RAIO-1018-62422

November 1, 2018

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 Supplemental Response to NRC Request for Additional Information No. 410 (eRAI No. 9310) on the NuScale Design Certification Application

REFERENCES:
1. U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 410 (eRAI No. 9310)," dated April 09, 2018
2. NuScale Power, LLC Response to NRC "Request for Additional Information No. 410 (eRAI No.9310)," dated July 26, 2018

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 Enclosures to this letter contain NuScale's supplemental response to the following RAI Question from NRC eRAI No. 9310:

- 03.09.02-62

Enclosure 1 is the proprietary version of the NuScale Supplemental Response to NRC RAI No. 410 (eRAI No. 9310). NuScale requests that the proprietary version be withheld from public disclosure in accordance with the requirements of 10 CFR § 2.390. The enclosed affidavit (Enclosure 3) supports this request. Enclosure 2 is the nonproprietary version of the NuScale response.

This letter and the enclosed responses 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
Samuel Lee, NRC, OWFN-8G9A
Marieliz Vera, NRC, OWFN-8G9A

Enclosure 1: NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9310, proprietary

Enclosure 2: NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9310, nonproprietary

Enclosure 3: Affidavit of Zackary W. Rad, AF-1018-62423

Enclosure 1:

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9310, proprietary

Enclosure 2:

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9310, nonproprietary

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

eRAI No.: 9310

Date of RAI Issue: 04/09/2018

NRC Question No.: 03.09.02-62

In the response to Subquestion 2 and 3 of RAI 8911, Question 03.09.02-27, the applicant stated that Belleville washers are placed below the lower core plate to tune the core's vertical natural frequency away from high vertical NPM acceleration frequencies that has peak near 17 Hz. A target core vertical frequency of 6 Hz was selected. To achieve the target frequency, the combined spring constant of the 10 Belleville washers acting in series at each core support block was calculated to be 106,800 lbf/in. However, EC-A010-2322-R2, "Reactor Module Seismic Model" Section 2.1.5 stated that four Belleville washers are assumed to exist at bottom of core support with spring constant of 1.068E5 lbf/in for each of the four washers. The staff is not clear how the combined spring constant of 106,800 lbf/in is obtained for the 10 Belleville washers acting in series. Provide the following information:

1. Spring constant for each of the 10 Belleville washers acting in series and the formula used in calculation of the combined spring constant of 106,800 lbf/in.

2. Clarify that the Design in-structure response spectra (ISRS) of the top and lower core plates (Fig. B16 to Fig. 21 in TR-0916-51502) are calculated from the NPM seismic model with 10 Belleville washers in series, not 4 Belleville washers in series, below the lower core plate.

Include the requested information in the NPM Seismic Report.

NuScale Response:

In a followup closed meeting with NRC on September 19th, 2018, clarification was requested on how the stiffness of the core support block assembly is accounted for in the seismic model, and on the gap between the alignment dowels (shear pins) and the lower core plate in the radial direction. The following information supplements the initial response to RAI 9310 Question 03.09.02-62, provided by RAIO-0718-61094 dated July 26, 2018.

In the RPV submodel, the core support blocks are modeled as solid blocks that are {{ }}2(a),(c) wide at their ends and {{ }}2(a),(c) wide in the middle and at the base. This defeatured geometry was originally used to model the core support blocks for use with the (subsequently deleted) seismic Belleville washers. The core support block assembly, shown in Figure 1 of the response to RAI 9310 03.09.02 Question 62, consists of a {{ }}2(a),(c) top plate that sits on top of two {{ }}2(a),(c) wide gussets, curved to match the profile of the RPV bottom head. The defeatured model geometry already in use in the seismic model requires no further refinement, given the substantial thickness of the core support block assembly top plate. Because the core support block assembly top plate is {{ }}2(a),(c) thick, it does not act as a spring that shifts the core's response as the seismic Belleville washers did. Therefore, the defeatured geometry is acceptable for extracting forces for stress analysis in this area of the model.

