July 26, 2017

MEMORANDUM TO: Samuel S. Lee, Chief
Licensing Branch 1
Division of New Reactor Licensing
Office of New Reactors

FROM: Omid Tabatabai, Senior Project Manager ***/RA/***
Licensing Branch 1
Division of New Reactor Licensing
Office of New Reactors

SUBJECT: SUMMARY OF JUNE 27, 2017, PUBLIC MEETING WITH NUSCALE POWER, LLC, TO DISCUSS VARIOUS TOPICS RELATED TO SECTION 3.13, "THREADED FASTENERS - ASME CODE CLASS 1, 2, AND 3", SECTION 5.2.3, "REACTOR COOLANT PRESSURE BOUNDARY MATERIALS", SECTION 6.1.1, "ENGINEERED SAFETY FEATURES MATERIALS," AND SECTION 9.1.1, "CRITICALITY SAFETY OF FRESH AND SPENT FUEL STORAGE AND HANDLING," OF THE NUSCALE DESIGN CERTIFICATION APPLICATION (DOCKET NO. 52-048)

On June 27, 2017, representatives of the U.S. Nuclear Regulatory Commission (NRC) and NuScale Power, LLC, (NuScale) held a public teleconference meeting. The purpose of this meeting was to discuss several topics related to Section 3.13, "Threaded Fasteners - ASME Code Class 1, 2, and 3," Section 5.2.3, "Reactor Coolant Pressure Boundary Materials," Section 6.1.1, "Engineered Safety Features Materials," and Section 9.1.1, "Criticality Safety of Fresh and Spent Fuel Storage and Handling," of the NuScale Design Certification Application. (DCA) A complete copy of NuScale's DCA is available on the NRC public Webpage at https://www.nrc.gov/reactors/new-reactors/design-cert/nuscale/documents.html.

Enclosure 1, "Summary of NRC Staff Questions and NuScale Responses," captures NRC staff questions, and NuScale's responses that were discussed during the teleconference.

CONTACT: Omid Tabatabai, NRO/DNRL
301-415-6616

The agenda and list of meeting attendees are included in Enclosures 2 and 3, respectively. The meeting notice is available in the NRC's Agencywide Documents Access and Management System Accession No. ML17178A055. There were no handouts used during this meeting.

Docket No.: 52-048

Enclosures:
1. Summary of NRC Staff Questions and NuScale Responses
2. Agendas
3. Attendees

SUBJECT: SUMMARY OF JUNE 27, 2017, PUBLIC MEETING WITH NUSCALE POWER, LLC, TO DISCUSS VARIOUS TOPICS RELATED TO SECTION 3.13, "THREADED FASTENERS - ASME CODE CLASS 1, 2, AND 3", SECTION 5.2.3, "REACTOR COOLANT PRESSURE BOUNDARY MATERIALS", SECTION 6.1.1, "ENGINEERED SAFETY FEATURES MATERIALS," AND SECTION 9.1.1, "CRITICALITY SAFETY OF FRESH AND SPENT FUEL STORAGE AND HANDLING," OF THE NUSCALE DESIGN CERTIFICATION APPLICATION (DOCKET NO. 52-048)

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STAFF'S QUESTIONS RELATED TO
DESIGN CERTIFICATION APPLICATION SECTION 3.13

REGULATORY BASIS

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix A, General Design Criterion (GDC) 1 requires that structures, systems, and components (SSCs) important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed.

GDC 4 requires that SSCs important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents (LOCA).

ISSUE 3.13-4

Design Criteria Document (DCD) Tier 2, final safety analysis report (FSAR) Table 5.2-4, "Reactor Coolant Pressure Boundary Component Materials Including Reactor Vessel, Attachments, and Appurtenances," states that the RPV flange closure stud bolts, nuts, and washers are made from SB-637 Alloy 718 (N07718).

Section 5.2.3.6 states that Alloy 718 threaded fasteners are also used in the pressurizer (PZR) heater bundle closures, reactor coolant system (RCS) piping flanges, and reactor safety valve (RSV) flanges. Section 3.8.2.1.4 states that the containment vessel (CNV) access opening threaded fasteners are manufactured from Alloy 718. Additionally, Section 6.1.1.1 states that the pressure-retaining bolting and stud materials (studs, nuts and flat washers) for connection of the upper and lower CNV shell flanges, top head, and RPV-to-CNV support ledge shell are fabricated out of Alloy 718.

American Society of Mechanical Engineers (ASME) Code Section II-D, Table 4 has a size restriction on SB-637 Alloy 718 bolting material.

The applicant should provide the sizes of all SB-637 Alloy 718 bolting materials, and other threaded fasteners. This information is necessary for the staff to determine if the RCS design meets ASME Code Section III requirements and 10 CFR 50.55a.

STAFF'S QUESTIONS RELATED TO

DESIGN CERTIFICATION APPLICATION SECTION 5.2.3

ISSUE 1

Title 10 CFR Part 50, Appendix A, GDC 4 requires SSCs to be designed and fabricated to accommodate the effects of environmental conditions during normal, off normal, and accident conditions. Title 10 CFR 52.6 requires that a standard design certification submitted for approval under 10 CFR Part 52, "shall be complete and accurate in all material respects." As described below the staff finds that portions of the NuScale application have conflicting or unclear statements. The conflicting or unclear statements prevent the staff from reaching a conclusion if NuScale design meets GDC 4.

In DCD Tier 2, FSAR Section 5.2.3.4.1, "Prevention of Sensitization and Intergranular Corrosion of Austenitic Stainless Steel," the applicant states the following:

> Avoidance of intergranular attack in austenitic stainless steels is accomplished by five primary methods:
>
> - Use of austenitic stainless steels with a carbon content not exceeding 0.03 wt%

In DCD Tier 2, FSAR Table 5.2-3, "Reactor Safety Valve Materials," the "pilot body, bonnet, disc and set" is specified as SA-479 Type 304 or Type 304L. The use of SA-479 Type 304 material would be not be consistent with the statement in Section 5.2.3.4.1.

The applicant should clarify the statement in Section 5.2.3.4.1,correct Table 5.2-3 to state that only Type 304L material is used, or revise the DCD Tier 2 information in an alternative manner to resolve the aforementioned inconsistency.

ISSUE 2

Title 10 CFR Part 50, Appendix A, GDC 1 and 30 require that components in the reactor coolant pressure boundary (RCPB) shall be designed, fabricated, erected, and tested to the highest quality standards practicable. Title 10 CFR 52.6 requires that a standard design certification submitted for approval under 10 CFR Part 52, "shall be complete and accurate in all material respects." As described below the staff finds that portions of the NuScale application have conflicting or unclear statements. The conflicting or unclear statements prevent the staff from reaching a conclusion if NuScale design meets GDC 1 and GDC 30.

