

## **NuScaleDCRaisPEm Resource**

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**Subject:** Request for Additional Information No. 306 RAI No. 9234 (16)  
**Attachments:** Request for Additional Information No. 306 (eRAI No. 9234).pdf

Attached please find NRC staff's request for additional information concerning review of the NuScale Design Certification Application.

Please submit your technically correct and complete response within 60 days of the date of this RAI to the NRC Document Control Desk. The NRC Staff recognizes that NuScale has preliminarily identified that the response to this question in this RAI is likely to require greater than 60 days.

If you have any questions, please contact me.

Thank you.

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## Request for Additional Information No. 306 (eRAI No. 9234)

Issue Date: 12/19/2017

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 16 - Technical Specifications

Application Section: 3.4.5, "RCS Operational LEAKAGE;" 3.4.9, "Steam Generator (SG) Tube Integrity;" and 5.5.4, "Steam Generator (SG) Program"

### QUESTIONS

16-38

With respect to steam generator (SG) tube integrity, the Standard Technical Specifications (STS) meet the requirements of § 50.36 of Title 10 of the *Code of Federal Regulations* (10 CFR), in part, by having an operational leakage limit and accident-induced leakage limit.

According to NuScale Limiting Condition for Operation (LCO) 3.4.5.d and Technical Specification (TS) 5.5.4.b.2, both the operational and accident-induced leakage limits are 150 gallons per day (other than a SG tube failure). As stated in the NuScale TS Bases (page B 3.4.9-3), "the accident induced leakage rate includes any primary to secondary LEAKAGE existing prior to the accident in addition to primary to secondary LEAKAGE induced during the accident."

Describe how conditions during an accident (other than a SG tube failure) remain within the bounds of the accident analyses (150 gpd) if operational leakage is 150 gpd and there appears to be no allowance for leakage induced during the accident. If appropriate, revise the TSs and Bases to identify an accident-induced leakage limit higher than the operational leakage limit.

The NRC staff also notes the following apparent typographical errors related to this question:

- a. TS Bases page B 3.4.9-3, last paragraph, states, "The accident analysis assumes that accident induced leakage does not exceed the limit specified in equal to the LCO 3.4.8, "RCS [reactor coolant system] Specific Activity." (underline added)
- b. Section 15.0.3.8.3 in Tier 2 of the FSAR, "Main Steam Line Break Outside Containment Accident," identifies the leakage limit as 150 gallons per minute. (underline added)

16-39

According to Section 4.2 of Technical Report (TR)-1116-52011-NP, Rev. 0, "Technical Specifications Regulatory Conformance and Development" (Accession No. ML17005A136 in the NRC's Agencywide Documents Access and Management System (ADAMS)), the Technical Specification Task Force (TSTF) travelers and revisions available to NuScale and issued before November 1, 2016, were considered during preparation of the NuScale Generic Technical Specifications (GTS). Please clarify in TR-1116-52011-NP how the NuScale GTS incorporate TSTF-510, "Revision 2, "Revision to Steam Generator Program Inspection Frequencies and Tube Sample Selection," which became available on October 27, 2011, and explain any exceptions.

Revision 4 of the STS was also completed in October 2011 and does not incorporate the language from TSTF-510. The NuScale GTS appear to generally adopt TSTF-510; however, the NRC staff notes the following exceptions in the affected GTS subsections. Please provide the justification for these exceptions, or revise the GTS and Bases for consistency with TSTF-510.

