NuScaleDCRaisPEm Resource

From: Cranston, Gregory
Sent: Tuesday, June 20, 2017 10:29 AM
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Subject: Request for Additional Information No. 64, RAI 8863
Attachments: Request for Additional Information No. 64 (eRAI No. 8863).pdf

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

Please submit your response within 60 days of the date of this RAI to the NRC Document Control Desk.

If you have any questions, please contact me.

Thank you.

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301-415-0546

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Request for Additional Information No. 64 (eRAI No. 8863)

Issue Date: 06/20/2017
Application Title: NuScale Standard Design Certification - 52-048
Operating Company: NuScale Power, LLC
Docket No. 52-048
Review Section: 06.02.04 - Containment Isolation System
Application Section: Multiple Tier 2 Sections related to Containment Isolation System

QUESTIONS

06.02.04-1

General Design Criterion 57, “Closed System Isolation Valves,” in conjunction with staff guidance (e.g., DSRS 6.2.4, and RG 1.141) allow using a closed system inside containment as one of the isolation barriers provided the closed system design, in part, satisfies the following requirement: the system is designed to withstand the external pressure from the containment structure acceptance test. No information was found in the FSAR that addressed this topic for closed systems inside containment (e.g., feed, steam, DHRS). Therefore, based on the above regulation and staff guidance, the staff request that the applicant address this item and include this information in the FSAR. As part of the response, provide a mark-up of the FSAR to reflect these changes. This item was discussed with NuScale staff during an Audit.

06.02.04-2

10 CFR 52.47(a)(2) requires sufficient information to permit understanding of the system designs and their relationship to the safety evaluations. The NuScale FSAR Tier 2, Section 6.2.4, “Containment Isolation System,” describes that containment isolation valves (CIVs) are operated by a gas-hydraulic actuation system. The gas-hydraulic actuation system is associated with valve actuators, solenoid valves and a hydraulic skid. However, the FSAR did not explicitly list (provide equipment identifiers) for the actuator and actuator solenoid (or pilot) valves, explicitly discuss their design and qualification requirements (aside from stating that they were safety-related), where the solenoid valves are located, or provide a drawing that depicts the hydraulic system to the actuators, to include the solenoid valves. Therefore, based on the regulation cited above, the NRC staff requests that the applicant provide this information and include a drawing(s) in the FSAR that depict(s) the engineered safety feature gas-hydraulic actuation system(s) and includes each actuation component (e.g., hydraulic system, solenoid valve(s), and actuator) associated with each CIV as expressed in the FSAR Tier 2 (e.g., Section 6.2.4) and note where each component is located. In addition, the staff requests that the safety-related CIV actuator and actuator solenoid (or pilot valves) be uniquely identified on FSAR equipment lists contained in appropriate FSAR tables (e.g., Chapter 3 equipment qualification, etc.). As part of the response, provide a mark-up of the FSAR to reflect these changes.

06.02.04-3

General Design Criterion (GDC) require containment isolation provisions so that fluid lines, which penetrate the primary containment boundary, are isolated in the event of an accident. Containment isolation barriers may also include blind flanges. The NuScale design includes 'in-service inserts' (e.g., FSAR Tier 2, Figures 6.2-5, 6.2.6a, and 6.2.6b) for primary side containment isolation valves (PSCIVs) and secondary side containment isolation valves (SSCIVs). The PSCIVs and SSCIVs in-service inserts are bolted flanged connections (blind flanges) between the containment penetration and the first outboard isolation. During Audit discussions, NuScale confirmed that these in-service inserts serve as passive containment isolation barriers and are periodically removed to support containment isolation leakage testing consistent with GDC 54, "Piping Systems Penetrating Containment" and Appendix J to Part 50, "Primary Reactor Containment Leakage Testing for Water-cooled Power Reactors." However, these in-service inserts are not explicitly identified in the FSAR as isolation barriers that are subject to leakage testing requirements. Therefore, based on the above regulations, the staff request the FSAR be revised (e.g., text, figures, and tables, as appropriate) to clearly indicate the in-service inserts that serve as isolation barriers and are subject to leakage testing. As part of the response, provide a mark-up of the FSAR.

06.02.04-4

10 CFR 50.34(f)(2)(xiv) part (D) requires that an applicant provide containment isolation systems that utilize a containment set point pressure for initiating containment isolation as low as is compatible with normal operation (additional background information can be found in DSRS 6.2.4 and NUREG-0737). NuScale's pressure set point is determined by taking the analytical limit and subtracting total loop uncertainty (see NuScale's setpoint methodology Technical Report: TR-0616-49121-P Rev. 0). Applying NuScale's setpoint methodology results in a set point that is based off the analytical limit and does not consider normal operation as required by the TMI regulation cited above. Therefore, based on the regulation and staff guidance, the NRC staff requests that the NuScale design certification applicant provide information that addresses the TMI regulation related to containment pressure set point given that NuScale's set point methodology does not explicitly require or account for the TMI requirement. As part of the response, provide a mark-up of the FSAR, as appropriate.

In addition, NuScale utilizes a temperature set point (under the bioshield) to initiate containment isolation. In a similar manner as discussed above for the pressure set point, NuScale's temperature set point is determined by taking the analytical limit and subtracting total loop uncertainty (see NuScale's setpoint methodology Technical Report: TR-0616-49121-P Rev. 0). For the temperature setpoint, the NRC staff request that the NuScale design certification applicant provide information on how NuScale arrives at a minimum containment isolation temperature set point that is in keeping with the approach used to determine the containment isolation pressure set point (as low as is compatible with normal operation). As part of the response, provide a mark-up of the FSAR, as appropriate.

06.02.04-5

NuScale FSAR Tier 2 Figure 5.4-9, “Steam Generator Simplified Diagram,” depicts relief valves installed on the feed water piping inside containment to the steam generators. FSAR Tier 2 Section 6.2.4, “Containment Isolation System,” indicates that the feed water piping is considered to be a closed system inside containment that is credited as a containment isolation barrier. FSAR Tier 2 Table 1.9-2, “Conformance with Regulatory Guides,” indicates conformance to RG 1.141, “Containment Isolation Provisions for Fluid Systems.” RG 1.141 endorses ANSI N271 (ANS 56.2) “Containment Isolation Provisions for Fluid Systems.” ANS 56.2 Figure B-14 indicates that a relief valve on a closed system inside containment that is credited as a containment isolation barrier is subject to the provisions of General Design Criterion (GDC) 56, “Primary Containment Isolation.” Therefore, based on the above regulation (i.e., GDC 56) and NuScale’s position related to staff guidance (e.g., conformance), the NRC staff requests that the applicant assess the feed water relief valves inside containment and their compliance with containment isolation design criterion; provide the staff with an explanation and results of the assessment; and include the information in the FSAR, as appropriate. As part of the response, provide a mark-up of the FSAR. (Note, this issue was discussed with NuScale staff as part of an Audit.)