In DCD Tier 2, FSAR Table 5.2-4 "Reactor Coolant Pressure Boundary Component Materials Including Reactor Vessel, Attachments, and Appurtenances," the "RCS Injection and Discharge Isolation Valves" entry references DCD Tier 2, FSAR Table 6.1-2, "Material Specifications for CNV Related non-ESF Components."

As stated in DCD Tier 2, FSAR Table 6.2-5, "Containment Isolation Valve Design Information," the RCS injection discharge valves are part of the containment isolation system. As such, the RCS injection and discharge valves are Engineered Safety Feature (ESF) components and should be described in DCD Tier 2, FSAR Table 6.1-1, “Material Specifications for ESF Components.” The applicant should revise Table 5.2-4 to reference the correct table.

ISSUE 3

Title 10 CFR Part 50, Appendix A, GDC 1 and GDC 30 require that components in the RCPB shall be designed, fabricated, erected, and tested to the highest quality standards practicable. Title 10 CFR Part 50, Appendix A, GDC 4 requires SSCs to be designed and fabricated to accommodate the effects of environmental conditions during normal, off normal, and accident conditions.

In DCD Tier 2, FSAR Table 5.2-4, “Reactor Coolant Pressure Boundary Component Materials Including Reactor Vessel, Attachments, and Appurtenances,” the “RCS Check Valves” entry references DCD Tier 2, FSAR Subsection 5.4.2.5.

Subsection 5.4.2.5 provides a generic statement that the RCS check valves will meet the ASME Code Section III and that the material will be stainless steel or a nickel-based alloy.

This information is insufficient for the staff to make a finding on GDC 1 and GDC 4.

Supplement the DCD Tier 2 information with the material specifications, types, and grades of all RCS components including the RCS check valves.

ISSUE 4

Title 10 CFR Part 50, Appendix A, GDC 1 and GDC 30 require that components in the RCPB shall be designed, fabricated, erected, and tested to the highest quality standards practicable. Title 10 CFR 52.6 requires that a standard design certification submitted for approval under 10 CFR Part 52, “shall be complete and accurate in all material respects.” As described below the staff finds that portions of the NuScale application have conflicting or unclear statements. The conflicting or unclear statements prevent the staff from reaching a conclusion if NuScale design meets GDC 1 and GDC 30.

In DCD Tier 2, FSAR Table 5.2-4, “Reactor Coolant Pressure Boundary Component Materials Including Reactor Vessel, Attachments, and Appurtenances” there is an entry for “safe ends” for the reactor vessel.

The DCD Tier 2 information does not provide clarity into the context of this table entry. Chapter 5 discusses safe ends for eight components: the CNV, the feedwater nozzle, the main steam nozzle, the reactor vent valve, the RSV, the reactor recirculation valve, the control rod drive mechanism, the PZR spray nozzle.

The applicant should provide further clarify of the “safe end” entry in the Table 5.2-4 and supplement the DCD Tier 2 information as necessary.

ISSUE 5

Title 10 CFR Part 50, Appendix A, GDC 4 requires SSCs to be designed and fabricated to accommodate the effects of environmental conditions during normal, off normal, and accident conditions. Title 10 CFR 52.6 requires that a standard design certification submitted for approval under 10 CFR Part 52, “shall be complete and accurate in all material respects.” As described below the staff finds that portions of the NuScale application have conflicting or unclear statements. The conflicting or unclear statements prevent the staff from reaching a conclusion if NuScale design meets GDC 4.

In DCD Tier 2, FSAR Table 5.2-3, "Reactor Safety Valve Materials," and DCD Tier 2, FSAR Table 5.2-4, "Reactor Coolant Pressure Boundary Component Materials Including Reactor Vessel, Attachments, and Appurtenances," weld filler materials E/ER308, E/ER309, and E/ER316 are permitted.

In DCD Tier 2, FSAR Section 5.2.3.4.1, "Prevention of Sensitization and Intergranular Corrosion of Austenitic Stainless Steel," the applicant states the following:

> Avoidance of intergranular attack in austenitic stainless steels is accomplished by five primary methods:
>
> - use of austenitic stainless steels with a carbon content not exceeding 0.03 wt%

In ASME/ American Society for Testing and Materials (ASTM) spent fuel assembly (SFA)-5.4 the maximum carbon content for the weld filler materials are: 0.08 percent for E308, 0.15 percent for E309, and 0.08 percent for E316.

Welding L-grade base metal with normal grade weld filler metal may result in carbon migration during welding. This practice would not be consistent with the staff expectations in Regulatory Guide (RG) 1.44 "Control of the Processing and Use of Stainless Steel."

The applicant should provide a justification on how sensitization of austenitic material is prevented during welding considering that the weld filler material may elevate the amount of carbon into the heat affected zone or the applicant should modify the DCD Tier 2 information to state that the weld filler material must also be L-grade.

ISSUE 6

Title 10 CFR 52.47(a)(9) requires an applicant for a standard design certification to "[identify and describe] all differences in design features, analytical techniques, and procedural measures proposed for the design and those corresponding features, techniques, and measures given in the standard review plan (SRP) acceptance criteria."

NUREG-0800, SRP Section 5.2.3, acceptance Criteria 4.D states that applicants and licensees utilizing electroslag welding may use staff guidance found in RG 1.34, "Control of Electroslag Weld Properties," to demonstrate that the joined metals meet the requirements of GDC 1.

NuScale DCD Tier 2, FSAR Table 1.9-2, "Conformance with Regulatory Guides," states that RG 1.34 is applicable to DCD Tier 2, FSAR Subsections 5.2, "Integrity of Reactor Coolant Boundary", 5.3, "Reactor Vessel", and 5.4, "Reactor Coolant System Components and Subsystem Design."

A search of DCD Tier 2, Chapter 5 revealed that a statement of compliance with RG 1.34 is only found in DCD Tier 2, FSAR Subsection 5.3.1.4. This statement is insufficient to cover all components in the RCS and is not consistent with FSAR Table 1.9-2.

The applicant should supplement DCD Tier 2, Subsections 5.2 and 5.4 with statements on conformance to RG 1.34 or should revise DCD Tier 2, FSAR Table 1.9-2 as appropriate.

ISSUE 7

Title 10 CFR Part 50, Appendix A, GDC 4 requires SSCs to be designed and fabricated to accommodate the effects of environmental conditions during normal, off normal, and accident conditions.

