October 2, 2017

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

FROM: Marieliz Vera, Project Manager ***/RA/***
Licensing Branch 1
Division of New Reactor Licensing
Office of New Reactors

SUBJECT: SUMMARY OF MAY 16, 2017, CATEGORY 1 PUBLIC TELECONFERENCE TO DISCUSS NUSCALE POWER, LLC'S DESIGN CERTIFICATION APPLICATION CHAPTER 9, SECTION 9.3.2, "PROCESS SAMPLING SYSTEM"; CHAPTER 3, SECTION 3.13, "THREADED FASTENERS (AMERICAN SOCIETY OF MECHANICAL ENGINEERS CODE CLASS 1, 2, AND 3)"; CHAPTER 6, SECTION 6.1.1, "METALLIC MATERIALS;" AND CHAPTER 10, SECTION 10.3.6, "STEAM AND FEEDWATER SYSTEM MATERIALS"

The U.S. Nuclear Regulatory Commission (NRC) held a Category 1 public teleconference on May 16, 2017, to discuss NuScale Power, LLC's (NuScale) Design Certification (DC), Chapter 9, Section 9.3.2, "Process Sampling System"; Chapter 3, Section 3.13, "Threaded Fasteners (ASME Code Class 1, 2, and 3)"; Chapter 6, Section 6.1.1, "Metallic Materials;" and Chapter 10, Section 10.3.6, "Steam and Feedwater System Materials." Participants included personnel from NuScale. There were no members of the public.

The public meeting notice can be found in the Agencywide Documents Access and Management Systems under Accession No. ML17132A133. This meeting notice was also posted on the NRC public website.

The meeting agenda and list of participants can be found in Enclosures 1 and 2, respectively. The technical issues discussed are included in Enclosure 3.

CONTACT: Marieliz Vera, NRO/DNRL
301-415-5861

**SUMMARY**:

The purpose of this teleconference was early applicant engagement on DC, Section 9.3.2, Section 3.13, Section 6.1.1, and Section 10.3.6. Each issue presented by NRC staff (Enclosure 3) will be addressed by NuScale supplementing the DC as required.
No comments from members of the public were received.

Docket No. 52-048

Enclosures:
1. Public Meeting
2. List of Attendees
3. MCB Public Teleconference

cc w/encls.: DC NuScale Power, LLC Listserv

SUBJECT: SUMMARY OF MAY 16, 2017, CATEGORY 1 PUBLIC TELECONFERENCE TO DISCUSS NUSCALE POWER, LLC'S DESIGN CERTIFICATION APPLICATION CHAPTER 9, SECTION 9.3.2, "PROCESS SAMPLING SYSTEM"; CHAPTER 3, SECTION 3.13, "THREADED FASTENERS (AMERICAN SOCIETY OF MECHANICAL ENGINEERS CODE CLASS 1, 2, AND 3)"; CHAPTER 6, SECTION 6.1.1, "METALLIC MATERIALS;" AND CHAPTER 10, SECTION 10.3.6, "STEAM AND FEEDWATER SYSTEM MATERIALS" DATED: 10/02/2017

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**U.S. NUCLEAR REGULATORY COMMISSION**

**CATEGORY 1 PUBLIC TELECONFERENCE**

**TO DISCUSS NUSCALE POWER, LLC'S DESIGN CERTIFICATION APPLICATION**

**CHAPTER 9, SECTION 9.3.2, CHAPTER 3, SECTION 3.13, CHAPTER 6, SECTION 6.1.1,**

**AND CHAPTER 10, SECTION 10.3.6**

**MAY 16, 2017**

**1:00 P.M. – 3:00 P.M.**

**AGENDA**

| **Public Meeting** | |
|---|---|
| 1:00-1:15 p.m. | Introductions and identification of topics |
| 1:15 – 2:30 p.m. | Design review discussions |
| 2:30 – 2:45 p.m. | Questions from the public |
| 2:15 – 2:25 p.m. | Proprietary Closed Session (if required) |
| 2:25 – 2:30 p.m. | Break |
| 2:30 – 3:00 p.m. | Closed portion |

