

January 07, 2019

Docket No. 52-048

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

SUBJECT: NuScale Power, LLC Submittal of Changes to Final Safety Analysis Report, Sections 3.9.3.1.2, "Load Combinations and Stress Limits," and 5.4.1.5, "Steam Generator Materials," and Table 6.1-3, "Pressure Retaining Materials for RCPB and ESF Valves"

REFERENCES: 1. Letter from NuScale Power, LLC to Nuclear Regulatory Commission, "NuScale Power, LLC Submittal of the NuScale Standard Plant Design Certification Application, Revision 2," dated October 20, 2018 (ML18311A006)

2. Letter from NuScale Power, LLC to NRC, RAIO-1018-62231, "NuScale Power, LLC Response to NRC Request for Additional Information No. 499 (eRAI 9564) on the NuScale Design Certification Application," dated October 22, 2018 (ML18295A787)

During a December 12, 2018 closed teleconference, with Bruce Baval, NRC Project Manager and NRC reviewers, Leslie Terry and Greg Makar, NuScale Power, LLC (NuScale) discussed potential updates to the Final Safety Analysis Report (FSAR), to clarify NuScale's responses to electronic Request for Additional Information (eRAI) 9564 (Reference 2). As a result of this discussion, NuScale changed FSAR Sections 3.9.3.1.2, "Load Combinations and Stress Limits," and 5.4.1.5, "Steam Generator Materials," and Table 6.1-3, "Pressure Retaining Materials for RCPB and ESF Valves." The Enclosure to this letter provides a mark-up of the FSAR pages incorporating revisions to FSAR Sections 3.9.3.1.2, "Load Combinations and Stress Limits," and 5.4.1.5, "Steam Generator Materials," and Table 6.1-3, "Pressure Retaining Materials for RCPB and ESF Valves" in redline/strikeout format. NuScale will include this change as part of a future revision to the NuScale Design Certification Application.

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

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

Sincerely,



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

Distribution: Samuel Lee, NRC, OWFN-8G9A
Gregory Cranston, NRC, OWFN-8G9A
Bruce Baval, NRC, OWFN-8C5

Enclosure: "Changes to NuScale Final Safety Analysis Report Sections Sections 3.9.3.1.2, "Load Combinations and Stress Limits," and 5.4.1.5, "Steam Generator Materials," and Table 6.1-3, "Pressure Retaining Materials for RCPB and ESF Valves" "

Enclosure:

“Changes to NuScale Final Safety Analysis Report Sections Sections 3.9.3.1.2, “Load Combinations and Stress Limits,” and 5.4.1.5, “Steam Generator Materials,” and Table 6.1-3, “Pressure Retaining Materials for RCPB and ESF Valves” ”

for the lifting, handling, and transportation loads. The platform mounting assemblies are analyzed to ensure minimum safety factors of five for material ultimate strength and three for material yield strength, and are maintained for dual-load-path loading conditions considering the dynamic load factor specified above.

RAI 03.09.03-1

Hydrogen Detonation

Short duration pressure pulse due to hydrogen detonation and hydrogen detonation with deflagration-to-detonation transition resulting from a combustible gas that results from a fuel-clad metal-water reaction followed by an uncontrolled hydrogen burn during a post-accident condition is evaluated per the rules defined in 10 CFR 50.44, 10 CFR 50.34 and the guidance provided in RG 1.7, Revision 3.

3.9.3.1.2 Load Combinations and Stress Limits

The RPV is a Seismic Category 1, ASME Section III, Class 1 component. The load combinations and stress limits for the RPV and its supports are presented in Table 3.9-3.

The CNV is a Seismic Category 1 component. The ASME classification of the CNV and its supports is described in Section 3.8.2.2. The load combinations and stress limit for CNV and its supports are presented in Table 3.8.2-2.

The RVI are Seismic Category 1 components. Portions of the RVI, which perform a core support function, are classified as Class CS components in accordance with ASME Section III, Subsection NG. The remaining portions of the RVI are designated as internal structures; however, they are designed using NG-3000 as a guide and constructed to ASME Subsection NG. The load combinations and stress limit are presented in Table 3.9-5.

RAI 03.09.05-16, RAI 05.04.02.01-6

The SG supports and SG tube supports are Seismic Category 1 components. The SG supports and SG tube supports are designated as internal structures and are designed ~~using~~ in accordance with ASME Section III, Subsection NG, however there are exceptions to the BPVC taken for fabrication as discussed in DCA Section 5.4.1.5- ~~as a guide~~. The load combinations and stress limit are consistent with those presented in Table 3.9-5.

The portions of the CRDM providing a RCPB function are ASME Code Class 1, Seismic Category I components. The CRDM coil heat exchangers, tubes, and connections, which provide cooling water and are external to the RCPB, are ASME Code Class 2, Seismic Category II components. The CRDM pressure housing is a Class 1 appurtenance per ASME BPVC, Section III, NCA-1271. The load combinations and stress limit are presented in Table 3.9-6. The CRDM seismic supports located on both the RPV and CNV head are ASME Code Class 1, Seismic Category I component supports.

with BPVC, Section II, and meet the requirements of Section III, Article NB-2000. Surfaces of pressure retaining parts of the SGs, including weld filler materials and bolting material, are corrosion-resistant materials, such as stainless steel or nickel-based alloy. The SGs are constructed of materials with a proven history in light water reactor environments and the SG materials associated with the RCPB are listed in Table 5.2-4.

