UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

PDR
PDR

May 24, 1976

George Lear, Chief, Operating Reactors Branch #3, DOR

DOCKETS NOS.: 50-219, 50-220, 50-237, 50-245, 50-249, 50-254, 50-259, 50-260, 50-263, 50-265, 50-271, 50-277, 50-278, 50-293, 50-296, 50-298, 50-321, 50-324, 50-325, 50-331, 50-333, 50-341, 50-354, 50-355, and 50-366.

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FACILITIES: Oyster Creek Nuclear Generating Station, Nine Mile Point Unit 1, Pilgrim 1, Dresden Units 2 and 3, Millstone Unit 1, Quad Cities Units 1 and 2, Monticello, Peach Bottom Units 2 and 3, Browns Ferry Unit 1, 2 and 3, Vermont Yankee, Hatch Units 1 and 2, Brunswick Units 1 and 2, Duane Arnold Energy Center, Cooper, Fitzpatrick, Enrico Fermi Unit 2, and Hope Creek Units 1 and 2.

SUMMARY OF MEETING HELD ON MAY 13, 1976 WITH REPRESENTATIVES OF THE MARK I OWNERS GROUP

On May 13, 1976 a meeting was held in Bethesda with representatives of the Mark I Owners Group, General Electric Company (GE), and their technical consultants. The purpose of the meeting was (1) to discuss the program for the plant-unique torus support system analyses presented in a letter from GE to the NRC staff dated April 26, 1976, and (2) to discuss the 1/4 scale pool swell test program objectives. Enclosure 1 is a list of meeting attendees.

SUMMARY

N. Edwards, NUTECH, described the program for the plant-unique analyses of torus support systems and the piping attached to the torus. Enclosure 2 contains the slides used in this presentation. General discussion between the NRC staff and representatives of the Mark I Owners Group resulted in

the identification of several outstanding areas of concern:

a. The criteria which will be utilized to evaluate the plant unique analysis results include specified "strength ratios" (SR), where the SR for an element is defined as the stress (or strain) in the element for a given applied load divided by a lower bound of the value of the stress (or strain) in that element at which one would predict failure of the element. The NRC staff stated that general guidelines for defining "failure" for each failure mode being considered should be developed. A meeting between representatives of the Mark I owners group and the NRC staff will take place in early June 1976 to develop such guidelines.

b. With respect to the plant unique sensitivity analysis for upward loads, the NRC staff requested that GE investigate the effects of applying the load factor (LF) to the entire pressure-time history curve (i.e., to both the downward and the upward segments of the curve) in addition to applying the LF to the upward force segment of the curve alone.

c. The NRC staff requested information which supports the use of a static analysis (rather than a dynamic analysis) of piping systems attached to the torus to predict stresses due to a postulated torus uplift.

d. The NRC staff stated that, in the application of the acceptance criteria for the attached piping, S_c should not be increased because of the dynamic strain rate effect.

e. The NRC staff stated that the following information should also be included in the plant unique analyses:

   1. A description of the procedures utilized in calculating the "total" dynamic parameters (such as mass, stiffness, damping values, and forcing functions) for the single degree of freedom equivalent model in terms of the actual system parameters.

   2. A discussion of the effects of calculated torus uplift on the vent pipes and vent pipe bellows.

   3. A discussion of the effects of calculated torus uplift on the operability of active pumps and valves on piping lines attached to the torus.

Representatives of the Mark I Owners Group stated that the reassessment of the Long Term Program Tasks has been delayed and that the Owners Group will not be prepared to discuss this reassessment with the NRC staff until the first week in July 1976.

The NRC staff stated that, based upon the information which has been presented, application of a correction factor of 0.8 to the Most Probable Loads of January 28, 1976 is acceptable.

S. Stark, GE, described the preliminary design and test objectives of the 1/4 scale Mark I Containment testing facility. Enclosure 3 contains the slides used in this presentation. The NRC staff requested information related to future plans for three dimensional (3D) testing. R. Fernandez, EPRI, stated that negotiations were in progress for developing a 3D testing program which would consist of a 1/12 scale test facility with multiple downcomers. Representatives of the Owners Group stated that they would keep the NRC staff advised of any future plans for additional testing.