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**CATEGORY 1 PUBLIC TELECONFERENCE**

**TO DISCUSS NUSCALE POWER, LLC'S DESIGN CERTIFICATION APPLICATION**

**CHAPTER 9, SECTION 9.3.2, CHAPTER 3, SECTION 3.13, CHAPTER 6, SECTION 6.1.1,**

**AND CHAPTER 10, SECTION 10.3.6**

**LIST OF ATTENDEES**

**MAY 16, 2017**

| NAME | AFFILIATION |
|---|---|
| Marieliz Vera | NRC |
| Anthony Markley | NRC |
| Nicholas McMurray | NRC |
| Gregory Makar | NRC |
| Omid Tabatabai | NRC |
| Marty Bryan | NuScale |
| Darrell Gardner | NuScale |
| Mark Paul | NuScale |
| Glenn Ashley | NuScale |
| Carrie Fosaaen | NuScale |
| Steve Unikewicz | NuScale |
| Wayne Massie | NuScale |
| Tamas Liszkai | NuScale |
| Hq Xu | NuScale |
| Geoff Quinn | NuScale |
| Matt Mallet | NuScale |
| Bob Bromm | NuScale |

**U.S. NUCLEAR REGULATORY COMMISSION**

**CATEGORY 1 PUBLIC TELECONFERENCE**

**TO DISCUSS NUSCALE POWER, LLC'S DESIGN CERTIFICATION APPLICATION**

**CHAPTER 9, SECTION 9.3.2, CHAPTER 3, SECTION 3.13, CHAPTER 6, SECTION 6.1.1, AND CHAPTER 10, SECTION 10.3.6**

**MATERIALS AND CHEMICAL BRANCH TECHNICAL ISSUES FOR DISCUSSION PUBLIC MEETING WITH NUSCALE POWER, LLC**

**MAY 16, 2017**

**NuScale DCA Section 9.3.2, Process Sampling System**

**ISSUE #1**

**BACKGROUND**

Title 10 *Code of Federal Regulations* (CFR) Part 50, Appendix A, General Design Criterion 1 (GDC 1) states,

> Quality standards and records, structures, systems, and components important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed. Where generally recognized codes and standards are used, they shall be identified and evaluated to determine their applicability, adequacy, and sufficiency and shall be supplemented or modified as necessary to assure a quality product in keeping with the required safety function.

NUREG-0800, Standard Review Plan (SRP), Section 9.3.2 states that industry water chemistry guidelines (e.g., the Electric Power Research Institute (EPRI) Pressurized-Water Reactor (PWR) Water Chemistry Guidelines) are used to meet the requirements of the GDC, "Quality Standards and Records."

**ISSUE**

The NuScale Final Safety Analysis Report (FSAR) Section 9.3.2, Process Sampling System does not describe the industry water chemistry guidelines (e.g., the EPRI PWR Water Chemistry Guidelines) used for controlling and monitoring the water chemistry of the primary and secondary side.

**REQUEST**

Provide clarification in the FSAR on the use of an industry chemistry guideline for controlling and monitoring the water chemistry of the primary and secondary side (e.g., EPRI PWR Water Chemistry Guidelines) to meet GDC 1 per NUREG-0800, along with the system applicability.

**ISSUE #2**

**BACKGROUND**

The need for a post-accident sampling system (PASS) was one of the findings endorsed by the Commission following the accident at the Three Mile Island (TMI) plant. The TMI-related recommendations specified in NUREG-0737, "Clarification of TMI Action Plan Requirements" were subsequently incorporated into 10 CFR 50.34(f)(2)(viii). Additionally, SRP Section 9.3.2 states that, in lieu of the PASS, the following actions are required to qualify process sampling for taking radioactive samples without having a specific post-accident sampling capability:

a. Establish the capability for classifying a fuel damage event at the Alert level threshold.

b. Develop contingency plans for obtaining highly radioactive samples of the reactor coolant, containment sump, and containment atmosphere.

c. Determine for its own plant(s) that no decrease in the effectiveness of emergency plans will result from not having PASS capability.

d. Establish the capability to sample and analyze hydrogen in the containment atmosphere (recommended).

e. Maintain offsite capability to monitor radioactivity, including radioactive iodine.