RAI 05.02.01.01-7

The FW and MS piping from the CNTS to the SGs, thermal relief valve, steam plenum access ports, and plenum access covers are classified as Quality Group B and are designed, fabricated, constructed, tested, and inspected as Class 2 in accordance with the BPVC and the applicable conditions promulgated in 10 CFR 50.55a(d). The FW and MS piping, thermal relief valve, steam plenum access ports, and plenum access covers, including weld materials, conform to fabrication, construction, and testing requirements of BPVC, Section III, Subsection NC. The materials selected for fabrication conform to the applicable material specifications provided in BPVC, Section II and meet the requirements of Section III, Article NC-2000. The materials and applicable specifications of the MS and FW piping, associated reducers and elbows, steam plenum access ports, and plenum access covers and fasteners are provided in Table 5.4-3.

RAI 05.02.01.01-7

Welding of the RCPB portions of the SGS is conducted utilizing procedures qualified in accordance with the applicable requirements of ASME BPVC, Section III, Subarticle NB-4300 and Section IX. Welding of the secondary side portions of the SGS is conducted utilizing procedures qualified in accordance with the applicable requirements of ASME BPVC, Section III, Subarticle NC-4300 and Section IX.

The inside and outside surfaces of the integral steam and feed plenum access ports 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.

The SG weld filler metals are listed in Table 5.2-4 and Table 5.4-3 and are in accordance with BPVC, Section II, Part C.

RAI 05.04.02.01-6

The SG supports and SG tube supports are designated as BPVC, Section III, Subsection NG "Internal Structures."; including weld materials, conform to The design, fabrication, construction, and testing of the SG tube supports, including weld materials, follow all requirements of BPVC, Section III, Subsection NG, with the following two exceptions as a guide. The SG tube supports are not Code stamped as "Core Supports" per NG-8000. Fabrication follows NG-4000, except that an N-Certificate holder is not required, however the fabricator is required to have a 10 CFR 50 Appendix B quality program.

RAI 05.04.02.01-6

RAI 05.02.03-1, RAI 05.04.02.01-18, RAI 06.01.01-1, RAI 06.01.01-1S1, RAI 06.01.01-2, RAI 06.01.01-3, RAI 06.01.01-4

Table 6.1-3: Pressure Retaining Materials for RCPB and ESF Valves

Bodies	SA-182 (Note 1)	Grade F304, F304L, F304LN, F316, F316L, F316LN
	SA-351 (Note 2)	Grade CF3, CF3A, CF3M, CF8, CF8A, CF8M
	SA-479 (Note 1)	Type 304, 304L, 304LN, 316, 316L, 316LN
Bonnets	SA-182 (Note 1)	Grade F304, F304L, F304LN, F316, F316L, F316LN
	SA-240 (Note 1)	Type 304, 304L, 304LN, 316, 316L, 316LN
	SA-351 (Note 2)	Grade CF3, CF3A, CF3M, CF8, CF8A, CF8M
	SA-479 (Note 1)	Type 304, 304L, 304LN, 316, 316L, 316LN
Discs	SA-182 (Note 1)	Grade F304, F304L, F304LN, F316, F316L, F316LN
	SA-351 (Note 2)	Grade CF3, CF3A, CF3M, CF8, CF8A, CF8M
	SA-479 (Note 1)	Type 304, 304L, 304LN, 316, 316L, 316LN, XM-19
	SA-564	Type 630 Condition H1100 or H1150
	SB-637	UNS N07718
Stems	SA-479 (Note 1)	Type 304, 304L, 304LN, 316, 316L, 316LN, XM-19
	SA-564	Type 630 Condition H1100 or H1150
	SB-637	UNS N07718
Pressure Retaining Studs, Bolts, and Screws	SA-193 (Note 3)	Grade B8, B8A, B8M, B8MA, B8R, B8RA, B8S, B8SA
	SA-453 (Note 4)	Grade 660 Class A or B
	SA-564	Type 630 Condition H1100
	SB-637 (Note 5)	UNS N07718
Pressure Retaining Nuts	SA-193 (Note 3)	Grade B8, B8A, B8M, B8MA, B8R, B8RA, B8S, B8SA
	SA-194	Grade 8, 8A, 8M, 8MA, 8R, 8RA, 8S, 8SA
	SA-453 (Note 4)	Grade 660 Class A or B
	SA-564	Type 630 Condition H1100
	SB-637 (Note 5)	UNS N07718
Filler Metals for Pressure Retaining Welds	SFA-5.4 (Note 6)	E308, E308L, E309, E309L, E316, E316L
	SFA-5.9 (Note 6)	ER308, ER308L, E309, E309L, ER316, ER316L

1. Carbon is limited to 0.03 percent maximum for unstabilized Type 3XX that are welded or exposed to temperature range between 800 °F and 1500 °F subsequent to final solution anneal.
2. Carbon is limited to 0.03 percent maximum. Delta ferrite is limited to 20 percent maximum, except to 14 percent maximum for CF3M and CF8M.
3. B8A, B8MA, B8R, and B8RA can only be used for Class 1 valves.
4. SA-453 Grade 660 is not used for pressure-retaining bolting exposed to RCS or pool water during operation or refuel, ~~except for the specific bolting design, fabrication, and installation that are optimized to prevent stress corrosion cracking.~~
5. Solution treatment temperature range prior to precipitation hardening treatment is restricted to 1800 °F to 1850 °F.
6. Carbon is limited to 0.03 percent maximum. The ferrite number is in the range of 5FN to 20FN except Type 316 and Type 316L are in the range of 5FN to 16FN.