In DCD Tier 2, FSAR Subsection 5.2.3 the applicant describes compliance with RG 1.44, "Control of the Processing and Use of Stainless Steel."

RG 1.44 contains the following statement:

> As described in Section 5.2.3 of NUREG-0800, manufacturing processes should control cold-working and abrasive work such as grinding, to minimize the amount of cold-working, since excessive cold-working in austenitic stainless steels can increase their susceptibility to stress corrosion cracking.

The applicant does not provide a similar statement in DCD. Operating experience has shown that cosmetic cleaning and grinding of nuclear components has resulted in cracking of austenitic stainless steel components.

The applicant should supplement the DCD with a statement similar to the following: "Cold-working and abrasive work, such as grinding, of austenitic stainless steel components shall be avoided unless it is necessary to meet the design requirements."

ISSUE 8

Title 10 CFR Part 50, Appendix A, GDC 4 requires SSCs to be designed and fabricated to accommodate the effects of environmental conditions during normal, off normal, and accident conditions.

In DCD Tier 2, FSAR Subsection 5.2.3, the applicant describes compliance with RG 1.44, "Control of the Processing and Use of Stainless Steel." In general, the applicant states that the NuScale design meets the requirements of RG 1.44 by avoiding sensitization. However, DCD Tier 2, Subsection 5.2.3 does not describe actions that should be taken if austenitic stainless steel material is subjected to sensitization temperatures.

The applicant should supplement the DCD Tier 2 information with a statement on how the applicant will meet RG 1.44, Regulatory Position 5.

RG 1.44, Regulatory Position 5 states that materials exposed to temperatures between 427 to 816 degrees C (800 to 1,500 degrees F) temperatures should be tested in accordance with ASTM A262 "Standard Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels" Practice E. Because the NuScale design mostly utilizes L-grade material, retesting of the L-Grade material is not necessary if the material has been exposed to sensitization temperatures for less than 1 hour.

ISSUE 9

Title 10 CFR Part 50, Appendix A, GDC 4 requires SSCs to be designed and fabricated to accommodate the effects of environmental conditions during normal, off normal, and accident conditions.

In DCD Tier 2, FSAR Table 5.2-4, “Reactor Coolant Pressure Boundary Component Materials Including Reactor Vessel, Attachments, and Appurtenances,” the reactor vessel and steam generators are specified as being welded with filler material ERNiCrFe-13.

Weld filler ERNiCrFe-13 (Alloy 52MSS) has not been used in nuclear power plant applications. Additionally, only a limited amount of research, conducted by Electric Power Research Institute (EPRI) (ADAMS Accession No. ML101590585) and PNNL (ADAMS Accession No. ML11661954), has been done to characterize Alloy 52MSS.

Provide the staff with additional justification on how Alloy 52MSS is suitable for the environmental conditions of the NuScale plant. The justification should contain information on crack susceptibility, crack growth, effects of dilution due to welding, the quantity of testing that has been conducted, and any welding controls or limitations that will be imposed to prevent hot-cracking and limit weld stresses during solidification.

ISSUE 10

Title 10 CFR Part 50, Appendix A, GDC 4 requires SSCs to be designed and fabricated to accommodate the effects of environmental conditions during normal, off normal, and accident conditions.

DCD Tier 2, FSAR Table 5.2-4, “Reactor Coolant Pressure Boundary Component Materials Including Reactor Vessel, Attachments, and Appurtenances,” states that RCS base metal will be welded with ERNiCrFe-7 material (Alloy 52/152). Industry experience has shown significant issues with primary water stress corrosion cracking (PWSCC) of the nickel-based Alloy 600 and the corresponding weld material Alloy 82/182. Alloy 690 and the corresponding weld material Alloy 52/152 has been proposed as an alternative due to its higher better resistance to PWSCC.

However, Alloy 52 welds are not completely immune to PWSCC. Contributing factors which could increase an Alloy 52 butt welds susceptibility to PWSCC include factors (for example, dilution effects on dissimilar metal welds, weld residual stresses, etc.) which may be controlled by the implementation of specific welding processes/parameters (e.g., heat input).

The DCD Tier 2 information should be supplemented. Additional statements should include:

1) Welding procedures will be qualified to minimize tensile stresses on the internal diameters.

2) The welding procedures will appropriately consider and control dilution effects.

3) That weld repairs which will be in contact with the reactor coolant will be made such that there will be compressive stress conditions on the wetted surface.

ISSUE 11

Title 10 CFR 52.6 requires that a standard design certification submitted for approval under 10 CFR Part 52 “shall be complete and accurate in all material respects.” As described below the staff finds that portions of the NuScale application have conflicting or unclear statements.

The staff has reviewed Figure 5.1-1, “NuScale Power Module Major Components,” Figure 5.1-3, “Reactor Coolant System Schematic Flow Diagram,” Figure 5.4-4, “Integral Steam Plenum,” Table 5.2-4, “Reactor Coolant Pressure Boundary Component Materials Including Reactor Vessel, Attachments, and Appurtenances,” and Table 5.2-6, “Reactor Pressure Vessel Inspection Elements.”

The staff cannot identify how the SSCs in the aforementioned figures are described in the aforementioned tables.

The staff requires a figure in the DCD Tier 2 FSAR that will identify the names and locations of all major components in the RCPB, such as the components in the Reactor Pressure Vessel (RPV) and PZR. The figure should also depict connections (welded or flanges) between major components in the RCS.

The staff provides the following issues which highlight why the figure is necessary:

1) Table 5.2-4 contains a “RPV top head”. Does this item include the PZR Baffle Plate? How many subcomponents is the RPV top head made of? All they all made of SA-508 grade 3, class 2 material?

2) The “upper and lower RPV steam generator shells” in Table 5.2-4 are not described in any figures nor is the term found elsewhere in Chapter 5. The “Reactor Pressure Vessel” shown in Figure 5.1.1 and “16. Reactor Vessel” in Figure 5.1-3 is not mentioned in Table 5.2-4. Are the “upper and lower RPV steam generator shells” and the “Reactor Pressure Vessels” related?

3) Where are the “upper and lower RPV steam generator shells” depicted? Are these components part of the riser?

ISSUE 12

Title 10 CFR 52.6 requires that a standard design certification submitted for approval under 10 CFR Part 52 “shall be complete and accurate in all material respects.” As described below the staff finds that portions of the NuScale application have conflicting or unclear statements.

The feed plenum is not mentioned in DCD Tier 2, FSAR Table 5.2-4, “Reactor Coolant Pressure Boundary Component Materials Including Reactor Vessel, Attachments, and Appurtenances.” Yet, the feed plenum tube sheet and the feed plenum forging should retain RCS pressure.

