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(TEMPORARY FORM)

CONTROL NO: 10703

FILE: _____

FROM: Iowa Electric Light and Power Co. Cedar Rapids, Iowa Lee Liu		DATE OF DOC 10-2-75	DATE REC'D 10-8-75	LTR xxx	TWX	RPT	OTHER
TO: Mr. George Lear		ORIG 3 signed	CC 37	OTHER	SENT NRC PDR SENT LOCAL PDR		xxx xxx
CLASS xxx	UNCLASS	PROP INFO	INPUT	NO CYS REC'D 40	DOCKET NO: 50-331		
DESCRIPTION: Ltr re our 2-15-75 and 4-17-75 ltrs furn addl info concerning the Mark I containment Program regarding Duane Arnold Energy Center				ENCLOSURES: ACKNOWLEDGED DO NOT REMOVE			
PLANT NAME: Duane Arnold							

FOR ACTION/INFORMATION 10-8-75 JGB

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			M. DUNCAN (E)	

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1 - ASLB	1 - CONSULTANTS	
1 - Newton Anderson	NEWMARK/BLUME/AGBABIAN	
✓ ACRS /SENT		

to C. H.

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IOWA ELECTRIC LIGHT AND POWER COMPANY

General Office

CEDAR RAPIDS, IOWA

October 2, 1975

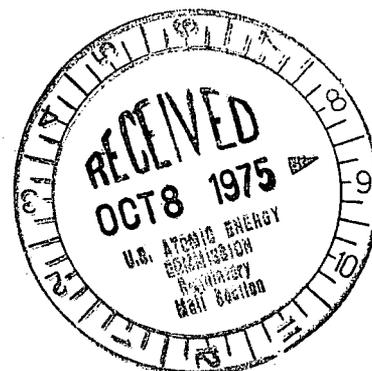
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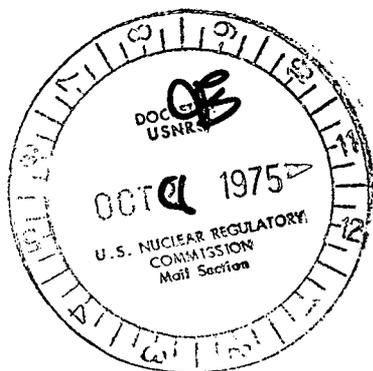
VICE PRESIDENT - ENGINEERING

50-331

Mr. George Lear, Chief
Operating Reactors Branch 3
Division of Reactor Licensing
Nuclear Regulatory Commission
Washington, D. C. 20555



Re: Duane Arnold Energy Center #1
Subject: Mark I Containment BWR Owner's Group
Long-Term Program Description
Reference: 1) Your letter to Duane Arnold, dated 2/15/75,
requesting data on steam vent clearing
phenomenon, and steam quenching vibration
phenomenon
2) Your letter to Duane Arnold, dated 4/17/75,
requesting additional information on primary
containment design data
3) Iowa Electric letter IE-75-544, dated 5/9/75,
describing planned actions of the Mark I
Containment BWR Owner's Group
4) Iowa Electric letter IE-75-873, dated 7/31/75,
describing planned actions of the Mark I
Containment BWR Owner's Group
5) General Electric letter from Ivan Stuart to
R. L. Tedesco, dated 6/13/75, concerning
Mark I Containment Short-Term Program Description
6) General Electric letter from G. L. Gyorey to
R. R. MacCary, dated 6/26/75, concerning Mark I
Containment load predictions
7) Iowa Electric letter IE-75-1067, dated 10/1/75,
concerning Mark I Containment BWR Owner's Group
Short-Term Program Final Report
File: A-110, T-23



Dear Mr. Lear:

The purpose of this letter is to describe the subject Long-Term Program. This program is being developed in response to your requests that we conduct an evaluation of the Duane Arnold Energy Center Mark I Containment. Your requests are documented in your February 15, 1975 and April 17, 1975 letters (references 1 and 2).

10703

This matter was discussed with you in our meeting of July 17, 1975. We have previously responded to you with our letters of May 9, 1975 and July 31, 1975 (references 3 and 4) in which we described the action planned to address your relief valve and loss of coolant accident load concerns. As explained in the May 9, 1975 letter (reference 3), the program for this work consisted of both short-term and long-term phases, with the short-term evaluation similar to that performed by GE and discussed with the Staff in a meeting in Bethesda on April 10, 1975. Our October 1, 1975 letter (reference 7) transmitted the Short-Term Program Final Report.