NuScale FSAR Section 9.3.2 states,

> a dedicated post-accident sampling system is not provided; therefore, off-normal operation of the process sampling system involves sampling under post-accident conditions. It is expected that the process sampling system would be used for post-accident sampling only if the information sought is essential and cannot be determined or estimated by other means. The primary means to detect and monitor fuel damage uses core exit temperature indication and radiation monitors located under the NuScale Power Module (NPM) bio-shields. Therefore, post-accident sampling is not used as a primary means for identifying fuel damage. However, post-accident sampling may be used to provide additional assessment of the extent of fuel damage.

**ISSUE**

Because the NuScale application states that a dedicated PASS is not provided, it is not clear to the staff how NuScale will meet the requirements of the following actions without having a specific post-accident sampling capability:

1. Determine for its own plant(s) that no decrease in the effectiveness of emergency plans will result from not having PASS capability.

2. Establish the capability to sample and analyze hydrogen in the containment atmosphere (recommended).

3. Maintain offsite capability to monitor radioactivity, including radioactive iodine

An example of how these capabilities have been met without having PASS can be found in a U.S. Nuclear Regulatory Commission (NRC) Letter to CE Owners Group, "Acceptance for Referencing of the Combustion Engineering Joint Applications Report, CE NPSD-1157, Revision 1, "Technical Justification for the Elimination of the Post-Accident Sampling System from the Plant Design and Licensing Bases for CEOG Utilities," May 16, 2000 (Agencywide Documents Access and Management Systems Accession No. ML003715250).

**REQUEST**

Provide clarification on how the following requirements will be met if a PASS will not be used.

1. Determine for its own plant(s) that no decrease in the effectiveness of emergency plans will result from not having PASS capability.

2. Establish the capability to sample and analyze hydrogen in the containment atmosphere (recommended).

3. Maintain offsite capability to monitor radioactivity, including radioactive iodine.

**NuScale DCA Section 3.1.3 Threaded Fasteners (American Society of Mechanical Engineers Code Class 1, 2, and 3)**

**REGULATORY BASIS**

The 10 CFR Part 50, Appendix A, 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 (LOCAs).

**ISSUE 3.13-1**

Section 3.13 discusses the use of Alloy 718 for the reactor pressure vessel (RPV) closure studs, and discusses the mitigation of stress corrosion cracking (SCC) for the Alloy 718 RPV closure studs based on final heat treatment of the material.

However, 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.

Revise Section 3.13 to address mitigation of SCC in Alloy 718 threaded fasteners in all environments and applications where they are used in the NuScale design. For example, addressing the mitigation of SCC in Alloy 718 applications in low flow areas, and requiring other Alloy 718 applications to have the same heat treatment as the RPV closure studs.

Revise Section 5.2.3.6, Section 3.8.2.1.4, etc. to reference Section 3.13 for the Alloy 718 threaded fastener design requirements for the mitigation of SCC.

**ISSUE 3.13-2**

Section 3.13, the first paragraph, states that the scope of the section includes bolts, studs, and washers. However, this paragraph does not include nuts, which are described later in Section 3.13.

Revise the first paragraph of the design control document (DCD) Section 3.13 to include nuts within the scope of the section.

**ISSUE 3.13-3**

Regulatory Guide (RG) 1.84, “Design, Fabrication, and Materials Code Case Acceptability, American Society of Mechanical Engineers (ASME) Section III,” is cited in Table 1.9-2 as being applicable to Section 6.1.

Section 3.13 also states that RG 1.84 is applicable.

However, Section 3.13 does not specifically cite any ASME Code Cases.