Provide a justification why these components are not listed in FSAR Table 5.2-4 or supplement the FSAR Table 5.2-4 with the additional components.

ISSUE 13

Title 10 CFR 52.47 requires that a standard design certification submitted for approval under 10 CFR Part 52 shall "contain a level of design information sufficient to enable the Commission … to reach a final conclusion on all safety questions associated with the design."

DCD Tier 2, FSAR Figure 5.4-4, "Integral Steam Plenum" and DCD Tier 2, FSAR Figure 5.4-16, "Pressurizer region of Reactor Vessel" depict holes in the PZR Baffle Plate which appear to be clad. The reactor coolant holes (which allow water to pass between the RPV and the PZR region) are described in DCD Tier 2, FSAR Section 5.4.5.2 as being four inches in diameter. There additional holes in the PZR baffle plate depicted in FSAR Figure 5.4-4.

The staff requests the following information on the cladding of the PZR Baffle Plate:

1) Is it correct that the holes in the baffle plate will be clad?

    a. Considering the diameter of the holes, does NuScale impose any additional requirements on the welding process to ensure that the limited accessibility does not result in defective cladding (for instance, conformance with the guidance in RG 1.71 "Welder Qualification for Areas of Limited Accessibility")?

    b. Does the size of the holes present a difficulty in evaluating that two layers of cladding exist or the nondestructive examination of the cladding surface?

2) Will this hole be clad with a welding process or will the hole be lined with a stainless steel sleeve which is welded to other cladding?

ISSUE 14

Title 10 CFR 52.47 requires that a standard design certification submitted for approval under 10 CFR Part 52 shall "contain a level of design information sufficient to enable the Commission … to reach a final conclusion on all safety questions associated with the design."

DCD Tier 2, FSAR Section 5.4.5.5 states: "Additionally, the upper surface of the baffle plate in the regions of the SG integral steam plenums is clad with nickel-based Alloy 690 material (UNS N06690) for compatibility." The information provided in the DCD is insufficient for the staff to understand where the Alloy 690 material will be used.

Describe in detail where in the SG integral steam plenums that the Alloy 690 is used as cladding:

a) Is the Alloy 690 cladding only use for the weldment between the forging and steam plenum cap?

b) Is it used on the forging under the steam plenum cap?

c) Does the Alloy 690 cladding extend further to include the baffle plate holes?

The current DCD Tier 2 FSAR figures do not differentiate between different cladding materials. As such, a combined operating license (COL) applicant or member of the public may erroneously assume that all cladding in the NuScale power module is E/ER 308/309 austenitic stainless steel. The applicant should update the DCD Tier 2 FSAR figures to show the locations of the Alloy 690 cladding.

ISSUE 15

Title 10 CFR 52.47 requires that a standard design certification submitted for approval under 10 CFR Part 52 shall "contain a level of design information sufficient to enable the Commission … to reach a final conclusion on all safety questions associated with the design."

In DCD Tier 2, FSAR Figure 5.4-4, "Integral Steam Plenum" and DCD Tier 2, FSAR Figure 5.4-16 "Pressurizer region of Reactor Vessel" there appears to be penetrations in the RPV (below the PZR baffle plate) that sit very close to the SG tubes.

1. What are these penetrations?
2. What are the in-service inspection requirements for these components?
3. Is ISI possible considering the proximity to the steam generator tubes?

If the in-service inspection requirements are not provided in the DCD Tier 2 information, the applicant should supplement the FSAR with this information or the applicant should provide a justification why the information is not necessary.

ISSUE 16

Title 10 CFR 52.47 requires that a standard design certification submitted for approval under 10 CFR Part 52 shall "contain a level of design information sufficient to enable the Commission … to reach a final conclusion on all safety questions associated with the design."

RCS Class 1 piping that penetrates the RPV is not listed in DCD Tier 2, FSAR Table 5.2-4, "Reactor Coolant Pressure Boundary Component Materials Including Reactor Vessel, Attachments, and Appurtenances." Akin to hot-legs and cold-legs in a large light water reactor, the staff requires information on all materials that are part of the RCS regardless of whether they sit within the RPV or within containment.

Supplement Table 5.2-4 with all components that are part of the RCS or supplement the table with references where the component's materials specifications can be found.

ISSUE 17

Title 10 CFR Part 50, Appendix A, GDC 4 requires SSCs to be designed and fabricated to accommodate the effects of environmental conditions during normal, off normal, and accident conditions.

DCD Tier 2, FSAR Figure 5.1-3, "Reactor Coolants System Schematic Flow Diagram," shows a component welded to the Upper RPV with two penetrations (above the Upper RPV Flange and below the downcommer transition). The staff believes that this component corresponds to the "ultrasonic testing sensor nozzles" in DCD Tier 2, FSAR Table 5.2-4, "Reactor Coolant Pressure Boundary Component Materials Including Reactor Vessel, Attachments, and Appurtenances."

Based upon this information the staff believes that the Upper RPV contains multiple Type 304/304L austenitic stainless steel to Grade 3, Class 2 low alloy steel dissimilar metal welds.

The applicant should supplement the DCD Tier 2 information as necessary to describe controls or requirements for the dissimilar metal weld which will ensure that the weldment and heat effected zone are not prone to degradation (due to migration of alloying elements, heat treatment after welding, etc.).

ISSUE 18

Title 10 CFR Part 50, Appendix A, GDC 1 and 30 require that components in the RCPB shall be designed, fabricated, erected, and tested to the highest quality standards practicable.

ASME Code Section III, NB-3661 permits the use of socket welds for pipes sized less than 2 Nominal Pipe Size (NPS). This allowance was created by ASME for small diameter piping in large light water reactors in which the failure of a 2 NPS line can be mitigated by normal makeup. The NuScale power module is smaller in size and utilizes small piping than traditional light water reactors. The failure of small diameter piping may result in a valid Emergency Safety Features (ESF) actuation. As such, the assumption made by ASME on the safety significance of small piping may not hold.

The staff requests the following information if applicable:

1) Provide the staff with a list of all socket welds which are used in the RCS.

2) Describe any socket welds which are located in areas where “the existence of crevices could accelerate corrosion” (footnote 24, ASME Code Section III, NB).

3) Describe any small lines penetrating the RCS where the (1) the small line is welded to the cladding and (2) the weld between the cladding and the components provides a pressure-retaining function or structural support (i.e., welds between components and cladding whose failure would result in immediate loss of RCS pressure).

