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25 May 1979

Dr. A. T. Clark
Fuel Reprocessing and Recycle Branch
Division of Fuel Cycling and Material Safety
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Re: Contract NRC-03-78-150, NMSS
Report "Seismic Analysis of the Acid Liquid Waste Tanks at the Western New York State Nuclear Service Center, West Valley, New York" by C. Y. Liaw, A. M. Davito and R. C. Murray, Lawrence Livermore Lab. Report UCRL-52600, March 1979

Dear Dr. Clark:

As part of our work assignment with your branch we have been asked to provide review comments concerning the results of the detailed seismic and wind evaluation studies of the nuclear fuel reprocessing plant operated by Nuclear Fuel Services, Inc. at West Valley, N.Y. This report provides summary review comments on the study pertaining to the NFS plant acid liquid waste tanks, as referenced above.

I had occasion to observe the facility generally during a site visit on 20 March 1978 in the company of NRC and LLL staff, and have participated in a number of meetings, as well as telephone conversations, during 1977 and 1978 with NRC and LLL personnel where various aspects of the analyses being carried out were discussed.

At this point it should be noted that it is extremely difficult to analyze in detail complicated and interconnected structures of the type being studied in the referenced report. At best, analyses of any type, including sophisticated analyses such as those summarized in the noted report, can

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provide only an estimate of the strength available to resist the specified loadings. My review comments are directed toward attempting to place in perspective the significance of the findings, based on the information contained in the report, as well as my experience in dealing with the seismic and wind resistance of similarly constructed facilities.

My comments on the referenced analysis report follow.

The noted report contains a study of the seismic adequacy of two acid waste tanks (8D-3 and 8D-4) located in a rectangular reinforced concrete vault. Each tank is 12 ft in diameter, 15.75 ft in height, made of 304 L stainless steel, and has a nominal capacity of 15,000 gal. The tanks are supported on legs of 8 in. extra strong pipe fastened to the bottom of the vault.

The reinforced concrete vaults are 32 ft by 19 ft by 25.25 ft high, with the floor slab extending out beyond the walls. A stainless steel liner covers the floor and extends up the wall 1.5 ft, creating a pan under the tanks.

The analysis of the tanks and vault was made with a finite element program (SAP 4) and included consideration of dead loads, hydrostatic loads (one tank is nearly full), thermal loads and seismic loads (0.20 g zero period ground acceleration and NRC Reg. Guide 1.60).

In the case of the tanks the analysis was made to ascertain there was no difficulty for yielding or buckling of the shell wall, yielding of the bottom plate, or yielding or buckling of the support legs and stiffeners. Several analyses incorporating different loading situations were made. Even for the low damping value employed (one percent of critical) the maximum stress in the tank wall occurred near the legs and was found to be about 40 percent of yield. The highest stress (in excess of yield) was found to occur in the base plate connecting the legs to the support assembly and suggests that yielding may occur but yet not impair the support function. Interaction effects are probably low in view of the fact that the tank legs are tied directly to the foundation slab.

In the case of the vault the analysis necessarily included equivalent static analysis of the soil pressures along with finite element analysis of the vault itself. The principal complication in carrying out the vault analysis centered around treatment of the thermal loadings. The analyses made suggest that some cracking of the vault may occur if the thermal gradient is very great. An elastic analysis, as undertaken here, is unable to offer more than an approximate insight into the nonlinear effects associated with the residual thermal loading. In view of the probability of at least some thermal gradient existing, it is quite likely that at a zero period acceleration of 0.20 g cracking of the reinforced concrete vault can be expected at the roof wall junction; cracking in this zone would not be expected to lead to leakage of any fluids.

Respectfully submitted,

W. J. Hall

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