

NuScaleDCRaisPEm Resource

From: Cranston, Gregory
Sent: Friday, September 22, 2017 11:01 AM
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Subject: Request for Additional Information No. 235 RAI No. 9109 (6.6)
Attachments: Request for Additional Information No. 235 (eRAI No. 9109).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.

If you have any questions, please contact me.

Thank you.

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Request for Additional Information No. 235 (eRAI No. 9109)

Issue Date: 09/22/2017

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 06.06 - Inservice Inspection and Testing of Class 2 and 3 Components

Application Section: 6.6

QUESTIONS

06.06-1

10 CFR 52.47, "Contents of Applications," specifies the level of design information needed to be submitted to support design certification. 10 CFR 52.47(a)(3)(i) requires that the design information include the principle design criteria for the facility and notes that Appendix A to 10 CFR Part 50, General Design Criteria, establishes minimum requirements for the principal design criteria for watercooled nuclear power plants. Appendix A to 10 CFR Part 50 specifies, in part, the following:

- 10 CFR Part 50, Appendix A, General Design Criterion 39 requires that, "The containment heat removal system shall be designed to permit appropriate periodic inspection of important components...and piping to assure the integrity and capability of the system."
- 10 CFR Part 50, Appendix A, General Design Criterion 45 requires that, "The cooling water system shall be designed to permit appropriate periodic inspection of important components...and piping, to assure the integrity and capability of the system."
- 10 CFR Part 50, Appendix A, General Design Criterion 55 requires that for "Each line that is part of the reactor coolant pressure boundary and that penetrates primary reactor containment...", "Other appropriate requirements to minimize the probability or consequences of an accidental rupture of these lines or of lines connected to them shall be provided as necessary to assure adequate safety. Determination of the appropriateness of these requirements, such as higher quality design, fabrication, and testing, additional provisions for inservice inspection,..."

10 CFR 50.55a(b) requires that systems and components of boiling and pressurized water-cooled nuclear power reactors must meet the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), with conditions on the use of ASME Code Section XI described in 10 CFR 50.55a(b)(2).

10 CFR 50.55a(g)(3)(ii) requires for design certifications under Part 52 issued on or after July 1, 1974 that ASME Code Class 2 and 3 components (including supports) must be designed and be provided with access to enable the performance of inservice examination of these components.

While ASME Code Section XI (as conditioned by 10CFR50.55a) provides reasonable assurance of leak tightness and structural integrity, several adjustments have been made to ASME Code Section XI and to 10CFR50.55a in response to operating experience. When evaluating a new reactor design, the NRC staff therefore examines areas where any new reactor designs significantly differ from the reactors for which the NRC and ASME have a large body of experience. One area of concern the NRC staff has for applying ASME Code Section XI to the NuScale design is the inspection requirements for smaller pipe sizes, such as NPS 4 or NPS 1.

The NRC staff request additional information on the use of the NPS 4 and other size-based ISI requirements for piping in the NuScale DCD to ensure that the NuScale SMR design meets 10 CFR Part 50, Appendix A, General Design Criteria 39, 45, and/or 55, as applicable to the system. If the ISI requirements for NPS 4 and smaller piping cannot be justified, revise the DCD to propose augmented

inspection requirements beyond those required by ASME Code, Section XI.

06.06-2

A typical boiling water or pressurized water reactor can have hundreds of Class 2 welds, meaning that a 7.5% sample of welds includes a significant number of welds in an ISI program for one of these reactors. The NuScale DCD describes a system with many fewer class 2 welds, resulting in a greatly reduced number of inspections. Based on an assessment of the significance of the piping systems of the NuScale design, determine how many Class 2 piping welds would need to be inspected to achieve the same level of safety as the 7.5% sample described in ASME Code, Section XI, Table IWC-2500, Examination Category C-F-1 and C-F-2, Note 2 to ensure compliance with 10 CFR Part 50, Appendix A, General Design Criteria 39, 45, and/or 55, as applicable to the system.