ISSUE 19

Title 10 CFR Part 50, Appendix A, GDC 1 and 30 require that components in the RCPB shall be designed, fabricated, erected, and tested to the highest quality standards practicable. Title 10 CFR 52.6 requires that a standard design certification submitted for approval under 10 CFR Part 52 “shall be complete and accurate in all material respects.”

At the May 2017, ASME Code Week meetings in Anchorage, Alaska, a representative from NuScale presented public statements that are not in agreement with the docketed information. The staff asks for correction of the docketed information or confirmation that the docketed information is correct.

1) Confirm that the reactor vessel head will meet the requirements of SA-508, Section 4.1 and SA-788, Section 6 as inferred in DCD Tier 2, FSAR Table 5.2-4, “Reactor Coolant Pressure Boundary Component Materials Including Reactor Vessel, Attachments, and Appurtenances.”

2) In Technical Report (TR)-0716-50439-P, “NuScale Comprehensive Vibration Assessment Program Technical Report,” Figure 2-20, “Pressurizer spray reactor vessel internals,” appears to depict that the RPV Top Head is a single piece that has one weld – the RPV top head to the PZR shell. Confirm that the staff interpretation of this drawing

is correct. If the staff interpretation is not correct, provide the staff with a description of subcomponents in the RPV Top Head (other than the piping penetrations and PZR heater penetrations and flanges).

ISSUE 20

Title 10 CFR Part 50, Appendix A, GDC 4 requires SSCs to be designed and fabricated to accommodate the effects of environmental conditions during normal, off normal, and accident conditions. Title 10 CFR 52.6 requires that a standard design certification submitted for approval under 10 CFR Part 52 “shall be complete and accurate in all material respects.” At the May 2017, ASME Code Week meetings, a representative from NuScale presented public statements that are not in agreement with the docketed information. The staff asks for correction of the docketed information or confirmation that the submitted on the docket information is correct.

DCD Tier 2, FSAR Table 5.2-4, “Reactor Coolant Pressure Boundary Component Materials Including Reactor Vessel, Attachments, and Appurtenances,” describes weld filler material (including cladding) specifications for the RCS.

Confirm that the material used for the RCS cladding will meet the aforementioned specifications.

ISSUE 21

Title 10 CFR Part 50, Appendix A, GDC 4 requires SSCs to be designed and fabricated to accommodate the effects of environmental conditions during normal, off normal, and accident conditions.

DCD Tier 2, FSAR Section 5.2.3.2.2, “Compatibility of Construction Materials with Reactor Coolant,” states:

> The inside and outside surfaces of the RPV low alloy steels are clad with austenitic stainless steel. The cladding on the inside surfaces is deposited with at least two layers; the first layer is Type 309L and subsequent layers are Type 308L. The cladding on the outside surfaces is deposited with at least one layer of Type 309L.

DCD Tier 2, FSAR Table 5.3-1, “Reactor Vessel Parameters,” infers that the reactor vessel and PZR are either 4 inches in thickness, 4.3 inches in thickness, or 4.5 inches in thickness. The interior surfaces of the reactor vessel is clad in 0.25 inches of stainless steel. Based upon the text in the FSAR, the staff believes that the baffle plate would have both surfaces clad with of 0.25 inches of stainless steel. The staff is concerned that the ratio of cladding thickness to base metal thickness is sufficient to produce distortion especially in for the baffle plate.

Provide information regarding the following:

1) Does the applicant expect that the cladding will be machined for surface finish?

2) Does the applicant expect that the cladding will be machined due to the effects of weld distortion?

3) If machining is done, how will the applicant ensure that the final state of the interior reactor pressure boundary material will meet the minimum two layers of cladding requirement? How is the machined layer of cladding sufficient considering that it may be thinner than the first layer of cladding?

If machining is done, supplement the DCD Tier 2 information with process controls that will ensure that the final state of the reactor pressure boundary cladding will meet the applicable minimum two layers of cladding requirement.

ISSUE 22

Title 10 CFR Part 50, Appendix A, GDC 4 requires SSCs to be designed and fabricated to accommodate the effects of environmental conditions during normal, off normal, and accident conditions. Title 10 CFR 52.47 requires that a standard design certification submitted for approval under 10 CFR Part 52 shall "contain a level of design information sufficient to enable the Commission … to reach a final conclusion on all safety questions associated with the design." As described below the staff finds that the NuScale application does not include necessary information for the staff to reach a safety finding.

DCD Tier 2, FSAR Section 5.2.3 addresses the primary coolant chemistry controls. This information is traditional found in DCD Tier 2, FSAR Section 9.3.4, "Chemical and Volume Control System (CVCS) (Including boron recover system)." By moving technical information from FSAR Section 9.3.4 to FSAR Section 5.2.3, the applicant must address aspects of NUREG-0800, SRP Section 9.3.4 in DCD Tier 2, FSAR Section 5.2.3.

SRP Section 9.3.4, ASME Code Section III, "Review Procedure," item 1.E instructs the review to "evaluate the proposed chemistry program with respect to that described in the latest version in the EPRI report series, "PWR Primary Water Guidelines.""

The applicant does not describe a primary water chemistry program and instead passes this requirement to a COL applicant in COL Item 5.2-4.

The staff finds this approach unacceptable. The primary water chemistry program is not a site-specific element. The applicant has sufficient detailed design information to construct the basis for a primary water chemistry program (see issues 25-27). Additionally, the applicant does not specify which version of the EPRI Primary Water Chemistry Guidelines will be used.

The applicant should revise COL 5.2-4 as follows:

> …The Strategic Water Chemistry Plan will provide the optimization strategy for maintaining primary coolant chemistry and provide the basis for requirements for sampling and analysis frequencies, and corrective actions for control of primary water chemistry consistent with the **latest version of the** Electric Power Research Institute Pressurized Water Reactor Primary Water Chemistry Guidelines.

ISSUE 23

Title 10 CFR Part 50, Appendix A, GDC 4 requires SSCs to be designed and fabricated to accommodate the effects of environmental conditions during normal, off normal, and accident conditions.

FSAR Section 5.2.3.2.1, "Reactor Coolant Chemistry," does not provide any detail on the diagnostic parameters as mentioned in the EPRI Pressurized-Water Reactor (PWR) Primary Water Chemistry Guidelines. Although the EPRI PWR Primary Water Chemistry Guidelines do not mandate any limits, the diagnostic parameters should be monitored as they provide an additional level of protection from corrosion, radiation protection and other failures.

The staff requests that the applicant supplement the DCD Tier 2 information with diagnostic parameters to be monitored. This should include; boron, silica, conductivity and suspended solids. The applicant should provide acceptance criteria for the diagnostic parameters which should define when corrective action is necessary.

