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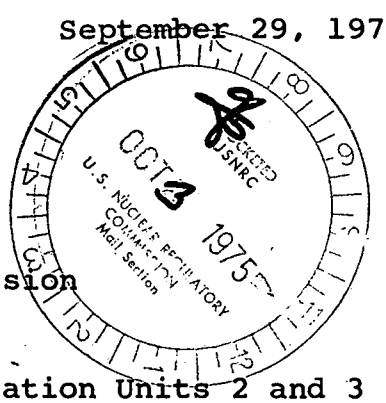
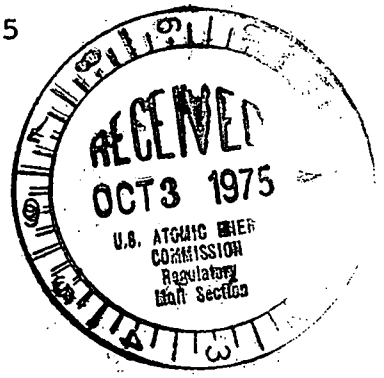
September 29, 1975





Mr. Dennis L. Ziemann, Chief
Operating Reactors - Branch 2
Division of Reactor Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Dresden Station Units 2 and 3
Quad-Cities Station Units 1 and 2
Mark I Containment Evaluation -
Long Term Program, NRC Dkts.
50-237, 50-249, 50-254, and 50-265

Dear Mr. Ziemann:

In our May 7, 1975 letter to you, we explained that a re-evaluation of the Mark I containment for the referenced plants was being undertaken to demonstrate that the integrity of the existing design would be maintained in the unlikely event of a DBA LOCA. This re-evaluation was started in response to requests for information from the NRC in letters dated February 14, 1975 and April 17, 1975. As explained in our May 7 letter, the program for this work consisted of both short term and long term phases, with the short term evaluation similar to that performed by G.E. and discussed with the Staff in a meeting in Bethesda on April 10, 1975. The status of this Short Term Program was reported in a letter from G.E. (I. F. Stuart) to A. Giambusso dated July 31, 1975. The proposed long term, in depth evaluation is described in this letter.

The Long Term Program has been developed to address pool dynamic loads associated with LOCA and relief valve blowdown events. It consists of a combination of tests, analyses, and the development of acceptance criteria by which the design basis can be assessed. A parallel effort of development of potential modifications will be included so that they will be ready if required. The objective of the Long Term Program is to verify that the containment is capable of meeting suitable criteria and that it will function as intended for a 40-year life. This program is being undertaken as a joint effort by the ad hoc BWR Mark I Containment Owners Group. It will be conducted on a generic basis to the greatest extent possible to minimize the time to achieve an acceptable overall uniform solution.

The activities of the Long Term Program include the evaluation of LOCA dynamic test data already obtained by G.E. and their licensee, together with a series of in-plant and out-of-plant tests supported by analytical programs to identify the phenomenological and structural characteristics of the Mark I containment. Specific activities are listed below with a brief summary of their objectives, expected completion schedule, and description of their content.

Relief Valve Discharge Related Activities

1. In-Plant Test of S/R Valve Discharge for Torus Pressure and Strain Measurements, Discharge Pipe Pressure and Water Level Measurements, and Consecutive Valve Actuation Measurements.

   Schedule: 4th Quarter 1975

   Objective: To establish a generic basis for and to refine the phenomenological model used to predict relief valve blowdown loads.

   Description: Conduct a series of single, multiple, and varying consecutive actuation tests in one plant equipped with extensive torus strain and pressure instrumentation; S/R valve discharge line water level and pressure instrumentation.

2. Select Plants for Torus Stress Test During Safety/Relief Valve Discharge.

   Schedule: 4th Quarter 1975

   Objective: Define the plants appropriate for relief valve strain gage testing.

   Description: Establish plant selection criteria. Evaluate preliminary test results and ensure that an adequate number of plants are being tested to include applicability to all plants .

3. Strain Gauge Testing in Representative Plants.

   Schedule: Start 4th Quarter 1975 - Complete 3rd Quarter 1976

Objective: Obtain direct torus shell strain measurements associated with relief valve actuations to demonstrate structural adequacy.

Description: Perform tests at several representative plants to adequately cover all Mark I designs. Install strain gauge measurement instrumentation on the torus exterior surface. Perform single and multiple valve tests and establish fatigue life adequacy for testing plants and plants of common type utilizing these data.

4. Relief Valve Mitigating Fix (Load Reduction) Testing.

Schedule: 1st Quarter 1976

Objective: Provide quantitative evaluation of different RV discharge devices in small scale for scaling potential devices that may be backfittable to Mark I. This is a backup mitigating fix being investigated in parallel with in-plant tests so that a device would be available if it should be needed later.

Description: Design various load mitigation devices on a subscale basis. Fabricate and install at the Moss Landing Test Facility and perform appropriate tests to obtain relative performance.