06.06-3

The drawings showing the penetrations through the containment shell and head appear to show that the nozzles are integral to the shell and head materials (e.g., Figure 6.2-6b) and no nozzle-to-shell or nozzle-to-head welds are shown in these figures. Tables 5.2-6 and 6.2.6 describes the nozzle-to-vessel and nozzle-to-head welds as Examination Category B-D, "Full Penetration Welded Nozzles in Vessels." Describe how the nozzles are attached to the containment vessel and head. This is an inconsistency in the two sections of the DCD.

Revise the DCD to resolve this inconsistency, describe how the nozzles are attached to the vessel and head, and provide the proposed ISI requirements for the nozzles so that the staff can confirm that the locations will meet the accessibility for inspection requirements of 10 CFR 50.55a(3)(ii).

06.06-4

DCD Section 6.6 states:

The initial ISI Program incorporates the latest edition and addenda of the ASME Code approved in 10 CFR 50.55a(b) on the date 128 months (emphasis added) prior to fuel load. ISI of components and system pressure tests conducted during successive 120-month inspection intervals comply with the requirements of the latest edition and addenda of the Code incorporated by reference in 10 CFR 50.55a(b) 18 months (emphasis added) prior to fuel load, subject to the limitations and modifications listed in 10 CFR 50.55a(b). In addition, the optional ASME Code cases listed in Regulatory Guide (RG) 1.147 (Reference 6.6-4) may be used.

DCD Section 6.6.4 states:

The examination program for the 120-month inspection interval is described in the Reactor Module Test Inspection Elements report and are fully developed in the Owners ISI Program to be developed as part of the COL (see COL Item 6.6-2). The initial in-service inspection program incorporates the latest edition and addenda of the ASME Code approved in 10 CFR 50.55a(b) on the date 18 months (emphasis added) prior to fuel load. ISI of components and system pressure tests are conducted during successive 120-month inspection intervals conform with the requirements of the latest edition and addenda of the Code incorporated by reference in 10 CFR 50.55a(b) 18 months (emphasis added) before the start of the 120-month interval, subject to the conditions listed in 10 CFR 50.55a(b).

Revise the DCD to clarify which edition and addenda would be used for each inspection interval for Class 2 and 3 items and provide a justification for anything other than “the latest edition and addenda of the Code incorporated by reference in 10 CFR 50.55a(b) 12 months before the start of the 120-month inspection interval,” as required by 10 CFR 50.55a(g)(4)(i) and (ii).

06.06-5

DCD Section 6.6 states:

The initial ISI Program incorporates the latest edition and addenda of the ASME Code approved in 10 CFR 50.55a(b) on the date 128 months prior to fuel load.

Section 6.6.4 of the DCD states:

The initial ISI Program incorporates the latest edition and addenda of the ASME Code approved in 10 CFR 50.55a(b) on the date 18 months prior to fuel load.

Revise the DCD to specify that the ISI program incorporates the latest edition and addenda of the Code incorporated by reference in 50.55a paragraph (a). Additionally, the language of the DCD in 6.6 and 6.6.4 omits the reference to the conditions listed in 10 CFR 50.55a(b) for the first 120 month inservice inspection interval. Revise the DCD to be consistent with 10 CFR 50.55a(g)(4)(i) or provide a justification as to why applicable 10 CFR 50.55a(b) conditions on a particular ASME Code edition and addenda in 10 CFR 50.55a are omitted for the first 120 month inspection interval.

06.06-6

The NuScale design drawings show several pipe-to-valve welds. Pipe-to-valve welds are a frequent area requiring relief requests for insufficient volumetric coverage as this geometry is challenging to inspect from both sides of the weld. Describe how the pipe-to-valve configuration will allow inspections will be conducted to obtain “essentially 100 percent” inspection coverage in accordance with the requirements of 10 CFR 50.55a(g)(3)(i).

06.06-7

The description for the Quality Group B items described in DCD section 6.6.1 appear to omit the feedwater piping.

Revise the DCD to assure that the ASME Class 2 boundaries are clearly defined.