NuScaleDCRaisPEm Resource

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Sent:	Friday, July 21, 2017 5:46 PM
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Subject:	Request for Additional Information No. 100, RAI 8906 (10.04)
Attachments:	Request for Additional Information No. 100 (eRAI No. 8906).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. 100 (eRAI No. 8906)

Issue Date: 07/21/2017
Application Title: NuScale Standard Design Certification - 52-048
Operating Company: NuScale Power, LLC
Docket No. 52-048
Review Section: 10.04.01 - Main Condensers
Application Section: 10.4.1 - Main Condensers

QUESTIONS

10.04.01-1

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 60 requires, in part, a power unit design to "include means to control suitably the release of radioactive materials in gaseous and liquid effluents … produced during normal reactor operation, including anticipated operating occurrences." As stipulated in SRP Section 10.4.1, Section II, "Acceptance Criteria", Item 1, the design of the main condenser (MC) is acceptable if the integrated design of the system meets the requirements of GDC 60 as related to failures in the design of the system which do not result in excessive releases of radioactivity to the environment.

FSAR Tier 2, Section 10.4.1.3 states that the condenser air removal system (CARS), as described in FSAR Tier 2, Section 10.4.2, monitors the removed gases [from the main condenser] for radioactivity and can be isolated. FSAR Tier 2, Section 10.4.2.3 states that if the effluent discharge from the main condenser becomes contaminated, there is provision to detect and isolate the non-condensable gases and vapor mixture discharged flow from the CARS and manually route it to balance of plant drainage system.

As written, the staff understands that only the CARS portion is isolated but not the steam source into the main condenser (MC). Therefore, the staff is unable to determine how the main condenser meets GDC 60 to isolate its steam source upon radiation detected in the main condenser (via the CARS system).

The applicant is requested to provide additional information on the provisions to isolate the MC steam source upon radiation detection in the MC (via the CARS) or provide justification as to why the MC does not need to meet GDC 60. The applicant is also requested to include a description of any valves, automatic or manual operation, and any support system needed. The FSAR is to be modified accordingly.

10.04.01-2

GDC 60 requires, in part, a power unit design to "include means to control suitably the release of radioactive materials in gaseous and liquid effluents … produced during normal reactor operation, including anticipated operating occurrences." As stipulated in SRP Section 10.4.1, Section II, "Acceptance Criteria", Item 1, the design of the main condenser (MC) is acceptable if the integrated design of the system meets the requirements of GDC 60 as related to failures in the design of the system which do not result in excessive releases of radioactivity to the environment.

FSAR Tier 2, Section 10.4.1.3 states that leakage from the hotwell is collected and retained by a leakage detection system. However, the staff is unable to determine how the leakage will be collected and controlled.

The applicant is requested to provide additional information on how the MC design and provisions would address GDC 60 or provide justification as to why the MC does not need to meet GDC 60. The applicant is also requested to include a description of the process of draining the hotwell and the ability to maintain control of the drained, potentially radioactive liquid. The FSAR is to be modified accordingly.

10.04.01-3

GDC 4 requires, in part, that SSCs important to safety be "appropriately protected against dynamic effects, including…the effects of discharging fluids …"

FSAR Tier 2 Section 10.4.1.3 states that the resulting flood from a failure of the MC hotwell does not prevent operation of a safety-related system because there are no such systems located in the TGB. The staff is concerned about flood waters exiting the TGB and potentially impacting SR SSCs elsewhere on the site. FSAR Tier 2, Section 10.4.5.3 states that the grade slope outside the TGB and cooling towers is such that is directs water away TGB and Cooling Tower. FSAR Tier 2, Section 3.4.2.1 states that the grade slope will be 1.5%. It is not clear to the staff, how the design, as currently stated in the FSAR, ensures the grade slope sufficiently funnels discharged water away from all structures/buildings containing safety-related SSCs. In addition, there are several buildings and structures on the site that are outside the scope of the design certification and thus their location and design could impede the ability to ensure flood waters are channeled away from SSCs important to safety.

The applicant is requested to provide additional design information, including any supporting figures, drawings, and analyses, regarding the acceptability of the 1.5% grade slope to perform its duty and protect SSCs from flood water. The applicant is also requested to add a COL item to ensure the COL applicant takes into account all final structures/buildings and site-specific grade characteristics to maintain the ability to channel flood waters away from important to safety SSCS. The FSAR is to be modified accordingly.

10.04.01-4

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 10.4.1, Section III.3.D states that design provisions have been incorporated into the MC that will preclude component or tube failures due to steam blowdown from the turbine bypass system.

In the review of FSAR Tier 2, Section 10.4.1, the staff was unable to find information addressing the MC design provisions to preclude component and tube failures due to steam blowdown.

The applicant is requested to provide the additional MC provision information, including any supporting figures and drawings, or provide justification as to why the MC does not need to meet the SRP and 10 CFR 52.47. The FSAR is to be modified accordingly.

10.04.01-5

GDC 4 requires, in part, that SSCs important to safety be "appropriately protected against dynamic effects, including…the effects of discharging fluids …" Item III.2.A of SRP Section 10.4.1, "Main Condensers," states that the requirements of GDC 4 are met by providing a means for controlling and correcting cooling water leakage into the condensate.

FSAR Tier 2, Section 10.4.1.2.2 states that [circulating water system (CWS)] cooling water ingress [into the main condenser] is monitored using cation conductivity measured at numerous locations. The module control system (MCS) is used to monitor the condensate and feedwater system (CFWS) for inleakage. The CFWS, to which the MC is connected to, is used to monitor inleakage from the CWS into the MC since the MC is part of the CFWS. This monitoring is acceptable because the CWS is pressurized while the MC runs at a vacuum, thus the direction of leakage would be from the CWS into the MC which in turn is connected to the CFWS.

The staff's review of FSAR Tier 2, Sections 10.4.1 and 10.4.5, was unable to find information related to the control and correction of any ingress of water from the CWS once detected.

The applicant is requested to provide additional design information including any supporting figures and drawings, to demonstrate, upon detection, the ability to control and correct inleakage or provide justification as to why the MC does not need to meet GDC 4. The FSAR is to be modified accordingly.