The core support block alignment dowels (shear pins) present in the core support block assemblies have no gap in the circumferential direction. Circumferential loads are carried by these shear pins, not the hold down bolts, which are only designed to restrain the assembly in the vertical direction. In the cold condition, no gap exists on the outside edge of each shear pin, between it and the lower core plate. In the hot condition, however, there is a {{ }}2(a),(c) gap. In the model documented in TR-0916-51502 Revision 1, the maximum radial relative displacement of the remote points used to couple the lower core plate tabs to the defeatured core support block assemblies is {{ }}2(a),(c). Therefore, the radial gap does not close, and lateral loads are carried by the connection made in the circumferential direction only. This results in a conservative design for the shear pins, because lateral loads are distributed between two pins in the circumferential direction, compared to four pins if both the circumferential and radial directions are coupled.

Impact on DCA:

The FSAR Tier 2, Section 3.9, Section 4.5.2, Section 5.2.3, Table 4.5-2, and Table 5.2-7 have been revised as described in the response above and as shown in the markup provided with this response.

effects of pipe whipping and discharge fluids are those that are in the proximity of high and moderate energy piping between the RPV and the CNV. Additionally, the leak-before-break methodology is applied as described in Section 3.6

- GDC 10, as it relates to reactor internals; reactor internals are designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of AOOs. For further details on compliance, see Section 3.1.2

3.9.5.1 Design Arrangements

Figure 3.9-1 through Figure 3.9-4 show the RVI subassemblies with components that comprise the RVI.

The overall RVI assembly is depicted in Figure 3.9-1. (Note the SG tube bundles which reside in the annulus between the upper riser assembly and the RPV upper shell are not depicted in this figure). The CSA is located near the bottom of the RPV, below the RPV flange. Above the CSA are the lower riser assembly and upper riser assembly. During disassembly, the CSA and lower riser assembly stay with the lower NPM and the upper riser assembly stays attached to the upper NPM. Each of the RVI sub-assemblies is described in more detail below.

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The CSA ~~(Figure 3.9-4)~~ includes the core barrel, upper support blocks, lower core plate, lower shared fuel pins and nuts, and reflector blocks (Figure 3.9-4), as well as the~~, lock plate assembly, lower core support lock inserts, and the~~ RPV surveillance specimen capsule holder and capsules (not shown in Figure 3.9-4).

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The core barrel is a continuous ring with no welds. The upper support blocks, which are welded to the core barrel, serve to center the core barrel in the lower RPV. In addition, one of the upper support blocks engages a core barrel guide feature on the lower RPV to provide circumferential positioning of the core barrel as it is lowered into the lower RPV. The lower core plate, which is welded to the bottom of the core barrel serves to support and align the bottom end of the fuel assemblies. The lower core support block~~s~~ assemblies are located on the RPV bottom head.

The reflector blocks contain no welds. The reflector blocks are aligned by reflector block alignment pins and stacked on the lower core plate inside the core barrel. The shape of the reflector block assembly closely conforms to the shape of the peripheral fuel assemblies and thereby constrains lateral movement of the fuel assemblies and minimizes the reactor coolant flow that bypasses the fuel assemblies.

Surveillance specimen capsule holders are welded to the outer surface of the core barrel at about the mid height of the CSA.

A flow diverter is attached to the RPV bottom head, under the CSA, as shown in Figure 3.9-1. This flow diverter smoothes the turning of the reactor coolant flow from the downward flow outside the core barrel to upward flow through the fuel assemblies.

The flow diverter reduces flow turbulence and recirculation and minimizes flow related pressure loss in this region.

The lower riser assembly includes the lower riser, the upper core plate, CRA guide tubes, CRA guide tube support plate, and ICI guide tube support structure (see Figure 3.9-3). The lower riser assembly is located immediately above the CSA and is aligned with and supported on the CSA by the four upper support blocks.

The lower riser channels the reactor coolant flow leaving the reactor core upward toward the central upper riser, and separates this flow from the flow outside the lower riser which is returning from the SGs.

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The upper core plate, which is attached to the bottom of the lower riser by ~~lock plate assemblies~~a socket head cap screw and alignment dowel, serves to support and align the top end of the fuel assemblies. Sixteen CRA guide tubes are attached to the upper core plate and extend upward to the CRA guide tube support plate. These guide tubes house the portion of the CRAs that extend above the top of the reactor core.