ISSUE 24

Title 10 CFR 52.47 requires that a standard design certification submitted for approval under 10 CFR Part 52 shall "contain a level of design information sufficient to enable the Commission … to reach a final conclusion on all safety questions associated with the design." As described below the staff finds that the NuScale application does not include necessary information for the staff to reach a safety finding.

DCD Tier 2, FSAR Section 5.2.3 does not provide detail on the pH range of the primary coolant. FSAR Section 5.2.3 does not provide information on what pH control program it will be used. FSAR Section 5.2.3 does not describe how the pH program will meet the EPRI PWR Primary Water Chemistry Guidelines.

Supplement DCD Tier 2, FSAR Section 5.2.3 with details on the pH control for the primary coolant. This should include a discussion on the planned chemistry regime considering the use of lithium in the reactor coolant (Coordinated Chemistry, Modified Chemistry, etc.)

ISSUE 25

Title 10 CFR Part 50, Appendix A, GDC 14 requires assurance that the RCPB have an extremely low probability of abnormal leakage, rapidly propagating failure, and of gross rupture. Title 10 CFR 52.47 requires that a standard design certification submitted for approval under 10 CFR Part 52 shall "contain a level of design information sufficient to enable the Commission … to reach a final conclusion on all safety questions associated with the design." As described below the staff finds that the NuScale application does not include necessary information for the staff to reach a safety finding.

DCD Tier 2, FSAR Section 5.2.3.2.1 addresses reactor coolant chemistry. This section discusses, in part, the parameters and impurity limitations that will be monitored during power operations. However, this section only provides limited information regarding the reactor coolant chemistry parameters and impurities to be monitored.

The applicant should:

1) Supplement the DCD Tier 2 information with the reactor coolant chemistry parameters and impurity limitations for all modes of operation. For example, Revision 7 of the EPRI PWR Primary Water Chemistry Guidelines provides parameters for cold shutdown, startup, and power operation.

2) Due to the unique design of the NuScale Power Modules (NPMs), describe the impacts of the reactor pool water chemistry on the reactor coolant chemistry during refueling outages. This should include expected impurity levels in the reactor coolant when the NPMs are open to the reactor pool, as well as the capability of the CVCS to maintain primary water chemistry at acceptable levels during this time.

ISSUE 26

Title 10 CFR Part 50, Appendix A, GDC 4 requires SSCs to be designed and fabricated to accommodate the effects of environmental conditions during normal, off normal, and accident conditions.

Then in DCD Tier 2, FSAR Section 5.2.3.4.2, “Cleaning and Contamination Protection Procedures” the applicant states:

> Cleaning of austenitic stainless steel components complies with ASME NQA-1 requirements (Reference 5.2-5). The final cleanness of the RCPB internal surfaces meets the requirements for "Class B" of Subpart 2.1.

The applicant should provide the following:

1) Describe and supplement the DCD Tier 2 information with the acceptance criteria for the cleanness of the outer surfaces of the RCPB.

2) Considering that the RCPB for the NuScale power module is primarily composed of ferritic materials clad with austenitic stainless steel, would the text in FSAR Section 5.2.3.4.2 apply to all components in the RCPB? If not:

    a. What components would it not apply to?

    b. What would the cleanness requirements be for these components?

    c. Supplement the DCD Tier 2 information with cleanness requirements for RCPB components that would not be required to meet FSAR Section 5.2.3.4.2

ISSUE 27

Title 10 CFR Part 50, Appendix A, GDC 4 requires SSCs to be designed and fabricated to accommodate the effects of environmental conditions during normal, off normal, and accident conditions.

In DCD Tier 2, FSAR Section 5.2.3, the applicant provides a discussion on the cladding for ferritic steel components. The applicant specifies the materials used for cladding, the preheat requirements for cladding, Non-Destructive Evaluation requirements for base metal prior to cladding application, preheat controls and qualification requirements to prevent under-bead cracking, and post weld heat treatment requirements. The applicant also states that welding of ferritic steels will be qualified in accordance with ASME Code Section IX – however it is not apparent that all of ASME Code Section IX applies to the cladding.

The applicant does not provide a welding code that will be utilized for the cladding process.

The applicant should supplement the DCD Tier 2 information with:

1) A statement that the qualification of cladding welding and welders will meet the requirements of ASME Code Section IX. If ASME Code Section IX will not be used, the applicant should describe how the qualification of cladding welding and welders will be conducted.

2) Provide the code of construction for the cladding welding process.

3) Provide details on NDE requirements for the cladding and acceptance criteria for any defects that are found.

ISSUE 28

COL Item 5.2-3 states the following:

> A COL applicant that references the NuScale Power Plant design certification will establish measures to control the on-site cleaning of RPV and pressure-retaining components associated with the RCPB during construction.

Then in DCD Tier 2, FSAR Section 5.2.3.4.2, “Cleaning and Contamination Protection Procedures” the applicant states:

> Cleaning of austenitic stainless steel components complies with ASME NQA-1 requirements (Reference 5.2-5). The final cleanness of the RCPB internal surfaces meets the requirements for "Class B" of Subpart 2.1.

ASME NQA-1, Subpart 2.1, “Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components for Nuclear Power Plants,” Section 100 provides the scope of this subpart as:

> Subpart 2.1 provides amplified requirements for the management of cleaning and cleanness control of fluid systems and associated components for nuclear power plants during manufacturing, construction, repairs, and modifications. [emphasis added]

The cleanness requirements for the RPV and other ASME Code components are imposed by ASME NQA-1 and will be invoked through the COL applicant’s quality assurance program.

COL Item 5.2-3 should be deleted.

STAFF'S QUESTIONS RELATED TO DESIGN CERTIFICATION APPLICATION SECTION 6.1.1

REGULATORY BASIS

Title 10 CFR Part 50, Appendix A, GDC 1 requires that SSCs important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed.

GDC 4 requires that SSCs important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including LOCAs.

ISSUE 6.1.1-15

The NuScale design is unique in that the CNV is thicker than a containment in a typical light water reactor. The design of the NuScale CNV is similar to the NuScale RPV in that they are both thick components. Electroslag welding can be used to weld thick components and has a high deposit rate.

NUREG-0800, SRP Section 5.2.3 states that applicants and licensees utilizing electroslag welding may use staff guidance found in RG 1.34, "Control of Electroslag Weld Properties," to demonstrate that the joined metals meet the requirements of GDC 1.

NuScale DCD Tier 2, FSAR Table 1.9-2, "Conformance with Regulatory Guides," states that RG 1.34 is applicable to DCD Tier 2, FSAR Subsections 5.2, "Integrity of Reactor Coolant Boundary," 5.3, "Reactor Vessel," and 5.4 "Reactor Coolant System Components and Subsystem Design." However, Table 1.9-2 and DCD Tier 2, FSAR Subsection 6.1.1 do not state that RG 1.34 is applicable.