- a. The NRC staff notes the following differences in GTS Subsection 3.4.5, "RCS Operational LEAKAGE," when compared to NUREG-1431, Revision 4, "Standard Technical Specifications," for Westinghouse plants (ADAMS Accession No. ML12100A222), Subsection 3.4.13, "RCS Operational LEAKAGE."
  1. Condition A in the STS states, "RCS operational LEAKAGE not within limits for reasons other than pressure boundary LEAKAGE or primary to secondary leakage." Corresponding Condition A in the GTS omits "operational" and "or primary to secondary leakage."
  2. Condition B in the STS states, "Required Action and associated Completion Time of Condition A not met." Corresponding Condition B in the GTS omits the phrase "of Condition A," which the NRC staff believes should be included for clarity, since Condition B has two other condition statements.
  3. The Completion Time for Required Action B.2 to "Be in MODE 5" (RCS average temperature ≤ 200°F) in the STS is "36 hours." The Completion Time for corresponding Required Action B.2 to "Be in MODE 5 with RCS temperature hot < 200 °F" in the GTS is "48 hours." The NRC staff notes that this difference is also addressed from the perspective of the associated Bases for the completion time by Sub-question 8 of Question 16-32 of RAI 228-9034 (ADAMS Accession No. ML17257A227).
  4. The Surveillance Requirement (SR) 3.4.13.1 in the STS uses "NOTES" while corresponding SR 3.4.5.1 in the GTS uses "NOTE." Since there are two surveillance column Notes, SR 3.4.5.1 should use "NOTES."
  5. The Frequencies for SR 3.4.13.1 and SR 3.4.13.2 in the STS are "[72 hours OR In accordance with the Surveillance Frequency Control Program]." The Frequencies for corresponding SR 3.4.5.1 and SR 3.4.5.2 in the GTS omit "72 hours OR" and the associated brackets. The associated GTS Bases for these SRs also omit the basis for the 72 hour Frequency, which is included in the STS Bases for these SRs. The NRC staff notes that this difference is also addressed from the perspective of TSTF-425, Revision 3, "Relocate Surveillance Frequencies to Licensee Control - Risk Informed Technical Specifications Task Force (RITSTF) Initiative 5b," in Question 16-30 of RAI 228-9034 (ADAMS Accession No. ML17257A227); specifically in Sub-questions d and e.
- b. Generic TS Subsections 3.4.9 and B 3.4.9, "Steam Generator (SG) Tube Integrity," use the phrase, "tube repair criteria." The NRC staff notes that bracketed information about SG tube repair methods and associated repair criteria, including "reviewer's notes," which is included in TSTF-510, for both TSs and Bases, applies to plants with tube repair methods (i.e., sleeve installation) previously approved by the NRC staff. This bracketed information may be included in the GTS and Bases as combined license (COL) information items, provided it is consistent with such information in TSTF-510. This is done to facilitate development of plant-specific TSs by COL applicants who have received NRC staff approval of SG tube repair methods and repair criteria proposed in their combined license applications that reference the NuScale design certification. If NuScale does not include this bracketed information in the GTS and Bases, then phrases such as "tube repair criteria" or "SG repair criteria" (see Bases for Action A) should be changed to "tube plugging criteria" or "SG tube plugging criteria;" and all bracketed information (and reviewer's notes) related to tube repair criteria and methods, included in TSTF-510, including alternate tube plugging criteria, as potentially applicable to NuScale SGs, should be omitted in the GTS and Bases.

- c. The comment above about the use of “repair criteria” also applies to GTS Subsection 5.5.4, “Steam Generator (SG) Program.”
- d. The first paragraph of GTS Subsection 5.5.4 includes the word, “provisions,” which was deleted in TSTF-510.
- e. Generic TS 5.5.4.a includes an unnecessary comma after the term “plugged” in the last sentence (editorial).
- f. The first sentence of GTS 5.5.4.b.1, the structural integrity performance criterion, does not match the wording and punctuation in the STS as modified by TSTF-510. While differences may be necessary due to the non-standard MODE definitions in the NuScale design, the sentence is unclear due to the location of parentheses and lack of commas. The NRC staff believes the intent was for the first sentence to read, “Structural integrity performance criterion: All inservice steam generator tubes shall retain structural integrity over the full range of normal operating conditions (including startup, operation in the power range, and cool down and all anticipated transients included in the design specification) and design basis accidents.”
- g. Generic TS 5.5.4.d uses the phrase, “An assessment of degradation,” while TSTF-510 changed this phrase to, “A degradation assessment” to be consistent with industry program documents.
- h. Generic TS 5.5.4.d.1 uses the phrase, “initial startup and SG replacement.” The TSTF-510 uses “SG installation” to allow the SG program to apply to existing and new plants.
- i. Generic TS 5.5.4.d.3 omits the phrase, “affected and potentially affected” which was added in TSTF-510 to clarify the term “each SG.” Generic TS 5.5.4.d.3 also uses the phrase, “whichever is less” (referring to 24 effective full power months or one refueling outage). This phrase was changed in TSTF-510 for clarification to “whichever results in more frequent inspections.”

16-40

In GTS 5.5.4.d.2, justify the use of the longest inspection intervals despite not having operating experience. Why was it considered unnecessary to have more frequent inspection of NuScale nuclear power modules (NPMs), or at least the initial NPMs in service, in order to obtain operating experience for early identification of degradation?

16-41

The NRC staff notes that the Bases in GTS Subsection B 3.4.5 are significantly different than the Bases in STS Subsection B 3.4.13. Please provide the justification for the exceptions noted below, or revise the GTS Bases for consistency with the STS Bases.

- a. GTS Subsection B 3.4.5, “RCS Operational LEAKAGE”
  - 1. The fourth paragraph of the Background section changes the STS phrase “into the containment area” to “outside of the reactor coolant pressure boundary.” In addition, this paragraph changes the STS phrase “Quickly separating the identified LEAKAGE ....” to “When possible, separating the identified LEAKAGE ....”