An ICI guide tube support structure is located inside the lower riser to support and align ICI guide tubes with their respective fuel assemblies.

The upper riser assembly is located immediately above the lower riser assembly and extends upward to the PZR baffle plate. It channels the reactor coolant leaving the core upward through the central riser and permits the reactor coolant to turn in the space above the top of the riser and below the PZR baffle plate, and then flow downward through the annular space outside of the riser and inside of the RPV where the SG helical tube bundles are located.

RAI 03.09.04-1S1, RAI 03.09.04-2S1, RAI 03.09.04-4S1, RAI 03.09.05-4, RAI 03.09.05-12

The upper riser assembly includes the upper riser, a series of control rod drive shaft and ICI guide tube supports referred to as upper CRDS supports, and the upper riser hanger assembly. The upper riser assembly also accepts and positions the RCS injection piping. The ICI guide tubes, which are supported by the upper riser assembly, extend from their respective penetrations in the RPV top head downward through the PZR space, the upper riser, and the lower riser to their respective fuel assemblies. The portion of the ICI guide tubes extending from the RPV upper head penetrations to the bottom of the upper riser assembly is depicted in Figure 3.9-2. The upper riser assembly hangs from the pressurizer baffle plate. There is a bellows assembly in the lower portion of the upper riser (see Figure 3.9-2). This bellows assembly exerts an initial contact load, in the cold condition, on the lower riser interface, and then allows for the vertical thermal expansion. The RVI materials including base materials and weld filler materials are discussed in Section 4.5.2 and are designed to minimize the number of welds and bolted interfaces within the high neutron flux regions.

During refueling and maintenance outages the upper riser assembly stays attached to the upper section of the NPM (upper CNV, upper RPV and SG) while providing physical access for potential inspection of the feedwater plenums, SG, RPV and control rod drive shaft supports. The lower riser assembly and CSA remain with the lower NPM (lower

Part D, Tables 2A, 2B, and 4. The remaining portions of the RVI are designated as internal structures and are designed to conform to ASME BPV Code, Section III, Article NG-3000 considering the requirements of Paragraph NG-1122(c).

RAI 03.09.02-62, RAI 04.05.02-2

The design of RVI has considered peak neutron fluence in the materials surrounding the core. Neutron irradiation-induced degradations such as irradiation-assisted stress corrosion cracking, void-swelling, stress-relaxation, and irradiation embrittlement have been evaluated using material aging degradation mechanism screening criteria of the Electric Power Research Institute (EPRI) materials reliability program (Reference 4.5-3). The components meeting the screening criteria are the incore instrumentation guide tube (ICIGT) flags and welds, fuel pins and caps, shared fuel pins and nuts, the intermediate reflector blocks and alignment pins, the lower core plate, and the core barrel. In addition, components identified as susceptible to irradiation-induced stress relaxation are also included for potential wear due to loosening. Components screening in for neutron degradation are included for augmented visual inspection.

4.5.2.2 Control on Welding

The welding of RVI materials conform to the applicable requirements of ASME BPV Code, Section III, Articles NG-2000, NG-4000, and NG-5000. Welding is conducted utilizing procedures qualified according to the rules of ASME BPV Code, Sections III, Subarticle NG-4300 and Section IX. Welders and welding operators are qualified in accordance with ASME BPV Code Section IX and RG 1.71, Revision 1.

Electroslag welding is not permitted on RVI and core structural supports. Additional information regarding welding of austenitic stainless steel RCPB materials provided in Section 5.2.3 is also applicable to the welding of RVI and core support components.

4.5.2.3 Nondestructive Examination

Nondestructive examinations of core support structure materials, including tubular products, conform to the requirements of ASME BPV Code, Section III, Subarticle NG-2500 utilizing the methods of ASME BPV Code, Section V and acceptance standards of Subarticle NG-5300.

4.5.2.4 Fabrication and Processing of Austenitic Stainless Steel Components

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Most RVI base metal is fabricated from Type 304/304L austenitic stainless steel. ~~The locking assembly studs are composed of austenitic stainless steel XM-19.~~ Austenitic stainless steel parts are fabricated from materials procured in the solution-annealed condition. Use of cold worked austenitic stainless steel is avoided to the extent practicable during fabrication of the RVI and core support structure. Austenitic stainless steel used in the RVI and core support components does not exceed a yield strength of 90,000 psi as determined by the 0.2 percent offset method.