Due to the unique NuScale design, and the similarities to the RPV and CNV components, the applicant should supplement DCD Tier 2, Subsection 6.1.1 with statements on conformance to RG 1.34, or provide justification on how the quality of any electroslag welds will be controlled.

ISSUE 6.1.1-16

DCD Tier 2, FSAR Table 6.1-1, "Material Specifications for ESF Components," states that ESF component base metal will be welded with ERNiCrFe-7 material (Alloy 52/152). Industry experience has shown significant issues with SCC of the nickel-based Alloy 600 and the corresponding weld material Alloy 82/182. Alloy 690 and the corresponding weld material Alloy 52/152 has been proposed as an alternative due to its higher better resistance to SCC.

However, Alloy 52 welds are not completely immune to SCC. Contributing factors which could increase an Alloy 52 butt welds susceptibility to SCC include factors (for example dilution effects on dissimilar metal welds, weld residual stresses, etc.) which may be controlled by the implementation of specific welding processes/parameters (e.g., heat input).

The DCD Tier 2 information should be supplemented. Additional statements should include:

1) Welding procedures will be qualified to minimize tensile stresses on the internal diameters.

2) The welding procedures will appropriately consider and control dilution effects

3) That weld repairs which will be in contact with the reactor coolant will be made such that there will be compressive stress conditions on the wetted surface.

STAFF'S QUESTIONS RELATED TO

DESIGN CERTIFICATION APPLICATION SECTION 9.1.1

Title CFR Part 50, Appendix A, GDC 62 requires preventing criticality in the fuel storage and handling system through the use of physical systems or processes. For the NuScale design the applicant utilizes a neutron absorbing material to prevent spent fuel re-criticality. TR-0816-49833-P, Revision 0 "Fuel Storage Rack Analysis" describes the fuel storage racks and provides analyses which demonstrates that the fuel storage racks meet GDC 62.

The staff finds that TR-0816-49833-P does not contain information on how neutron absorbing material is qualified. Qualification testing should ensure that the neutron absorber is suitable during fabrication, shipping, construction, and operation. Additionally, the TR does not impose process controls to ensure that the manufactured material meets the safety functions described in TR-0816-49833-P.

Additional guidance on the qualification of neutron absorber material may be found in Interim Staff Guidance document SFST-ISG-23, Revision 0, "Application of ASTM Standard Practice C1671-07 when performing technical reviews of spent fuel storage and transportation packaging licensing actions," and ASTM C-1671-07, "Qualification and Acceptance of Boron Based Metallic Neutron Absorbers for Nuclear Criticality Control for Dry Cask Storage System and Transportation Packaging." The staff acknowledges that SFST-ISG-23 and ASTM C1671-07 contain some aspects which are specific to dry spent fuel storage, however the majority of content in both documents are generic. Additional conditions or clarifications on the use of SFST-ISG-23 and ASTM C1671-07 are provided below.

The following list of issues summarize the staff concerns.

Issue 1 – Material Fabrication

The key processes and controls on the key processes should be described. Key processes should include neutron absorber material fabrication methods (e.g., extrusion, stir casting, compaction process, etc.), whether cladding is used, raw material specifications, etc. Process controls should include particle size distribution limitations, heat treatment ranges, ratio of B_4C to Al, minimum density, contamination controls, etc. The process controls shall prevent changes to the fabrication process which could impact the credited safety function or introduce new degradation mechanisms.

In addition, TR-0816-49833-P, Section 3.4.1.3.2, "Neutron Absorber Material Specification," should be expanded to describe acceptance testing which will verify that key process controls were met during fabrication.

Revise FSAR Section 9.1.1 or TR-0816-49833-P to describe how the material fabrication will be controlled to ensure that the manufactured product is consistent with the licensing basis. Alternatively, the applicant may commit to meeting ASTM C1671-07 (in particular Section 5.2.7, "Key Processes and Process Controls") subject to the conditions on

ASTM C1671-07 in SFST-ISG-23, with the following modification:

SFST-ISG-23, Revision 0 states:

> **"Clarification regarding use of Sections 5.2.7 and 5.3 of ASTM C1671-07"**
> When implementing Sections 5.2.7 and 5.3, a description of the key processes, major operations process controls, and the acceptance testing steps of neutron absorbing materials ~~should be included in Chapter 8 of a Part 71 application, and the proposed Technical Specifications in a Part 72 application~~.

For the purpose of the NuScale application, the applicant should modify the guidance in SFST-ISG-23, Revision 0 as follows:

> **Modification:**
>
> **"Clarification regarding use of Sections 5.2.7 and 5.3 of ASTM C1671-07"**
>
> When implementing Sections 5.2.7 and 5.3, a description of the key processes, major operations process controls, and the acceptance testing steps of neutron absorbing materials shall be described by a COL applicant. A COL information item shall be added to the DCD.

Issue 2 – Environmental Compatibility

Neutron absorber material qualification testing should demonstrate that the material is suitable for use in the spent fuel pool (SFP) environment for the lifetime of the component. Qualification testing should verify that the safety functions of the neutron absorber are not impaired by radiation damage, borated water, or boiling temperatures. Testing should verify that prolonged immersion in SFP water will not result in the formation of gas pockets (hydrogen or steam) which can interfere with SFA withdrawal or may impact subcriticality.

Revise FSAR Section 9.1.1 or TR-0816-49833-P to describe how the material will be qualified for environmental compatibility. Alternatively, the applicant may commit to meeting ASTM C1671-07 (in particular Section 5.2.3, "Environmental Qualification Tests") subject to the conditions on ASTM C1671-07 in SFST-ISG-23, with the following modification:

SFST-ISG-23, Revision 0states:

> **"Additional guidance regarding use of Section 5.2.5.3 of ASTM C1671-07:"**
>
> ~~The following additional guidance applies to Section 5.2.5.3: Neutron absorbing materials should undergo testing to simulate submersion and subsequent cask drying conditions, as part of a qualifying test program~~.
>
> ~~Clad aluminum/boron carbide neutron absorbers with open porosities between one and three percent have exhibited blistering after canister drying. This blistering was due to flash steaming of water that was trapped in pores. The staff is concerned that such blistering could have an adverse impact on fuel retrievability.~~

> ~~Unclad aluminum/boron carbide neutron absorbing materials with open porosities less than 0.5- volume percent may not be required to undergo simulated submersion and drying tests~~.

