NuScaleDCRaisPEm Resource

From: Cranston, Gregory
Sent: Friday, January 12, 2018 3:57 PM
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Cc: NuScaleDCRaisPEm Resource; Lee, Samuel; Chowdhury, Prosanta; Jackson, Diane; Haider, Syed; Tabatabai, Omid
Subject: Request for Additional Information No. 338 RAI No. 9357 (6.2.1.1)
Attachments: Request for Additional Information No. 338 (eRAI No. 9357).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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301-415-0546

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Request for Additional Information No. 338 (eRAI No. 9357)

Issue Date: 01/12/2018
Application Title: NuScale Standard Design Certification - 52-048
Operating Company: NuScale Power, LLC
Docket No. 52-048
Review Section: 06.02.01.01.A - PWR Dry Containments, Including Subatmospheric Containments
Application Section: 6.2.1.1 Containment Structure

QUESTIONS

06.02.01.01.A-2

NPM Containment DBA Analyses

To meet the General Design Criteria (GDCs) 16, 38, and 50 relevant to the containment design basis and guided by the Standard Review Plan (SRP), the staff is reviewing the applicant's analytical models and analysis results that are used for the licensing-basis safety analyses. Specifically, the staff needs to assess the conservatism of the licensing-basis models, constitutive/closure relations, and model input parameters used for the applicant's NPM design basis accident (DBA) containment response analyses, in order to conclude that the results are valid over the applicable range of DBA conditions.

In order to establish the peak calculated containment pressure and temperature, Table 3-3 in the Containment Response Analysis Methodology Technical Report (TR-0516-49084-P, Revision 0) describes five cases of primary system mass and energy release used to calculate the maximum containment (CNV) pressure and maximum containment wall temperature for each case. The staff identified additional information that is needed to perform smart-samples for confirmatory and sensitivity CNV analyses to support making safety findings regarding the NuScale design under DBA conditions. To accomplish this, the staff is focusing on modeling the CNV decoupled from the reactor pressure vessel (RPV) and, rather, using the NuScale-provided mass and energy rates into and out of the CNV as prescribed boundary conditions. In this regard, NuScale is requested to address the following questions regarding the peak containment pressure and wall temperature modeling and the corresponding mass and energy rates. This information may be provided for audit. As part of the audit, the staff may identify information that is necessary for docketing or incorporation in FSAR. The regulatory bases identified above are applicable to all questions in this RAI.

Provide the containment mass and energy rate (i.e., mass per unit time and energy per unit time) of addition to the containment through the discharge point(s) from the reactor coolant system (RCS), and the return from the containment to the RCS through the point(s) of return for each of Cases 1 through 5, which describe transients in which the load originates in the primary-side. Similarly, address the two cases of sources originating in the secondary side (i.e., main steam line and feedwater line break cases). Provide separately the contributions of water and steam (and fog, if modeled). For clarity, the staff requests this information to be provided in the following manner:

a. In general, provide two sets of files per case, where each set corresponds to the values for the conditions assigned to yield: 1) the case-maximum containment pressure, and 2) the case-maximum containment wall temperature.

b. For distinct locations/sources that contribute to the mass and energy release, provide the data separately. For example, contributions of several RVVs, or likewise the contribution of several RRVs, may be lumped. However, the data for lumped RVVs and RRVS should not be further combined. Similarly, provide separately the contribution of any broken line, or, generally, the contribution from any functionally and elevationally distinct location. Also, include contributions that may be negative (e.g., long-time RRV flows may be from the containment vessel to the pressure vessel).

c. Provide the data in the form of Excel spreadsheets or the equivalent. Use a fine plotting interval. One plot point per second is suggested. If a still finer interval provides valuable insights, provide the data (e.g., within 30 seconds) of the substantive time of the opening of a valve or the initiation of a break.

06.02.01.01.A-3

Some data have been provided on containment water depth, however, supplement these data with containment water mass to address the five cases of TR-0516-49084-P wherein the source is the primary RCS, and also to the main steam line and feedwater line break cases of TR-0516-49084-P.

06.02.01.01.A-4

For the staff's better understanding of the Case 5 accident progression due to inadvertant opening of the RRV, please provide the reason(s) for the increasing containment vapor temperature in Figure 5-31 during the period of zero to 50 seconds that precede the transient.