Clarify if any ASME Code Cases will be used related to Section 3.13, or revise Section 3.13 to reference the appropriate FSAR section that describes the applicable Code Cases.

**NuScale DCA Section 6.1.1 Metallic Materials**

**REGULATORY BASIS**

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 6.1.1-1**

The NRC staff have identified several items in Table 6.1-1 that are incomplete or unclear. For example,

a. Section 6.1.1.1 states that pressure-retaining bolting and stud material (studs, nuts, and flat washers) for manways and inspection or access ports in the containment vessel (CNV) are made of SA-564, Grade 630 material.

Table 6.1-1 lists the material for the following components on the CNV Head Assembly:

| Component/CNV Head Assembly | Material/Grade/Type |
|---|---|
| Inspection port and manway cover nuts<br><br>Studs, nuts and flat washers for CNV15-20, CNV24, CNV25, CNV38, and CNV39 | SA-564, Grade 630, Condition H1100 |

Currently, Table 6.1-1 does not state that Grade 630 is used for studs or flat washers for "Inspection port and manway covers" that are not in the specifically listed penetrations.

b. Figure 6.2-3b states that penetration CNV25 is a "CNV head manway."

Therefore, CNV25 is covered by both categories in Table 6.1-1: "Inspection port and manway covers" and "studs, nuts and flat washers for CNV15-20, CNV24, CNV25, CNV38, and CNV39". Currently it is not clear why some penetrations are specifically cited and other are not.

c. Figure 6.2-3a shows penetrations for the CNV Upper Shell Assembly. Figure 6.2-3a shows CNV27 through CNV32, which use threaded fasteners. However, these penetrations are not listed in Table 6.1-1 under the CNV Upper Shell Assembly.

d. Figure 6.2-3b shows penetrations for the CNV Head Assembly. Figure 6.2-3b shows CNV8, CNV9, and CNV37, which use threaded fasteners but are neither "inspection port or manway covers" nor specifically cited in the other category. Therefore, they are not covered by either category in Table 6.1-1 for the CNV Head Assembly.

e. Table 6.1-1 lists specific nozzles and their materials of construction as part of the "CNV Upper Shell Assembly." However, Figure 6.2-3a shows "CNV41, NPS 3, RVV Trip 0107," which is not listed in Table 6.1-1.

f. There are several examples of components in Table 6.1-1 that list their "Material/Grade/Type" as "Austenitic stainless steel or Ni-Cr-Fe alloy" instead of a specific material. Depending on the specific grade or type of material used, austenitic stainless steels and/or nickel-based alloys may have varying degrees of acceptability based on their resistance to inservice degradation under operating conditions. Therefore, Table 6.1-1 should contain the specific material grade/types for each component (and filler metal) so the material can be demonstrated to exhibit acceptable resistance to degradation for each component.

g. Currently the material specifications of the containment isolation valves are not listed.

Supplement Table 6.1-1 with material specifications for containment isolation valves. The supplement should include all components that are credited as having a containment isolation safety function.

h. Page 6.3-7 describes the stainless steel bolt-on flow diffusers that are attached to the discharge of the reactor vent valves (RVVs). They diffuse the high pressure steam and water flow to protect plant cables and other components (Section 6.3.2.6). Table 6.1-1 only states “RVV and RRV bolts and nuts,” but not specifically the bolts for the diffusers.

Revise Table 6.1-1 to address the above examples, and review Table 6.1-1 to ensure that it is complete.

**ISSUE 6.1.1-2**

Section 6.1.1.1 states that the ferrite number for cladding material will be controlled between 5 and 20. However, Section 6.1.1.1 does not discuss how this will be achieved.

Revise Section 6.1.1.1 to specify how cladding ferrite number will be controlled between 5 and 20.

**ISSUE 6.1.1-3**

FXM-19 is a nitrogen-strengthened austenitic stainless steel. FXM-19 is used for the CNV Lower Shell Assembly, but has not been used in large structural components in the nuclear industry. Therefore, the staff requests information related to its use.