5. Relief Valve Consecutive Actuation Transient Analysis.

Schedule: 3rd Quarter 1976

Objective: Refine analytical methods for predicting discharge pipe pressure and stress amplification features associated with consecutive relief valve actuations.

Description: Develop predictive model and verify with results from test data obtained in Item Number 1 above. Establish methods for applying to all Mark I containments.

6. Relief Valve Steam Discharge Thermal Mixing.

Schedule: 3rd Quarter 1976

Objective: Develop techniques for predicting thermal mixing in the suppression pool during relief valve discharge.

Description: Consolidate all plant and test facility data available on thermal mixing.

LOCA Related Activities

1. Mark I Submergence Pool Swell Test in 4T Facility.

Schedule: 1st Quarter 1976

Objective: Obtain pool swell data (i.e., surface velocity, breakthrough elevation, etc.) with a closed full scale single vent containment configuration and vent submergence typical of Mark I, downcomer lateral loads, and establish pool swell and jet impingement characteristics.

Description: Modify 4T Facility to simulate Mark I downcomer submergence. Instrument appropriately and perform tests.

2. Determine Vent Lateral Loads.

Schedule: 3rd Quarter 1976 - final

Objective: Refine main vent lateral load values to be expected during a LOCA event.

Description: Utilizing data obtained in Item 1 above and data available from G.E. licensee test programs, to establish load values for all subsequent analyses.

3. Establish LOCA Load Definition Basis.

Schedule: 2nd Quarter 1976

Objective: Establish the basis for LOCA loads on all containment structures.

Description: Compare all appropriate available LOCA related test facility data. Establish and verify analytical and experimental basis used to define loads on all other containment structures. Document for future use.

4. Define Final LOCA Design Loads

Schedule: 3rd Quarter 1976

Objective: Establish final design loads using basis developed in Item 3 above for the analyses to be performed on reference plants.

Description: Before the final structural analysis is performed, define all loads ensuring that adequate attention has been given to all new and applicable test and analytical data. This will include appropriate seismic loads.

5. Perform Stress Analysis of Torus, Torus Internals, and Supports and Develop Structural Modifications if Needed.

Schedule: 4th Quarter 1976 and 1st Quarter 1977

Objective: Complete the analysis required to demonstrate torus structure integrity during LOCA. Develop generic conceptual design fixes as necessary to make the design conform to the agreed-upon acceptance criteria. These fixes would be tailored to specific plant application during implementation.

Description: Utilizing the LOCA dynamic loads from the tests and analytical programs, perform detailed structural analysis of the representative plants. Evaluate results in accordance with established acceptance criteria and develop generic design modifications as appropriate.

Common (LOCA and Relief Valve) Activities

1. Establish Criteria for Determining Adequacy of Structural Design.

   Schedule: 2nd Quarter 1976

   Objective: Develop acceptance criteria to be utilized as the design basis for evaluating the adequacy of the Mark I containments.

   Description: Work with ASME Code Committees and NRC representatives to arrive at a mutually agreeable basis for evaluating structural capability for all Mark I containments. Document for future use.

2. Conduct Hardware Tests for Potential Structural Fixes if Required.

   Schedule: 4th Quarter 1975 through 1st Quarter 1977

   Objective: Determine the load capability of existing critical structures or potential fixes for critical structural elements as identified in the test and analytical programs.

   Description: As critical structural elements are identified by the various programs, establish a parallel effort to develop acceptable modification. It may be necessary to mockup and test existing structures or the proposed fixes to determine ultimate capability. Mockups would be tested to destruction.

3. Compare to Plant Licensing Basis.

   Schedule: 2nd Quarter 1977

   Objective: Establish and justify to the NRC the design adequacies of the torus including fixes, if required, considering all of the applied loads.

Description: Utilizing all load and strain information produced by the above programs, complete a detailed analysis of the representative plants to evaluate the adequacy of all Mark I containments utilizing the agreed-upon acceptance criteria.

The completion of the Long Term Program is scheduled for mid 1977. We believe that this program is responsive to the NRC's requests. Detailed planning and procurement of lead equipment has already started in order to meet the expected reporting date. It is recognized that the program duration is longer than originally discussed. This is a direct result of the increased definition of the Long Term Program now available and the extended scope of the Short Term Program as documented in our submittals on that subject. No other program duration changes are known or anticipated. Further, the ad hoc BWR Mark I Owners Group will continue to evaluate progress in order to take advantage of any schedule improvements which can be made.

We suggest a meeting with the NRC Staff be scheduled after you have reviewed the contents of this letter at which time a more detailed discussion of the proposed Long Term Program could be held. The Short Term Program will have been completed and results documented; therefore, this meeting would also be an appropriate time to evaluate the results of that work. The proposed meeting would be conducted with all other members of the Mark I Containment Owners Group and will be arranged by a representative of that group.

Very truly yours,

G. J. Reimel for

G. A. Abrell
Nuclear Licensing Administrator
Boiling Water Reactors