ENCLOSURE

Los Alamos
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

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IN REPLY REFER TO: N-6-87-416 (R54W)
MAIL STOP: K557
TELEPHONE: (505)667-9062
FTS 843-9062

Safety Assessment

Mr. R. Rothman
Office of Nuclear Reactor Regulation
Mail Stop P712
US Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Rothman:

REFERENCE: R. H. Shell, "In the Matter of the Application of Tennessee Valley Authority," Docket Nos. 50-438 and 50-439, letter to NRR Licensing Branch No. 4, March 1985.

Los Alamos has just completed a technical evaluation of a new analytical method submitted by TVA for analysis of environmental conditions inside containment during a main-steam-line break (MSLB) for qualification of safety-related electrical equipment (referenced letter). This work was done under FIN A-7293, Casework Reviews, and a draft of our report on this research is enclosed.

In the referenced report, TVA proposes to not follow the licensing guidelines established in NUREG-0588 for their new calculative method. The technical area in which TVA proposes to exceed the NRC limits is in evaluating the condensing heat-transfer coefficient during the MSLB. NUREG-0588 requires the use of the Uchida heat-transfer correlation. However, when the Uchida correlation was used to predict the heat-transfer coefficients for the Carolinas Virginia Tube Reactor (CVTR) containment experiments, it underpredicted the heat-transfer coefficients by a factor of 4--5.

Instead of using the required Uchida correlation, TVA proposes to scale the experimental CVTR heat-transfer coefficients and use them for their Bellefonte Nuclear Plant (BLN). To do this, TVA tries to establish two points. First, they apply their analytical method using their MONSTER code directly to the CVTR experiments; second, they propose a scaling approach to apply these CVTR results to BLN. Los Alamos' review examined both of these points.

In their analysis of CVTR, TVA parametrically varied the revaporization rate and compared the resulting predicted temperatures with the CVTR experimental values. (See Fig. 1 in the attached report.) Based on this analysis, TVA selected 10% revaporization as the appropriate value to use, and they state that the 10% value is conservative for the CVTR analysis.

Los Alamos disagrees with this conclusion. Based on Fig. 1, the TVA analysis overlays the CVTR experimental data for a large portion of the time and only overpredicts the peak value by 4°F. As discussed in our report, in light of large unanalyzed nonhomogenous effects, this is not a sufficient margin to justify being considered a conservative analysis.

The second element of the TVA method is scaling the CVTR results for BLN. To do this, TVA proposes to use the magnitude of the CVTR heat-transfer coefficients but to scale the time at which the peak value is observed. This is based on the form of the Tagami correlation in which the peak heat-transfer coefficient is proportional to the integrated blowdown energy rate per unit containment volume. Justification for this method is not presented beyond drawing an analogy with the Tagami correlation. There are no comparisons with independent data, and there are no sensitivity studies.

Los Alamos conducted a review of the literature on condensing heat-transfer coefficients for containments. We did not find any support for the TVA approach outside of the Tagami correlation. We did find clear support for a physical approach based on the total heat transfer being the sum of the sensible heat transfer plus the condensing heat transfer. Some of our effort was spent examining these methods.

It is our conclusion that the TVA proposed method is not an orthodox approach founded on recognized physical principles. The method is not supported by independent test data or sensitivity studies and as such is not a justifiable alternative to the NRC method.

Sincerely,

Jack Edwards

JNE/jg

Enc. as cited

Cy: A. Notafrancesco, NRC
J. G. Keppler, NRC
C. Poslusny, NRC
C. G. Tinkler, NRC
R. J. Bohl, N-DO, MS K560
L. H. Sullivan, N-6, MS K557
J. E. Hyder, N-6, MS K557
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N-6 File