Provide additional information related to the processing (heat treatment, cold work, etc.) of FXM-19 which will be implemented in order to mitigate SCC.

Clarify that the weld filler material that will be used for FXM-19 is E209 or ER209 in order to ensure that the mechanical properties of the weld are similar to the base metal.

Provide justification that the ferrite number range of 5 to 20 is acceptable for the FXM-19 welds, or clarify the ferrite number that will be maintained for the FXM-19 welds.

**ISSUE 6.1.1-4**

Section 6.1.1 lists the NuScale engineered safety features (ESF) systems as the 1) containment system (CNTS), 2) Emergency Core Cooling System, and 3) decay heat removal system.

Section 6.1.1 also states that this section proves information on materials with the CNV that are associated with non-ESF systems. These include the RCS, CNTS, steam generator system (SGS), and control rod drive system (CRDS).

Therefore, the CNTS is listed as both an ESF system and non-ESF system. This is unclear as systems that penetrate containment are credited as having a containment isolation safety function.

Clarify the portions of the CNTS that are ESF and non-ESF systems.

Clarify the portions of the other systems RCS injection/discharge, SGS, CRDS, etc. that have an ESF and revise Table 6.1-1 to include their material specifications.

**ISSUE 6.1.1-5**

The RPV is clad low alloy steel. The CNV upper shell and head are also clad low alloy steel.

Section 6.1.1.1 states that the CNV through-bolt holes are clad with one layer of Type 309L stainless steel. However, there is no discussion about the clad for the RPV through-bolt holes which will be exposed to borated water during refueling and accident conditions. Furthermore, it is not clear where the through-bolt hole design is used for the CNV and RPV construction.

Clarify that the RPV through-bolt holes will be clad.

Clarify which specific threaded fasteners of the CNV and RPV bolts are through-bolts.

Provide justification that only one layer of 309L will provide adequate corrosion resistance considering dilution of the cladding layer with the base metal.

Provide information related to the inspection of the through-bolt holes to ensure that the cladding layer will not degrade to allow borated water to come into contact with the base material.

**ISSUE 6.1.1-6**

The RPV outside surface cladding is specified as a one layer weld deposit of Type 309L, whereas the inside surfaces and sealing surfaces are clad with a minimum of two layers, with the first layer being Type 309L and the subsequent layers being Type 308L.

For the CNV, the interior surface cladding is specified as a one layer weld deposit of Type 309L, whereas the external surface is clad in at least two layers. The first layer is Type 309L and the second layer is Type 308L.

Provide justification that, where utilized, a cladding of only one layer of 309L weld deposit will provide adequate corrosion resistance considering dilution of the cladding layer with the base metal considering these layers will be exposed to borated water during refueling operations.

**ISSUE 6.1.1-7**

In Table 6.1-1 and Table 6.1-2, weld filler materials E/ER308, E/ER309, and E/ER316 are permitted. However, the austenitic stainless steel base metal is listed as L-grade.

In 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 weight (wt) percent

In ASME Code, Section II, 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 RG 1.44, "Control of the Processing and Use of Stainless Steel."

Provide a justification on how sensitization of austenitic material is prevented during welding or specify that the weld filler material must also be L-grade.

**ISSUE 6.1.1-8**

Page 6.1-5 states that, "The CNTS piping, fittings, pipe supports and components are constructed of austenitic stainless steel Type 304 or 304L and are ASME Class 2 components." Page 6.1-5 also states that, "The RCS and SGS piping, fittings, pipe supports and components interior to the CNV are constructed of austenitic stainless steel Type 304 or 304L and are designed to ASME Class 1 or Class 2 criteria as appropriate for the associated functional system."

In 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 percent

Clarify Page 6.1-5 to state that Grade or Type 304/304L will be used to be consistent with Table 6.1-1, Table 6.1-2 and the requirements in Section 5.2.3.4.1 to mitigate intergranular attack.

