

Request for supplemental information - completeness determination for NuScale Topical Report, TR-108601, Revision 0, "Statistical Subchannel Analysis Methodology."

NuScale-TR-108601, Rev. 0, "Statistical Subchannel Analysis Methodology, Supplement 1 to TR-0915-17564-P-A, Revision 2," (SSAM) did not provide sufficient technical information to enable the NRC to complete its review and make an independent assessment regarding the acceptability of the updated methodology.

The SSAM did not provide an assessment of the impact to critical heat flux (CHF) calculations associated with the nodalization change proposed in the SSAM. Section 3.7.2 of SSAM, which is a supplement to the methodology provided in NuScale Topical Report (TR)-0915-17564, "Subchannel Analysis Methodology, Revision 2," (NSAM), identifies that axial nodalization impacts the prediction of CHF. Section 3.7.2 of NSAM also identifies that axial nodalization impacts the prediction of CHF. Accordingly, a change to the axial nodalization impacts the data reduction calculations used in the development of CHF correlations and associated limits. The change to the nodalization proposed in the SSAM did not contain a corresponding assessment to confirm the applicability of the updated SSAM axial nodalization, including the impact on the prediction of CHF and associated impact on the development of the CHF correlations and their limits. The technical information below describes this identified gap in more detail.

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}} NuScale should demonstrate that the choice of nodalization will not result in a nonconservative estimate of local fluid conditions affecting the CHF correlation near the location of predicted MCHFR.

If NuScale would like to apply a nodalization different from that used in their validation of the CHF correlation, as described in the SSAM, NuScale should either demonstrate that the new nodalization: (1) adequately represents the initial nodalization response, (2) demonstrates that the new nodalization results in a conservative estimate of CHF compared to the estimate which would be obtained with the initial nodalization, or (3) re-perform the validation with the new nodalization in order to quantify the uncertainty resulting from the new nodalization and update the SSAM with the demonstration. If NuScale would like to make use of the higher estimates of CHF (less conservative) resulting from changes to nodalization, they should re-perform their validation analysis with that same updated nodalization and confirm that the approved CHF limit remains bounding.

SSAM Nodalization Assessment:

An acceptable assessment approach which has been commonly used in the past (ADAMS no. ML20031C947) is to re-perform the CHF correlation validation using the new modeling options. This validation is used to confirm that the CHF statistical limit remains applicable even when the new modeling options are applied. The new modeling options that are applied in SSAM are the changes to the entire axial nodalization proposed in SSAM section 3.7.2 for the basemodel. Similarly, other modeling options (node size changes) that are requested to be used as a part of

SSAM could also use the same assessment approach of re-performing the CHF correlation validation for each specific modeling option (node size change).

Safety evaluation Section 3.3.2 (and subsections), for an acceptable assessment approach used in the past (ADAMS no. ML20031C947), describes the NRC review of the assessment approach of re-performing the CHF correlation validation using new modeling options. This assessment approach demonstrates, through the quantification of its error when compared with experimental data, that the initial CHF statistical limit remains applicable even when the new modeling options are applied.

Summary:

To be accepted for review, the SSAM should include an assessment of the impact to CHF calculations associated with the nodalization change proposed in the SSAM. The assessment, as described above, should confirm the applicability of the SSAM axial nodalization with respect to the development of CHF correlation associated limits, which would provide the NRC with sufficient information to complete its review.