2. The Background section omits the STS paragraph which says, “A limited amount of leakage inside containment is expected from auxiliary systems that cannot be made 100% leaktight.”
  3. The fifth paragraph of the Background section omits the STS phrase “and the core from inadequate cooling.”
  4. The first paragraph of the Applicable Safety Analyses section changes the STS phrase “other operational LEAKAGE” to “other forms of RCS Operational LEAKAGE.”
  5. The discussion in the Applicable Safety Analyses section implies that the operational leakage limit is the same as the accident-induced leakage limit (150 gpd). The STS compares 150 gpd to the accident-induced leakage limit. In addition, STS paragraphs related to accident-induced leakage are changed or missing.
  6. Paragraph “a.” in the LCO section, under the heading “Pressure Boundary LEAKAGE,” adds the phrase, “defined as LEAKAGE (except primary to secondary LEAKAGE)...defined in 10CFR50.2” and other information not in the STS. Editorial change, “10CFR50.2” should read “10 CFR 50.2.”
  7. The unidentified leakage value of 0.5 gpm in Paragraph “b.” in the LCO section, under the heading “Unidentified LEAKAGE,” is less than the STS value of 1 gpm.
  8. The identified leakage value of 2 gpm in Paragraph “c.” in the LCO section, under the heading “Identified LEAKAGE,” is less than the STS value of 10 gpm.
  9. In the Actions section, the discussion of Required Action A.1 changes the STS phrase as indicated by markup: “or reduce RCS Operational LEAKAGE to within limits...” (Underlined part added to STS). This is an addition seen throughout the Bases.
  10. In the Actions section, the discussion of Action B differs from the corresponding STS discussion. In particular, Required Action B.2 allows 48 hours to be in MODE 3 with RCS temperature hot < 200°F rather than the 36 hours allowed by the STS to be in MODE 5 (RCS average temperature ≤ 200°F). The NRC staff notes that this difference is also addressed from the perspective of the associated Bases for the completion time by Sub-question 8 of Question 16-32 of RAI 228-9034 (ADAMS Accession No. ML17257A227).
  11. In the SRs section, the discussion of SR 3.4.5.1, the second, third, fourth, and fifth paragraphs are significantly different than the STS.
- b. GTS Subsection B 3.4.9, “Steam Generator (SG) Tube Integrity”
1. The end of the first paragraph of the Background section omits the sentence from corresponding STS Subsection B 3.4.20 that lists the LCOs governing the requirements for the SG heat removal function. TR-1116-52011-NP, “Technical Specifications Regulatory Conformance and Development,” Revision 0, Table B-1, “Comparison of standard technical specifications with NuScale generic technical specifications,” indicates that the GTS do not include equivalent LCOs (STS LCOs 3.4.4, 3.4.5, 3.4.6, and 3.4.7) because they are “not applicable to NuScale design” and because there are “no corresponding credited features.” However, it appears that the decay heat removal system, which utilizes the SGs, does address the SG heat removal function. The applicant is requested to explain why the GTS include no LCO addressing the SG heat removal function and why no design-specific replacement sentence is proposed, or revise Subsection B 3.4.9 to include a sentence referencing the LCO that governs the SG heat removal function. The NRC staff notes that conforming changes may also need to be made to TR-1116-52011-NP to describe the heat removal function of the SGs.
  2. The second paragraph in the Applicable Safety Analyses section omits an accident-induced leakage value, which is included in the corresponding paragraph in STS Subsection B 3.4.20.

3. The LCO section omits the second paragraph of the LCO section in STS Subsection B 3.4.20, regarding plugging tubes during inspections.
4. The sixth paragraph in the LCO section is not a separate paragraph in the LCO section of STS Subsection B 3.4.20, where it is the last sentence of the sixth paragraph.
5. The eighth paragraph in the LCO section omits an accident-induced leakage value, which is included in the corresponding ninth paragraph of the LCO section of STS Subsection B 3.4.20. The eighth paragraph points to accident-induced leakage not exceeding the limit in LCO 3.4.8, "RCS Specific Activity." In addition, this paragraph uses "SGTF" instead of "SGTR" and there appears to be a typo in the phrase, "does not exceed the limit specified in equal to the LCO."
6. The ninth (and last) paragraph in the LCO section, refers to LCO 3.4.8, "RCS Operational LEAKAGE." This should be changed to LCO 3.4.5. In addition, this paragraph states that LCO 3.4.5 "limits primary to secondary LEAKAGE through any one SG to 150 gallons per day." However, LCO 3.4.5 does not include the phrase, "through any one SG."
7. In the Actions section, the first paragraph in the discussion of Required Actions A.1 and A.2 uses the phrase "tube repair criteria," which is consistent with the corresponding STS paragraph, but according to TSTF-510, this should be changed to "tube plugging criteria."
8. In the Actions section, the second paragraph in the discussion of Required Actions B.1 and B.2 states that the "allowed Completion Times are reasonable, based on operating experience," even though there is no operating experience for the NuScale design. The NRC staff notes that the 36 hour completion time to be in MODE 5 is also addressed from the perspective of the associated Bases for the completion time by Sub-question 8 of Question 16-32 of RAI 228-9034 (ADAMS Accession No. ML17257A227).
9. In the SR section, the third paragraph of the discussion of SR 3.4.9.1 uses the phrase "tube repair criteria," which is consistent with the corresponding STS paragraph. But according to TSTF-510, this should be changed to "tube plugging criteria."
10. In the SR section, the fourth paragraph of the discussion of SR 3.4.9.1 omits the closing sentence of the markup of STS from TSTF-510 about crack indications.
11. In the SR section, both paragraphs of the discussion of SR 3.4.9.2 use the phrase "tube repair criteria." But according to TSTF-510, this should be changed to "tube plugging criteria."