**ISSUE 6.1.1-9**

RG-1.28, "Quality Assurance Program Criteria (Design and Construction)," is cited in Table 1.9-2 as being applicable to Section 6.1. However, this RG is not directly cited in Section 6.1.

Section 6.1.1 discusses controls on cleanliness, special processes, and handling, storage, shipping, cleaning, and preservation in order to meet the requirements of ASME NQA-1 and 10 CFR Part 50, Appendix B, Criteria IX and XIII.

Clarify Section 6.1 to describe how RG 1.28 is applicable.

**ISSUE 6.1.1-10**

RG-1.36, "Nonmetallic Thermal Insulation for Austenitic Stainless Steel," is cited in Table 1.9-2 as being applicable to Section 6.1. However, this RG is not directly cited in Section 6.1.

Section 6.1.1 states that thermal insulation (metallic and non-metallic) is not used inside the CNV. The "Comments" column in Table 1.9-2 also states that nonmetallic thermal insulation is not used on reactor coolant pressure boundary (RCPB) components.

However, the “Comments” column also states that if nonmetallic thermal insulation is used on austenitic stainless steel components that are part of the RCPB, CNV or other safety-related or risk-significant systems, then it will conform to the RG.

Therefore, there seems to be a contradiction since the NuScale DCD states that thermal insulation will not be used, yet the comment states that if insulation is used then it will conform to the RG.

Clarify the Table 1.9-2 comment on the use of nonmetallic insulation in the NuScale Design.

Clarify Section 6.1 and/or Table 1.9-2 to describe how RG 1.36 is applicable.

**ISSUE 6.1.1-11**

RG-1.65, “Materials and Inspections for Reactor Vessel Closure Studs,” is cited in Table 1.9-2 as being applicable to Section 6.1. However, this RG is not directly cited in Section 6.1.

Clarify Section 6.1 and/or Table 1.9-2 to describe how RG 1.65 is applicable.

**ISSUE 6.1.1-12**

RG-1.84, “Design, Fabrication, and Materials Code Case Acceptability, ASME Section III,” is cited in Table 1.9-2 as being applicable to Section 6.1. However, this RG is not directly cited in Section 6.1.

Section 6.1 also does not specifically cite any ASME Code Cases.

Clarify if any ASME Code Cases will be used in Section 6.1, or revise Section 6.1 to reference the appropriate FSAR section that describes the applicable Code Cases.

Clarify Section 6.1 and/or Table 1.9-2 to describe how RG 1.84 is applicable.

**ISSUE 6.1.1-13**

RG-1.99, “Radiation Embrittlement of Reactor Vessel Materials,” is cited in Table 1.9-2 as being applicable to Section 6.1. However, this RG is not directly cited in Section 6.1.

Clarify Section 6.1 and/or Table 1.9-2 to describe how RG 1.99 is applicable.

**ISSUE 6.1.1-14**

Table 1.1-1, “Acronyms and Abbreviations,” states that the abbreviation for “Boiler and Pressure Vessel Code” is “BPVC.”

Throughout Section 6.1.1 there are examples of using different acronyms to describe the ASME Boiler and Pressure Vessel Code include “B&PV” and “BPV Code.”

Clarify the use of acronyms for the ASME Boiler and Pressure Vessel Code throughout Section 6.1.1.

**NuScale DCA Section 10.3.6 Steam and Feedwater System Materials**

10 CFR Part 50, Appendix A, GDC 1 requires 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 10.3.6-1**

Section 10.1 states that the steam and power conversion system is comprised of the following components and process systems:

- turbine generator system (TGS) (Section 10.2)
- main steam system (MSS) (Section 10.3)
- main condenser (MC) (Section 10.4.1)
- condenser air removal system (CARS) (Section 10.4.2)
- turbine gland sealing system (Section 10.4.3)
- turbine bypass system (Section 10.4.4)
- circulating water system (CWS) (Section 10.4.5)
- condensate polishing system (CPS) (Section 10.4.6)
- condensate and feedwater system (CFWS) (Section 10.4.7)
- auxiliary boiler system (ABS) (Section 10.4.10)
- feedwater treatment system (FWT) (Section 10.4.11)

