NuScaleDCRaisPEm Resource

From:	Cranston, Gregory
Sent:	Friday, July 21, 2017 11:55 AM
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Subject:	Request for Additional Information No. 97, RAI 8878 (10.04)
Attachments:	Request for Additional Information No. 97 (eRAI No. 8878).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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Licensing Branch 1 (NuScale)
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Office of New Reactors
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Request for Additional Information No. 97 (eRAI No. 8878)

Issue Date: 07/21/2017
Application Title: NuScale Standard Design Certification - 52-048
Operating Company: NuScale Power, LLC
Docket No. 52-048
Review Section: 10.04.05 - Circulating Water System
Application Section: 10.4.5

QUESTIONS

10.04.05-1

GDC 4

10 CFR 52.47(a)(2) requires that a standard design certification applicant provide a description and analysis of the structures, systems, and components (SSCs) of the facility, with emphasis upon performance requirements, the bases, with technical justification therefor, upon which these requirements have been established, and the evaluations required to show that safety functions will be accomplished.

10 CFR 52.47(c)(2) requires that a standard design certification of "a nuclear power reactor design that … uses simplified, inherent, passive, or other innovative means to accomplish its safety functions must provide an essentially complete nuclear power reactor design except for site-specific elements such as the service water intake structure and the ultimate heat sink, and must meet the requirements of 10 CFR 50.43(e)."

GDC 4 requires, in part, that SSCs important to safety be "appropriately protected against dynamic effects, including the effects of discharging fluids." According to SRP 10.4.5, the requirements of GDC 4 are met when the circulating water (CW) system design includes provisions to accommodate the effects of discharge water (e.g., flooding).

The staff was unable to determine whether the pipe rupture flooding analysis accounts for the external portion of the circulating water system (CWS) piping (e.g., piping running between the cooling tower(s) and turbine generator buildings (TGBs)). In addition, the staff was unable to verify whether the grade slope is sufficient to carry this CWS flooding water away from the buildings housing SSCs as indicated in FSAR Tier 2, Subsection 10.4.5.3.

The applicant is requested to provide additional CWS pipe rupture flooding information including any supporting figures and drawings. The FSAR is to be modified accordingly.

10.04.05-2

Hydraulic Transients & Expansion Joint

10 CFR 52.47(a)(9) governs the technical content of a design certification application and requires that, for applications for light-water cooled nuclear power plants, an evaluation of the standard plant design against the Standard Review Plan (SRP) revision in effect 6 months before the docket date of the application. It also states that, where a difference exists, the evaluation shall discuss how the proposed alternative provides an acceptable method of complying with the Commission's regulations, or portions thereof, that underlie the corresponding SRP acceptance criteria.

GDC 4 requires, in part, that SSCs important to safety be "appropriately protected against dynamic effects, including the effects of discharging fluids." According to SRP 10.4.5, the requirements of GDC 4 are met when the circulating water (CW) system design includes provisions to accommodate the effects of discharge water. The SRP further states that means should be provided to detect leakage in the CW system in order not to adversely affect when there is failure of a component (e.g., expansion joint) or piping in the CW system.

SRP 10.4.5, Section III.1 states:

> *Although the circulating water system is not safety related, a failure of this system, or any of its components, may affect a safety-related component or system. Since large quantities of water flow through the circulating water system (CWS), a leak or break in a component or pipe or expansion joint failure could cause severe and unacceptable flooding of adjacent areas. The reviewer verifies that the design includes provisions to minimize hydraulic transients and their effect upon the functional capability and the integrity of system components. In evaluating the effects of the failure of an expansion joint, the reviewer assumes that the butterfly valve(s) are not available to isolate CWS flow out of the failed expansion joint unless the valve(s)*

have been designed to safety-grade requirements. The reviewer analyzes the descriptions and drawings in the SAR and determines that provisions are incorporated in the design to prevent unacceptable flooding of areas containing safety-related equipment or to mitigate the consequences of flooding.

In the review of FSAR Tier 2, Section 10.4.5, the staff could not find any provision to meet the GDC 4 criteria, as it relates to dynamic effects such as hydraulic transients (e.g., water hammer), during plant startup and shutdown, normal operation, and accident conditions. Also lacking from the FSAR was information related to the failure of CWS expansion joints and resulting floods.

The applicant is requested to provide additional CWS expansion joint failure and hydraulic transient (e.g., water hammer) information including any supporting figures and drawings. The FSAR is to be modified accordingly.

10.04.05-3

Leakage

10 CFR 52.47(c)(2) requires that a standard design certification of "a nuclear power reactor design that … uses simplified, inherent, passive, or other innovative means to accomplish its safety functions must provide an essentially complete nuclear power reactor design except for site-specific elements such as the service water intake structure and the ultimate heat sink, and must meet the requirements of 10 CFR 50.43(e)."

SRP 10.4.5, Section III.2 states that the circulating water system (CWS) design should have the capability to detect leaks and to secure the system quickly and effectively.

In the review of FSAR Tier 2, Section 10.4.5, the staff was unable to find information addressing the CWS capability of detecting and controlling leaks.

The applicant is requested to provide additional CWS leak detection information including any supporting figures and drawings. The FSAR is to be modified accordingly.