Processing and welding of unstablized AISI Type 3XX series austenitic stainless steels comply with RG 1.44 to prevent sensitization and stress-corrosion cracking. When rapidly cooled by means other than water quenching, non-sensitization of base materials is verified by test in accordance with Practice A or Practice E of ASTM A262 (Reference 4.5-1) as required by RG 1.44.

For AISI Type 3XX series austenitic stainless steel subjected to sensitizing temperatures subsequent to solution heat treatment, the carbon content is limited to no more than 0.03 wt%.

RVI weld filler metals and associated specifications listed in Table 4.5-2 are in accordance with ASME BPV Code, Section II, Part C. They are analyzed for delta ferrite content and limited to a ferrite number of 5FN to 20FN in accordance with RG 1.31 and ASME BPV Code, Section III, Paragraph NG-2433. Carbon content of austenitic stainless steel weld filler metals is limited to no more than 0.03 wt%.

Tools for abrasive work such as grinding, polishing, or wire brushing are not permitted to be contaminated by previous usage on ferritic carbon steel or other materials that could contribute to intergranular cracking or stress-corrosion cracking.

Section 5.2.3 describes the controls used to minimize the introduction of potentially harmful contaminants including chlorides, fluorides, and low melting point alloys on the surface of austenitic stainless steel components. In accordance with RG 1.44, cleaning solutions, processing equipment, degreasing agents, and other foreign materials are removed during processing prior to elevated temperature treatments. Acid pickling is avoided on stainless steel and not used on sensitized austenitic stainless steel.

4.5.2.5 Other Materials

Materials exposed to primary reactor coolant are corrosion-resistant stainless steels, nickel-based alloys, and, to a limited extent, cobalt-based alloys. These materials are selected from materials proven in light-water reactor operation and for their compatibility with the reactor coolant as specified in ASME BPV Code, Section III, Paragraph NG-2160 and Subsubarticle NG-3120.

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~~Precipitation hardenable stainless steel 17-4 PH, Grade 630 procured in the H1100 condition is used in portions of the core support locking assemblies. The minimum precipitation hardening heat treatment maintains a minimum tempering temperature of 1100°F for at least 4 hours per ASME BPV Code, Section II, Part A, Material Specification SA-564.~~

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~~A cobalt-based alloy, Stellite 3 casting, or a qualified low-cobalt or cobalt-free alloy is used on wear surfaces of the core support locking assemblies. Use of a low cobalt or cobalt-free alloy may be substituted if the wear and corrosion resistance is qualified by testing.~~

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Table 4.5-2: Reactor Vessel Internal Materials

Component	Specification	Material Designation (Grade, Class, or Type)
Core Support Assembly		
Core barrel	SA-965	Type 304/304L; Grade F304/F304L
Reflector blocks	SA-965 or SA-182	Type 304/304L; Grade F304/F304L
Lower core plate	SA-965 or SA-240	Type 304/304L
Alignment pins for reflectors Shared fuel pin and fuel pin nuts	SA-479	Type 304/304L
Alignment pins for lower core plate	SA-193	Type 304; Grade B8
Upper support blocks	SA-479 or SA-240	Type 304/304L
Socket Head Cap Screw	SA-193	Grade B8, Class 1
Alignment Dowel	SA-193	Grade B8, Class 1
~~**Core Support Locking Assembly**~~		
~~Locking plates~~	~~SA-240~~	~~Type 304/304L~~
~~Spacers~~	~~SA-479~~	~~Type 304/304L~~
~~Spherical bearing ball~~	~~N/A~~	~~Stellite 3 cast~~ ~~or~~ ~~Low cobalt or cobalt-free material~~
~~Set screws, nuts, washers, locking Belleville washers~~	~~SA-193~~	~~Type 304; Grade B8~~
~~Check ball retainer~~	~~SA-564~~	~~Type 17-4 (UNS S17400); Grade 630; Condition H1100~~
~~Studs~~	~~SA-479~~	~~Type XM-19~~
Reactor Vessel Surveillance Capsule Assembly		
Capsule basket, protection guide, support Specimen enclosure Screw locking caps	SA-240	Type 304/304L
Plugs and dowel pins Screws	SA-479	Type 304/304L
Upper Riser Assembly		
Upper riser transition and section Riser backing strips Upper CRD supports Upper riser hanger ring and hanger braces Chemical volume and control system (CVCS) injection piping support Incore instrumentation centering plate Flow diverter	SA-240	Type 304/304L
Upper riser hanger threaded structural fasteners Upper riser hanger alignment pins	SA-479	Type 304
Upper riser bellows CVCS injection flexible pipe	N/A	Type 304L
CVCS injection piping	SA-312	Seamless; Grade TP304/TP304L
CVCS injection piping end cap CVCS injection piping elbow	SA-182	Grade F304/F304L
Incore instrumentation guide tubes (ICIGTs) - 1-12	SA-213	Grade TP304/TP304L
Pressurizer spray nozzles	SA-479	Grade TP304/TP304L
Washers	SB-637	Alloy 718 (UNS N07718)