The Long-Term Program has been developed to address pool dynamic loads associated with loss of coolant accident 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 agreed-upon criteria and that it will function as intended for a forty-year life. This program is being undertaken as a joint effort by the BWR Mark I Containment Owner's 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 loss of coolant accident dynamic test data already obtained by General Electric 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 Long-Term Program activities are described as follows:

I. RELIEF VALVE DISCHARGE RELATED ACTIVITIES

- A. In-Plant Test of Safety/Relief 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 consecutive actuation tests in one plant equipped with extensive torus strain and pressure instrumentation; S/R valve discharge line water level and pressure instrumentation.

- B. 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.
- C. 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 Containment 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.
- D. Safety/Relief Valve Mitigating Fix (Load Reduction) Testing
Schedule: 1st Quarter 1976
Objective: Provide quantitative evaluation of different safety/relief valve discharge devices in small scale for scaling potential devices that may be backfittable to Mark I Containments. 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 sub-scale basis. Fabricate and install at the Moss Landing Test Facility and perform appropriate tests to obtain relative performance.
- E. Safety/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 safety/relief valve actuations.
Description: Develop predictive model and verify with results from test data obtained in Item IA above. Establish methods for applying to all Mark I Containments.

- F. Safety/Relief Valve Steam Discharge Thermal Mixing
Schedule: 3rd Quarter 1976
Objective: Develop techniques for predicting thermal mixing in the suppression pool during safety/relief valve discharge.
Description: Consolidate all plant and test facility data available on thermal mixing.

II. LOSS OF COOLANT ACCIDENT RELATED ACTIVITIES

- A. Mark I Containment 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 Containment, downcomer lateral loads, and establish pool swell and jet impingement characteristics.
Description: Modify 4T Facility to simulate Mark I Containment downcomer submergence. Instrument appropriately and perform tests.
- B. Determine Vent Lateral Loads
Schedule: 3rd Quarter 1976 - final
Objective: Refine main vent lateral load values to be expected during a loss of coolant accident event.
Description: Utilizing data obtained in Item II A above and data available from General Electric licensee test programs, to establish load values for all subsequent analyses.
- C. Establish Loss of Coolant Accident Load Definition Basis
Schedule: 2nd Quarter 1976
Objective: Establish the basis for loss of coolant accident loads on all containment structures.
Description: Compare all appropriate available loss of coolant accident related test facility data. Establish and verify analytical and experimental basis used to define loads on all other containment structures. Document for future use.
- D. Define Final Loss of Coolant Accident Design Loads
Schedule: 3rd Quarter 1976
Objective: Establish final design loads using basis developed in Item II C 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.

- E. 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.

III. COMMON (LOSS OF COOLANT AND SAFETY/RELIEF VALVE) ACTIVITIES

- A. 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.
- B. Conduct Hardware Tests for Potential Structural Fixes if Required
Schedule: 4th Quarter 1975 - 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.
- C. 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.

Completion of the Long-Term Program is scheduled for Second Quarter 1977. We believe this program is responsive to NRC requests. Detailed planning and procurement of long lead equipment is now in progress. It is recognized that the program duration is longer than originally discussed with you. 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. No other program duration changes are anticipated. The Mark I Containment Owner's Group will continue to evaluate our progress in order to take advantage of any schedule improvements which can be made.

We suggest a meeting with the NRC Staff 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 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 Owner's Group and will be arranged by a representative of that group.

Three signed and notarized originals and thirty-seven copies of this letter are transmitted herewith. This letter is true and accurate to the best of my knowledge and belief.

Iowa Electric Light and Power Company

By Lee Liu
Lee Liu
Vice President, Engineering

LL/LDR/1f
encl.

cc: D. Arnold
J. Newman
W. Paulson (2)

Sworn and Subscribed to before me on
this 3rd day of October, 1975.

Georgia F. Marlowe
Notary Public in and for the State
of Iowa.

Georgia F. Marlowe
NOTARY PUBLIC
State of Iowa
Commission Expires
September 30, 1976