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OBSERVATIONS ON SANDIA/SWEC CODE COMPARISON

This letter includes some observations on the results of the comparison of Sandia and Stone & Webster Engineering Corporation (SWEC) analyses of the AB-B accident sequence at the Surry station as computed with the MARCH/CONTAIN and THREED/NAUA computer programs, transmitted to you in my letter of December 20.

Observations based on the results of these two independent analyses are as follows:

- The results of the two analyses are in good agreement both qualitatively and quantitatively for pre-existing containment openings from 0 to 2 $ft^2$, which is the region of practical interest. (The work of the Containment Loads and Response Groups has highlighted the importance of small containment openings. Large openings in reinforced concrete containments, such as Surry, are extremely unlikely.)

- Both analyses indicate that cumulative leakage is maximized with a pre-existing containment opening slightly larger than 0.5 $ft^2$ and that leakage is less for both smaller openings and openings up to several square feet.

- The MARCH/CONTAIN analysis resulted in peak leakage $\sim$ 50% greater than computed in the THREED/NAUA analysis.

- The Sandia analysis with no hydrogen burns resulted in higher cumulative leakage for the larger opening sizes (i.e., from 2 to 7 $ft^2$) than resulted from the comparable SWEC analysis, which did not include hydrogen burns. This is due to differences in the analyses, such as volumetric leak rates and the fact that the THREED thermal hydraulic analysis included water in the containment atmosphere which was settled out in the CONTAIN analysis.

- With regard to hydrogen burns, it is observed that if a burn does not occur prior to the large steam injection into the containment, which occurs at the time of core stump, then burns are not calculated to occur for several hours (e.g., 2 to 3 hrs) due to the steam inerting of the atmosphere.

- For pre-existing containment openings equal to or less than $\sim$ 1 $ft^2$, the containment atmosphere is steam inerted preventing hydrogen burns for several hours in both the Sandia and SWEC analyses.

- For larger opening sizes, out-leakage of steam and in-leakage of air can produce conditions suitable for hydrogen burns to occur in the containment prior to the steam inerting associated with core slumping. This results in the high cumulative leakages for the larger opening sizes in the CONTAIN analyses.

- It is significant to note that in these analyses there are only a few minutes between the injection of hydrogen into the containment and injection of copious amounts of steam at the time of core slump. Thus the early hydrogen burns, which cause the higher releases for the larger opening sizes in the CONTAIN analysis, result during a very narrow window in time with the assumed availability of an ignition source at that time. (Note: In the AB-B sequence all on-site and off-site electrical power is postulated to be lossed).

In summary, the relatively good agreement between the SWEC analysis, performed early in 1983, and the Sandia analysis, performed in December 1984, illustrates that independent methodologies produce similar results when applied to the analysis of fission product leakage for a large break LOCA accident sequence in large dry PWR containments.

The graphical presentation of the results forwarded to you in draft form in my earlier letter is being redrawn by our Graphic Arts Section and will be forwarded to you shortly.

I believe this limited computer code comparison has been informative and productive. I thank you for your efforts in encouraging Sandia and SWEC to perform the comparison, which should serve as a useful adjunct to the SWEC analysis reported in the Report of the ANS Special Committee on Source Terms.

Sincerely,

E. A. Warman

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