For the purpose of the NuScale application, the applicant should modify the guidance in SFST-ISG-23, Revision 0 as follows:

> **"Additional guidance regarding use of Section 5.2.5.3 of ASTM C1671-07:"**
>
> <u>The environmental qualification testing shall demonstrate that the material is not prone to blistering</u>.

<u>Issue 3 – Material Structural Adequacy</u>

If the material is not credited with a structural design function, testing shall demonstrate that the neutron absorber has sufficient strength and ductility to prevent cracking, fracture, or other significant damage during fabrication, shipping, and operation.

Revise FSAR Section 9.1.1 or TR-0816-49833-P to describe how the material will be qualified for structural adequacy. Alternatively, the applicant may commit to meeting ASTM C1671-07 (in particular Section 5.2.6, "Mechanical, Absorber Uniformity, and Other Qualification Testing") subject to the conditions on ASTM C1671-07 in SFST-ISG-23.

<u>Issue 4 – Neutron Absorption Properties</u>

Neutron absorber material qualification testing should demonstrate that the material has sufficient neutron absorption properties to achieve its design function. Uniformity of the neutron absorber, measurement uncertainties, and biases should be assessed during qualification. The assessments shall be used to demonstrate that the neutron attenuation measurements of the production material is sufficiently conservative.

The applicant should define neutron attenuation acceptance criteria and methods of assessing bias and uncertainty for the production material. The acceptance criteria and methods shall be used to verify that the production material meets the licensing basis.

Revise FSAR Section 9.1.1 or TR-0816-49833-P to describe how the material will be qualified for neutron absorption properties. Alternatively, the applicant may commit to meeting ASTM C1671-07 (in particular Section 5.2.6, "Mechanical, Absorber Uniformity, and Other Qualification Testing," and Section 5.3, "Neutron Absorber Material Acceptance Testing") subject to the conditions on ASTM C1671-07 in SFST-ISG-23, with the following modification:

SFST-ISG-23, Revision 0 states:

> **"Additional guidance regarding use of Section 5.2.6.2 and 5.3.4.1 of ASTM C1671-07"**
>
> ….
>
> ~~If 90-percent credit is taken for the efficacy of the neutron absorber, methods other than neutron attenuation should be used only as verification or partial substitution for attenuation tests. Benchmarking of other methods, against neutron attenuation testing, should be done periodically throughout acceptance testing, under appropriate attenuation conditions and with proper sample sizes.~~

> ~~This should be done to confirm the adequacy of the proposed methods, as the staff considers direct measurement of neutron attenuation to be the most reliable method of measuring the expected neutron absorbing behavior of the poison plates.~~
>
> ~~For neutron absorbing materials for which 75-percent credit is taken, direct neutron attenuation measurements should only be part of the qualification program, which should include benchmarking for other methods used to determine the boron-10 areal density. Once qualified and benchmarked, the alternative methods which have been validated by attenuation measurements, such as wet chemistry analyses, are sufficient to verify the minimum areal density of the neutron absorbing material during acceptance testing.~~

For the purpose of the NuScale application, the applicant should modify the guidance in SFST-ISG-23, Revision 0 as follows:

> **"Additional guidance regarding use of Section 5.2.6.2 and 5.3.4.1 of ASTM C1671-07"**
>
> ….
>
> Direct neutron attenuation measurements shall be used to verify that production material is in conformance with the design analyses. Methods other than neutron attenuation should be used only as verification or partial substitution for attenuation tests. Benchmarking of other methods, against neutron attenuation testing, should be done periodically throughout acceptance testing, under appropriate attenuation conditions and with proper sample sizes. This should be done to confirm the adequacy of the proposed methods, as the staff considers direct measurement of neutron attenuation to be the most reliable method of measuring the expected neutron absorbing behavior of the poison plates.

DISPOSITION OF STAFF'S QUESTIONS

The staff discussed 32 issues with NuScale during the teleconference. All issues and staff questions were given a disposition of:

- "NuScale to submit a supplement to the docketed information,"
- "No action necessary,"
- "Pending further staff review," or
- "Staff to issue RAI."

One issue regarding, threaded fasteners, was deferred to an upcoming audit.

For the "no action necessary" dispositioned items, NuScale provided additional clarification during the teleconference and the staff determined that: (1) follow-up action should be deferred to another NRC staff technical reviewer, (2) the staff interpretation of the FSAR was correct and a docketed supplement was not necessary to meet NRC regulations, or (3) the staff's issue is not applicable to the NuScale design.

A summary of the dispositions are as follows:

FSAR Section	Issue #	Disposition
3.13	3.13-4	Deferred until audit
5.2.3	5.2.3-1, 5.2.3-2, 5.2.3-4, 5.2.3-5, 5.2.3-6, 5.2.3-7, 5.2.3-8, 5.2.3-9, 5.2.3-11, 5.2.3-12, 5.2.3-13, 5.2.3-16, 5.2.3-18, 5.2.3-22, 5.2.3-23, 5.2.3-25, 5.2.3-26, 5.2.3-28	NuScale to provide docketed supplement
	5.2.3-14, 5.2.3-15, 5.2.3-17, 5.2.3-19, 5.2.3-20, 5.2.3-21	No Action
	5.2.3-10, 5.2.3-24	Pending further NRC staff review
	5.2.3-3, 5.2.3-27	NRC Staff to issue RAI
6.1.1	6.1.1-15, 5.2.3-18*	NuScale to provide docketed supplement
	6.1.1-16	Pending further NRC staff review
9.1.1	9.1.1-1 (the entirety of the issue list)	NRC Staff to issue RAI

*As discussed during the teleconference, NuScale's supplement in response to issue Sections 5.2.3-18 will include two similar statements in FSAR Section 5.2.3 and FSAR Section 6.1.1. These statements will uniformly address the issue for the RCS and the containment system.

MEETING AGENDA

Tuesday, June 27, 2017

Time	Topic	Speaker
1:00 pm – 1:10 pm	Introductions	NRC/NuScale
1:10 pm – 2:45 pm	Discussion of staff questions	NRC/NuScale
2:45 pm – 2:55 pm	Public Comments	All
2:55 pm – 3:00 pm	Meeting Conclusion	NRC/NuScale

LIST OF ATTENDEES

NuScale

Geoff Quinn
Steve Unikewicz
Marty Bryan
Tamas Liszkai
Greg Myers
Matt Mallet
HQ Xu
Jon Muniga
Carrie Fosaaen
Paul Pigman
Paul Guinn

NRC Staff

Matt Mitchell
Omid Tabatabai
Bruce Bavol
Marieliz Vera
Anthony Markley
Nicholas McMurray
Andrew Yeshnik