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PROPOSED POSITIONS ON GE POOL DYNAMICS TEST PROGRAMS

At this time we are faced with several milestones that require action in our review of GE test programs directed at pool dynamic effects in pressure-suppression containments. GE has recently completed the final series of 1/3 scale pool dynamics tests for Mark III and the small-scale model verification tests for relief valve clearing loads. In addition, we have recently received and made preliminary evaluations of several documents from GE regarding their test programs and the response from Mississippi Power and Light (Grand Gulf) to our standard pool dynamics letter. The status of these efforts by GE and ourselves, and our impending reviews of each BWR pressure-suppression containment require that we establish definitive positions in these areas. Our recommended positions with a summary of background information is provided below.

Background - LOCA Pool Dynamics

GE performed seven full-scale air tests in February 1974 to scope the magnitude of pool swell loads for Mark III. These tests were followed by comprehensive 1/3 scale tests from June 1974 to April 1975 directed at froth impingement and flow ΔP loads on the HCU floor and bulk swell impact loads on pipes, I-beams, etc., located near the pool surface. GE's experimental approach in the 1/3 scale tests was predicated on the theory that knowledge of water ligament thickness and water ligament velocity defines pool swell loads independent of other factors such as vent submergence and pool surface to structure distance. Therefore representative Mark III structures and design parameters were not simulated in the test facility.

In May 1974 GE wrote a design guide which specified pool swell loads for Mark III based solely on the results of the air tests (Ref. response to Question 3.82, GESSAR). It is GE's position that the air tests yielded conservative pool swell loads and that the specified values in the guide are "bounding." These values are, in fact, being used in the Grand Gulf design (MP&L submittal dated April 25, 1975).

We have previously informed GE (letter, Moore to Stuart, October 7, 1974) and each Mark III applicant (standard letters on pool dynamics) that reliance on air test data alone to justify pool swell loads would not be acceptable due to deficiencies in the number and type of air tests. We also recommended in our October 7, 1974 letter that GE perform additional

D-21

pool swell tests based on the locations of structures in actual Mark III plants. We learned later (San Jose meeting, February 12-13, 1975) that GE was relying on a ligament thickness/ligament velocity correlation. As a result, we informed them (in the meeting and in a letter, Tedesco to Stuart, dated March 26, 1975) that this approach would have to be fully justified. An advance copy of this justification was received several weeks ago (draft NEDE-13407P) and we have made a preliminary evaluation. Our conclusion is that GE has not adequately supported their experimental approach.

Background - Relief Valve Loads

In April 1970, GE submitted NEDO-10859 which described their analytical model for determining loads due to relief valve vent clearing with supporting data from tests done at the Quad Cities plant. Our evaluation of that report (Butler to Stuart, September 12, 1974) indicated that further testing was required to validate their model. In a meeting in San Jose on February 12-13, 1975 GE described several refinements (to account for reflection and reinforcement of pressure waves off the rigid concrete structures in Mark II and III containments) they had made in their analytical model and informed us that a series of small-scale relief valve tests would soon be performed in San Jose for model verification purposes. Loads calculated using this model would be used to assess the structural adequacy of containment structures. We subsequently informed GE (letter, Tedesco to Stuart, March 26, 1975) that their approach would be adequate on an interim basis but that additional confirmation of the loads by in-plant testing would be required.

GE has recently submitted (letter, Gyorey to Tedesco, April 8, 1975) a detailed description of their small-scale relief valve facility and the testing program which is not complete. Based on our preliminary review of this information we conclude that due to limitations of the facility, results from these tests will not be sufficient to make a determination that the GE analytical model adequately predicts relief valve clearing loads for full size plants.

Recommended Positions

1. On the basis of available test data, the pool swell loads specified in the GE design guide for Mark III are not currently justified and are not acceptable as the final basis for structural designs of Mark III plants. We believe that the loads from the air tests are representative (i.e., scoping type tests) but not necessarily bounding on upper limit values. Additional pool dynamic testing will be required, which simulates the location of actual Mark III containment structures, to establish conservative pool swell loads for Mark III.

2. Anticipating the problems associated with completely justifying extrapolation of Mark III pool dynamics data for Mark I and II, an additional test program should be performed, similar to Mark III, to establish conservative values of pool dynamic loads for Mark I and II type plants.

3. We will require that a larger scale test program which is more representative of actual plant conditions be performed to provide confirmation of the Mark II and Mark III relief valve clearing model.

4. Our position regarding relief valve clearing loads for each type of plant is as follows:

   Mark I: In-plant testing of relief valves should be performed at about the next refueling outage for representative plants. Responses to our standard letter should be provided as requested.

   Mark II & III: Use of the GE analytical model, following verification by larger scale tests, will be acceptable to establish design basis relief valve clearing loads. Further verification will be required by in-plant testing of relief valve loads during startup testing. Testing of the prototype of each class of plants and relief valve configuration will be sufficient.

We plan to discuss these positions with GE in our forthcoming meeting with them in San Jose on May 20-21, 1975.

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