the first layer is Type 309L and subsequent layers are Type 308L. The austenitic stainless steel cladding on the outside surfaces is deposited with at least one layer of Type 309L. The Ni-Cr-Fe cladding is deposited with Alloy 52/152. Weld overlay cladding is conducted utilizing procedures qualified in accordance with the applicable requirements of ASME BPVC, Section III, Subarticle NB-4300 and Section IX.

The through-holes in the baffle plate of the low-alloy steel, integral steam plenum for the twelve incore instrumentation guide tubes are sleeved with Alloy 690 inserts. Larger through-holes in the baffle plate for the CRDM shafts and holes for pressurizer insurge and outsurge flow, approximately two inches in diameter or greater, are cladded with austenitic stainless steel.

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The use of cobalt based alloys is minimized and limits are established to minimize cobalt intrusion into the reactor coolant. Cobalt based alloys are used for hard surfacing and wear resistant parts in the CRDMs~~ and the core support locking assembly~~. Refer to Section 4.5 for additional details regarding the materials of the CRDMs~~ and reactor vessel internals~~. Low cobalt or cobalt-free alloys may be used for hardfacing and wear resistant parts in contact with the reactor coolant if their wear and corrosion resistance are qualified by testing.

5.2.3.3 Fabrication and Processing of Ferritic Materials

5.2.3.3.1 Fracture Toughness

The fracture toughness properties of the RCPB components comply with the requirements of 10 CFR 50, Appendix G, "Fracture toughness requirements," and ASME BPVC, Section III, Subarticle NB-2300. Discussion of the fracture toughness requirements of the RPV materials are provided in Section 5.3.

5.2.3.3.2 Welding Control - Ferritic Materials

Welding of ferritic materials used for components of the RCPB is conducted utilizing procedures qualified in accordance with the applicable requirements of ASME BPVC, Section III, Subarticle NB-4300 and Section IX.

Stainless steel corrosion resistant weld overlay cladding of low alloy steel components conforms to the requirements of RG 1.43, Revision 1. Controls to limit underclad cracking of susceptible materials also conform to the requirements of RG 1.43.

Prior to cladding, the surfaces to be clad are examined using magnetic particle or liquid penetrant tests in accordance with ASME BPVC Section III, Paragraphs NB-2545 or NB-2546, respectively.

Other than for austenitic stainless steel cladding of low alloy steel, electroslag welding is not used.