Section 10.3.6 states that the MSS and CFWS designs meet the guidance contained in Generic Letter 89-08, "Erosion-Corrosion-Induced Pipe Wall Thinning," and EPRI NSAC-202L-R3, "Recommendations for an Effective Flow-Accelerated Corrosion Program," governing design considerations to minimize erosion and corrosion (including flow accelerated corrosion (FAC)) and acceptable FAC monitoring programs. EPRI NSAC-202L-R3 states that the first evaluation task in the plant FAC program is to identify all piping systems, or portions of systems, that could be susceptible to FAC. EPRI NSAC-201L-R3 also states that some systems or portions of systems can be excluded from further evaluation due to their relatively low level of susceptibility.

However, Combined Operating License (COL) Item 10.3-2 states:

> A COL applicant that references the NuScale Power Plant design certification will provide a description of the flow-accelerated corrosion monitoring program for carbon steel portions of the steam and power conversion systems that contain water or wet steam and are susceptible to erosion and corrosion damage.

As written, the COL item states that the COL applicant will provide a description for "carbon steel portions of the steam and power conversion systems that contain water or wet steam and are susceptible to erosion and corrosion damage." The EPRI NSAC-202L program requires that all systems are identified in the FAC program and allows lines to be excluded from inspections based upon certain criteria. Furthermore, the COL item should clarify that it is applicable to all steam and power conversion systems that are discussed in Section 10.1.

Additionally, Section 10.3.6 states that the MSS and CFWS designs meet the guidance contained in Generic Letter 89-08 and EPRI NSAC-202L-R3 governing design considerations to minimize erosion and corrosion (including FAC) and acceptable FAC monitoring programs.

However, as worded, this paragraph does not include all steam and power conversion systems. For example, Section 10.4.4 states that the turbine bypass system is part of the turbine generator system (TGS). The design of the turbine bypass system contains a desuperheater to reduce the temperature of the superheated steam before entering the main condenser. This specific portion of piping would contain saturated steam or two phase flow making it susceptible to FAC. Therefore, it would not be covered under the design requirements in Section 10.3.6 since it is not part of the MSS or CFWS.

Revise COL Item 10.3-2 to align with the EPRI NSAC-202L-R3 program to include all piping systems and to then exclude systems based on their low level of susceptibility, as well clarify that the COL item is applicable to all steam and power conversion systems defined in Section 10.1. For example,

> A COL applicant that references the NuScale Power Plant design certification shall provide a description of the flow-accelerated corrosion monitoring program that meets Generic Letter 89-08 and EPRI NSAC-202L-R3 for the steam and power conversion systems referenced in Section 10.1.

Revise Section 10.3.6 that the steam and power conversion systems listed in Section 10.1 will be designed to meet the requirements contained in Generic Letter 89-08 and NSAC-202L-R3. For example,

> Section 10.3.6 states that the steam and power conversion systems referenced in Section 10.1 meet the guidance contained in Generic Letter 89-08 and EPRI NSAC-202L-R3 governing design considerations to minimize erosion and corrosion (including FAC) and acceptable FAC monitoring programs.
>
> The steam and power conversion systems' design and layout incorporate appropriate provisions to minimize FAC. These provisions are applied to the high-energy, nonsafety-related portions that could adversely impact safety-related systems susceptible to FAC and other flow-induced degradation mechanisms. These provisions include:

Revise other references to the MSS and CFWS to include the steam and power conversion systems.

**ISSUE 10.3.6-2**

Section 10.3.6.2 states:

> The design, materials selection, fabrication, and operation of components mitigate susceptibility to intergranular stress corrosion cracking of the stainless steel and nickel based materials used. See additional stress corrosion cracking information in Section 3.6.3.

