500-1 (B-D) Note 1
Decay heat removal system lines	B-D	Volumetric	Single sided, shell side
Head manway	B-D	Not required	See Table IWB-2500-1 (B-D) Note 1

Table 6.2-3: Containment Vessel Inspection Elements (Continued)

Component Description	Examination Category	Examination Method	Notes
CRDM access opening	B-D	Not required	See Table IWB-2500-1 (B-D) Note 1
CNV manway	B-D	Not required	See Table IWB-2500-1 (B-D) Note 1
SG inspection ports	B-D	Not required	See Table IWB-2500-1 (B-D) Note 1
Pressurizer heater access ports	B-D	Not required	See Table IWB-2500-1 (B-D) Note 1
RRV and RVV trip/reset	B-D	Not required	See Table IWB-2500-1 (B-D) Note 1
CRDM power	B-D	Not required	See Table IWB-2500-1 (B-D) Note 1
RPI groups	B-D	Not required	See Table IWB-2500-1 (B-D) Note 1
Nozzle-to-Safe-end Dissimilar Metal Welds (SE)			
Feedwater lines SE (inner and outer)	B-F	Surface and Volumetric	
Main steam lines SE (inner and outer)	B-F	Surface and Volumetric	
CRDS return line SE (outer)	B-F	Surface and Volumetric	
CRDS return lines SE (inner)	B-F	Surface	
CVCS makeup line SE (outer)	B-F	Surface and Volumetric	
CVCS makeup line SE (inner)	B-F	Surface	
CVCS pressurizer spray line SE (outer)	B-F	Surface and Volumetric	
CVCS pressurizer spray line SE (inner)	B-F	Surface	
Containment evacuation system line SE	B-F	Surface	
Containment flood and drain system line SE (inner and outer)	B-F	Surface	
CRDS supply line SE (inner and outer)	B-F	Surface	
CVCS letdown line SE (inner and outer)	B-F	Surface	
RPV high point degasification line SE (inner and outer)	B-F	Surface	
Decay heat removal system lines SE (inner and outer)	B-F	Surface	
RRV and RVV trip/reset SE	B-F	Surface	
Bolting			
CNV main flange bolts	B-G-1	See Notes	Per Note 7 of B-G-1, surface examination is permitted when bolts are removed.
CNV bolting two inches or less in diameter	B-G-2	VT-1	Examine if removed.
CNV Shell			
CNV inner and outer shell	General	Visual	Inspection pursuant to GDC 39