RAI 03.09.02-62S1, RAI 04.05.02-2, RAI 05.04.02.01-6, RAI 05.04.02.01-16

Table 5.2-7: Reactor Vessel Internals Inspection Elements

Description	Location	Examination Category	Examination Method	Notes
Core Support Components				
Reflector Block - Bottom	Core Support Assembly	B-N-3	VT-3	
Reflector Block Intermediate	Core Support Assembly	B-N-3	VT-1	Required VT-3 augmented to VT-1. Exam will be of the interior surface, checking for a gap developing between reflector blocks.
Reflector Block Top	Core Support Assembly	B-N-3	VT-3	
Reflector Block Alignment Pins	Core Support Assembly	B-N-3	VT-1	Inspection only required when reflector blocks are removed for another reason
Core Barrel	Core Support Assembly	B-N-3	VT-1	Required VT-3 augmented to VT-1 of accessible surfaces
Lower core Plate	Core Support Assembly	B-N-3	VT-1	Required VT-3 augmented to VT-1 of accessible surfaces
Upper Core Plate	Lower Riser Assembly	B-N-3	VT-3	
Lower Core Plate Alignment Pins	Core Support Assembly	B-N-3	VT-3	
Socket Head Cap Screws	Core Support Assembly	B-N-3	VT-3	Mating interface between upper core support block and lower riser
Alignment Dowels	Core Support Assembly	B-N-3	VT-3	Mating interface between upper core support block and lower riser
Upper Support Block	Core Support Assembly	B-N-2	VT-1	
Core Barrel to Lower Core Plate	Core Support Assembly	B-N-2	VT-1	
Fuel Pins	Lower Riser Assembly	B-N-3	VT-1	Required VT-3 augmented to VT-1
Fuel Pins Caps	Lower Riser Assembly	B-N-3	VT-1	Required VT-3 augmented to VT-1
Fuel Pin Capture Weld	Lower Riser Assembly	B-N-2	VT-1	
Shared Fuel Pins and Nuts	Core Support Assembly	B-N-3	VT-1	Required VT-3 augmented to VT-1
Lower Riser to Upper Core Plate	Lower Riser Assembly	B-N-3	VT-3	

Table 5.2-7: Reactor Vessel Internals Inspection Elements (Continued)

Description	Location	Examination Category	Examination Method	Notes
ICIGT Bottom Flag ICIGT 1 to Upper Core Plate	Lower Riser Assembly	B-N-3	VT-1	Required VT-3 augmented to VT-1
Core Support Block Assembly	Core Support Assembly	B-N-3	VT-3	Includes cap screws and dowels
Internal Structures				
ICI Guide Tubes	Lower Riser Assembly	N/A	VT-3	
ICI Guide Tubes (Upper)	Upper Riser Assembly	N/A	VT-3	
ICI Guide Tubes Bottom Flag	Lower Riser Assembly	N/A	VT-1	Required VT-3 augmented to VT-1
CVCS Makeup Piping Assembly	Upper Riser Assembly	N/A	VT-3	
Upper CRDS Support	Upper Riser Assembly	N/A	VT-3	
Upper Hanger Assembly Fasteners	Upper Riser Assembly	N/A	VT-3	
Upper Hanger Ring & Reinforcements	Upper Riser Assembly	N/A	VT-3	
Lower Riser Section	Lower Riser Assembly	N/A	VT-3	
Lower Riser Trunnion	Lower Riser Assembly	N/A	VT-3	
Lower Riser Spacer	Lower Riser Assembly	N/A	VT-3	
Lower Riser Spacer to Lower Riser Section	Lower Riser Assembly	N/A	VT-3	
Lower Riser Transition to Lower Riser Spacer	Lower Riser Assembly	N/A	VT-3	
ICIGT Support to Lower Riser Transition	Lower Riser Assembly	N/A	VT-3	
ICIGT Support to ICIGT	Lower Riser Assembly	N/A	VT-3	
ICIGT Bottom Flag to ICIGT	Lower Riser Assembly	N/A	VT-3	
CRA Guide Tube Support Plate to Lower Riser Spacer	Lower Riser Assembly	N/A	VT-3	
CRA Guide Tube Assembly (including Guide Cards)	Lower Riser Assembly	N/A	VT-3	
Upper Riser Section Seam	Upper Riser Assembly	N/A	VT-3	
Riser Backing Strip A	Upper Riser Assembly	N/A	VT-3	
Riser Backing Strip B	Upper Riser Assembly	N/A	VT-3	
Upper CRDS Support	Upper Riser Assembly	N/A	VT-3	
Brace to Upper Riser Hanger Ring	Upper Riser Assembly	N/A	VT-3	

Enclosure 3:

Affidavit of Zackary W. Rad, AF-1018-62423

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NuScale Power, LLC

AFFIDAVIT of Zackary W. Rad

I, Zackary W. Rad, state as follows:

1. I am the Director, Regulatory Affairs of NuScale Power, LLC (NuScale), and as such, I have been specifically delegated the function of reviewing the information described in this Affidavit that NuScale seeks to have withheld from public disclosure, and am authorized to apply for its withholding on behalf of NuScale.
2. I am knowledgeable of the criteria and procedures used by NuScale in designating information as a trade secret, privileged, or as confidential commercial or financial information. This request to withhold information from public disclosure is driven by one or more of the following:
    a. The information requested to be withheld reveals distinguishing aspects of a process (or component, structure, tool, method, etc.) whose use by NuScale competitors, without a license from NuScale, would constitute a competitive economic disadvantage to NuScale.
    b. The information requested to be withheld consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), and the application of the data secures a competitive economic advantage, as described more fully in paragraph 3 of this Affidavit.
    c. Use by a competitor of the information requested to be withheld would reduce the competitor's expenditure of resources, or improve its competitive position, in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product.
    d. The information requested to be withheld reveals cost or price information, production capabilities, budget levels, or commercial strategies of NuScale.
    e. The information requested to be withheld consists of patentable ideas.
3. Public disclosure of the information sought to be withheld is likely to cause substantial harm to NuScale's competitive position and foreclose or reduce the availability of profit-making opportunities. The accompanying Request for Additional Information response reveals distinguishing aspects about the method by which NuScale develops its power module seismic analysis.

    NuScale has performed significant research and evaluation to develop a basis for this method and has invested significant resources, including the expenditure of a considerable sum of money.

    The precise financial value of the information is difficult to quantify, but it is a key element of the design basis for a NuScale plant and, therefore, has substantial value to NuScale.

    If the information were disclosed to the public, NuScale's competitors would have access to the information without purchasing the right to use it or having been required to undertake a similar expenditure of resources. Such disclosure would constitute a misappropriation of NuScale's intellectual property, and would deprive NuScale of the opportunity to exercise its competitive advantage to seek an adequate return on its investment.

4. The information sought to be withheld is in the enclosed response to NRC Request for Additional Information No. 410, eRAI No. 9310. The enclosure contains the designation "Proprietary" at the top of each page containing proprietary information. The information considered by NuScale to be proprietary is identified within double braces, "{{ }}" in the document.
5. The basis for proposing that the information be withheld is that NuScale treats the information as a trade secret, privileged, or as confidential commercial or financial information. NuScale relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC § 552(b)(4), as well as exemptions applicable to the NRC under 10 CFR §§ 2.390(a)(4) and 9.17(a)(4).
6. Pursuant to the provisions set forth in 10 CFR § 2.390(b)(4), the following is provided for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld:
    a. The information sought to be withheld is owned and has been held in confidence by NuScale.
    b. The information is of a sort customarily held in confidence by NuScale and, to the best of my knowledge and belief, consistently has been held in confidence by NuScale. The procedure for approval of external release of such information typically requires review by the staff manager, project manager, chief technology officer or other equivalent authority, or the manager of the cognizant marketing function (or his delegate), for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside NuScale are limited to regulatory bodies, customers and potential customers and their agents, suppliers, licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or contractual agreements to maintain confidentiality.
    c. The information is being transmitted to and received by the NRC in confidence.
    d. No public disclosure of the information has been made, and it is not available in public sources. All disclosures to third parties, including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or contractual agreements that provide for maintenance of the information in confidence.
    e. Public disclosure of the information is likely to cause substantial harm to the competitive position of NuScale, taking into account the value of the information to NuScale, the amount of effort and money expended by NuScale in developing the information, and the difficulty others would have in acquiring or duplicating the information. The information sought to be withheld is part of NuScale's technology that provides NuScale with a competitive advantage over other firms in the industry. NuScale has invested significant human and financial capital in developing this technology and NuScale believes it would be difficult for others to duplicate the technology without access to the information sought to be withheld.

I declare under penalty of perjury that the foregoing is true and correct. Executed on November 1, 2018.

Zackary W. Rad