Section 3.6.3.1.2 states:

> SA-312 TP304/304L dual certified stainless steel is also resistant to SCC given adequate control of dissolved oxygen levels. The alloy contains 0.03 maximum weight percent carbon, which mitigates sensitization. The use of cold worked austenitic stainless steels is generally avoided; however, if used, the yield strength as determined by the 0.2 percent offset method does not exceed 90 ksi.

However, there is no discussion in Sections 10.3.6.2 or 3.6.3.1.2 to control items such as processing and cleanliness to prevent sensitization in stainless steel that could lead to SCC.

RG-1.44, "Control of the Processing and Use of Stainless Steel," is cited in Table 1.9-2 as being applicable to Section 10.3. However, this RG is not directly cited in Section 10.3.

Revise Section 10.3.6 to include a reference to RG 1.44 to prevent sensitization in stainless steel that could lead to SCC.

**ISSUE 10.3.6-4**

Section 10.3.6.3 states five provisions to minimize FAC:

1. Elimination of high turbulence points wherever possible (e.g., adequate straight pipe length downstream of flow orifice or control valve, etc.).

2. Use of long radius elbows.

3. Smooth transition at shop or field welds.

4. Selection of pipe diameter to have velocities within industry recommended values.

5. Use of corrosion resistant materials.

However, Section 10.3.6 does not contain information related to these items such as material specifications or corrosion allowances for the staff to evaluate.

Provide the materials specifications and corrosion allowances for the steam and power conversion systems.

**ISSUE 10.3.6-5**

Section 10.3.6.1 states that the, "…piping is non-nuclear safety ASME Code B31.1 piping. All MSS and CFWS component materials meet ASME code requirements."

Throughout the FSAR, "ASME code" refers to the ASME BPVC. However, since "ASME Code B31.1" is specifically referenced in the first sentence, the use of "ASME code" is not clear in the second sentence.

Clarify the specific ASME code (e.g. B31.1, BPVC) in the second sentence.

**ISSUE 10.3.6-6**

Table 1.9-2 states that RG 1.50, "Control of Preheat Temperature for Welding of Low-Alloy Steel," is applicable to Section 10.3. However, Section 10.3 and Section 10.3.6 do not specifically cite RG 1.50.

Furthermore, RG 1.50 states that it is only applicable to Class 1, 2, and 3 components and the MSS and CFWS are designed to ASME B31.1. However, RG 1.50 provides preheat temperature controls to help assure satisfactory welds.

Clarify that the preheat recommendations of RG 1.50 will be applicable to the non-Class 1, 2, and 3 components in the MSS and CFWS.

**ISSUE 10.3.6-7**

RG-1.28, "Quality Assurance Program Criteria (Design and Construction)," is cited in Table 1.9-2 as being applicable to Section 10.3. The staff agrees that the quality control requirements are applicable to Section 10.3. However, this RG is not directly cited in Section 10.3.

Clarify Section 10.3 to describe how RG 1.28 is applicable.

**ISSUE 10.3.6-8**

RG-1.36, "Nonmetallic Thermal Insulation for Austenitic Stainless Steel," is cited in Table 1.9-2 as being applicable to Section 10.3. However, this RG is not directly cited in Section 10.3

Clarify Section 10.3 to describe how RG 1.36 is applicable.

**ISSUE 10.3.6-9**

RG-1.71, "Welder Qualification for Areas of Limited Accessibility," is cited in Table 1.9-2 as being applicable to Section 10.3. The staff agrees with stating that RG 1.71 is applicable to Section 10.3. However, this RG is not directly cited in Section 10.3

Clarify Section 10.3 to describe how RG 1.71 is applicable.

**ISSUE 10.3.6-10**

RG-1.84, "Design, Fabrication, and Materials Code Case Acceptability, ASME Section III," is cited in Table 1.9-2 as being applicable to Section 10.3. However, this RG is not directly cited in Section 10.3.

Section 10.3 does not specifically cite any Code Cases.

Clarify if any Code Cases will be used related to Section 10.3, or revise Section 10.3 to reference the appropriate FSAR section that describes the applicable Code Cases.