

NuScaleDCRaisPEm Resource

From: Cranston, Gregory
Sent: Tuesday, December 19, 2017 12:21 PM
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Cc: NuScaleDCRaisPEm Resource; Lee, Samuel; Chowdhury, Prosanta; Karas, Rebecca; Thomas, Matt; Markley, Anthony; Schmidt, Jeffrey
Subject: Request for Additional Information No. 304 RAI No. 9189 (9.3.4)
Attachments: Request for Additional Information No. 304 (eRAI No. 9189).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. 304 (eRAI No. 9189)

Issue Date: 12/19/2017

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 09.03.04 - Chemical and Volume Control System (PWR) (Including Boron Recovery System)

Application Section: 9.3.4

QUESTIONS

09.03.04-5

In accordance with GDC 1, 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.

In FSAR Tier 2, Table 3.2-1, "Classification of Structures, Systems, and Components," the applicant designates "piping from (CES, CFDS, CVCS, FWS, MSS, and RCCWS) CIVs to disconnect flange (outside containment)" as Quality Group D. Furthermore, in this table, the applicant designates the CVCS Discharge Spoolpiece Drain Valve, Discharge Spoolpiece Isolation Valve, Injection Check Valve, Injection Spoolpiece Drain Valve, Pressurizer Spoolpiece Drain Valve, Reactor Module Removable Spoolpieces, RPV High Point Degasification Isolation Valve, RPV High Point Degasification Spoolpiece Drain Valve, and Spray Check Valve, as Quality Group C. Also, FSAR Tier 2, Figure 9.3.4-1, "Chemical and Volume Control System Diagram," shows the piping between the CIVs and the respective CVCS isolation valves (i.e. injection check valve, discharge isolation valve, pressurizer spray check valve, and the high point degasification isolation valve) is Quality Group C, which is inconsistent with FSAR Tier 2, Table 3.2-1. Lastly, FSAR Tier 1, Table 2.2-1, "Chemical and Volume Control System Piping," identifies this piping as ASME Code Section III Class 3 piping, which is inconsistent with FSAR Tier 2, Table 3.2-1's quality classification of Quality Group D because Regulatory Guide 1.26 indicates that ASME Code Section III Class 3 piping is Quality Group C.

From the information provided in the FSAR, the staff is unable to determine the appropriate Quality classification of this piping between the CIVs and the removable spoolpieces. The staff asks the applicant to clarify what this piping's Quality classification is and if this piping is Quality Group D, the staff asks the applicant to justify why its Quality Group D when the removable spoolpieces, their respective drain valves, and the associated isolation valves are Quality Group C, and update FSAR Tier 1, Table 2.2-1 and FSAR Tier 2, Figure 9.3.4-1 to be consistent with FSAR Tier 2, Table 3.2-1. If this piping's Quality classification is actually Quality Group C, the staff asks the applicant to update Table 3.2-1 appropriately.

09.03.04-6

In accordance with 10 CFR 52.47(b)(1), the DC application shall contain the proposed inspections, tests, analyses, and acceptance criteria that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a facility that incorporates the design certification has been constructed and will be operated in conformity with the design certification, the provisions of the Act, and the Commission's rules and regulations.

As part of the ASME Code Class 3 components in the CVCS, the applicant identified the RPV high point degasification isolation valve in FSAR Tier 1, Table 2.2-2, as an air operated valve. However, the staff noted that this valve is identified as a solenoid operated valve in FSAR Tier 2, Figure 9.3.4-1.

The staff asks the applicant to clarify if the RPV high point degasification isolation valve is an air operated valve or a solenoid operated valve. The staff also asks the applicant to update the FSAR as necessary to maintain consistency between Tier 1 and Tier 2 information.

09.03.04-7

In accordance with 10 CFR 50 Appendix A GDC 14, "Reactor coolant pressure boundary," the reactor coolant pressure boundary shall be designed, fabricated, erected, and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture.

To meet the requirements of GDC 14, as it relates to the RCPB having an extremely low probability of abnormal leakage, rapidly propagating failure, and gross rupture, the CVCS should be designed to maintain acceptable purity levels in the reactor coolant through the removal of insoluble corrosion products and dissolved ionic material by filtration and ion exchange. Furthermore, the CVCS should be designed to maintain proper RCS chemistry by controlling total dissolved solids, pH, oxygen concentration, and halide concentrations within the acceptable ranges. Lastly, the CVCS should be designed such that the probability of corrosion-induced failure of the RCPB will be minimized, thereby maintaining the integrity of the RCPB. As DSRS Section 9.3.4 specifies, the application should contain the necessary drawings, descriptions, schematics, and P&IDs so that the staff can review the CVCS in order to ascertain that the RCPB has an extremely low probability of abnormal leakage, rapidly propagating failure, and gross rupture.

Part 1.) In FSAR Tier 2, Figure 5.1-2, the applicant shows a single branch off of the CVCS RCS Injection line that goes to the ECCS Actuator Valves. In FSAR Tier 2, Figure 6.3-1, the applicant shows two branches from the RCS that go to the ECCS valves. The staff cannot determine how a single branch, from one drawing connects to two branches on a different drawing, and thus cannot ascertain whether or not the system has been designed to minimize abnormal leakage. The staff requests the applicant to update the FSAR with the appropriate connection between Figure 5.1-2 and Figure 6.3-1 so that the staff can logically verify the line's adequacy.

Part 2.) In FSAR Tier 2, Figure 6.3-1, the applicant shows the CVCS/ECCS reset lines going to both RRV trip valves, and shows the RRV reset valves discharging into containment. This display of the RRV reset/trip lines and valves is directly opposite of how it is displayed for the RRVs on the same figure. The staff cannot determine if the reset/trip lines and valves are configured correctly for the RRVs showed in Figure 6.3-1. The staff requests the applicant to update the FSAR with the appropriate reset/trip line and valve configuration in Figure 6.3-1.

Part 3.) In FSAR Tier 2, Figure 6.3-1, the staff notes that the ECCS line between the reset valve, trip valve, and associated ECCS valve is normally isolated from the CVCS during normal operation. The staff notes that the CVCS is used to reset the ECCS valve by providing pressurized CVCS water to this ECCS line. After this line becomes isolated from the CVCS, the CVCS no longer maintains chemistry of this water. The staff notes that contaminants could accumulate in this line due to stagnation and may affect ECCS valve operation. The staff cannot determine if this line, which contains stagnate CVCS water, maintains appropriate chemistry throughout the operation of the plant. The staff requests the applicant to provide the chemistry requirements of these lines and valves (i.e. reset line/valve, trip line/valve, and ECCS line/valve) and justify how the CVCS meets those requirements when the CVCS water has stagnated within those lines and valves. The staff requests the applicant to update FSAR Tier 2, Section 9.3.4 with this explanation justifying how the CVCS adequately maintains the water chemistry used to reset the ECCS valves over the operation of the plant.