John Guibert
Operating Reactors Branch #3
Division of Operating

Enclosures:
1. Attendance List
2. Slides
3. Slides

ENCLOSURE 1

ATTENDANCE LIST

MEETING BETWEEN MARK I OWNERS GROUP AND NRC STAFF

MAY 13, 1976

NAME	ORGANIZATION
John Gilbert	NRC
George Lear	NRC
B. D. Liaw	NRC/EB
G. Bagchi	NRC/EB
Richard J. Stuart	NRC/DOR/ENG. BR.
Jack Kudrick	NRC
C. C. Lainas	NRC
C. J. Anderson	NRC
C. I. Grimes	NRC
K. Tedesco	NRC
Norman W. Edwards	NUTECH
R. E. Keever	NUTECH
R. F. Petrokas	NUTECH
W. Z. Masters	GE
S. J. Stark	GE
R. H. Buchholz	GE
L. V. Sobon	GE
W. E. Cooper	Teledyne Mat'l. Res.
J. A. Hayward	Teledyne Mat'l. Res.
C. W. Wolf	Jersey Central Power & Light
B. Biava	Jersey Central Power & Light
T. T. Robin	Southern Services
K. R. Iy-Engar	Southern Services
G. Maise	Brookhaven Lab
G. H. Neils	Northern States Power
D. Lynn Whitt	CBI
R. H. Logue	Philadelphia Electric Co.
R. F. Reedy	Chicago Bridge & Iron
W. F. Bauer	Public Service E & G Co.
D. P. Galle	Commonwealth Edison
P. Kennedy	Tokyo Elec. Power Co.
R. N. Smart	NUS Co.
R. T. Fernandez	EPRI
F. E. Gregor	Detroit Edison Co.

DESCRIPTION OF
SHORT TERM PROGRAM
PLANT UNIQUE TORUS SUPPORT SYSTEMS
AND ATTACHED PIPING ANALYSIS

Prepared for:

Mark I Containme t Owners Group

April 23, 1976

DESCRIPTION OF
SHORT TERM PROGRAM
PLANT UNIQUE TORUS SUPPORT
SYSTEMS AND ATTACHED PIPING ANALYSIS

TABLE OF CONTENTS

METHOD OF ANALYSIS

- DOWNWARD LOADS
- UPWARD LOADS
  - TORUS SUPPORT
  - ATTACHED PIPING

LOADINGS

DEAD LOADS

HYDROSTATIC

EARTHQUAKE

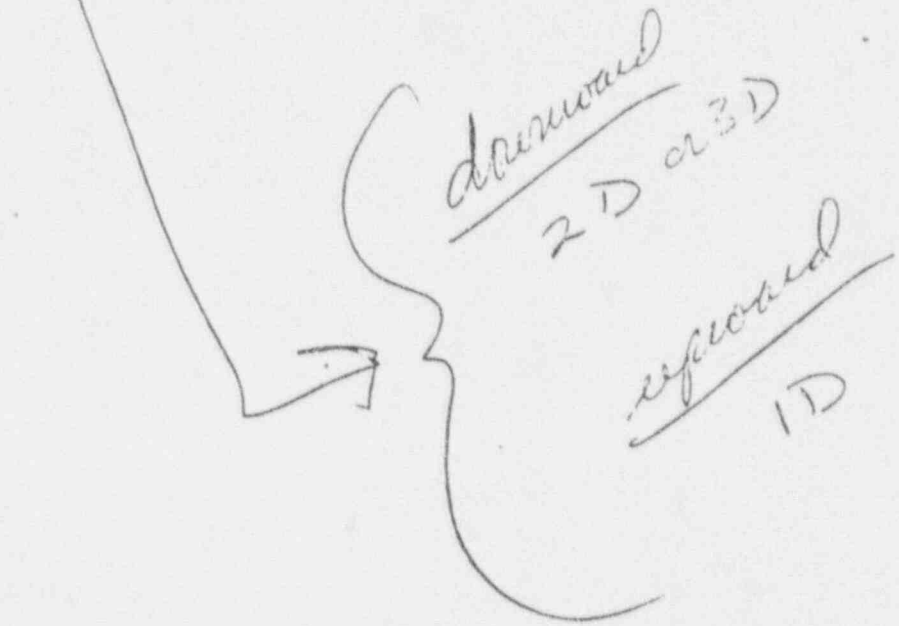
HYDRODYNAMIC POOL SWELL

BASE CASE ANALYSIS:

ADDENDUM NO. 2 LOADS

SENSITIVITY ANALYSIS

LOAD = LF*(CF * ADDENDUM No. 2 LOADS)



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CRITERIA

BASE CASE ANALYSIS

- TORUS SUPPORT SYSTEM

$$SR \leq 0.5$$

- ATTACHED PIPING

$$\frac{iM_D}{Z} < 3.0\ S_c$$

$$\frac{iM_D}{Z} < 5.0\ S_c$$

CRITERIA

SENSITIVITY ANALYSIS

- TORUS SUPPORT SYSTEM

  SR $\leq$ 1.0 FOR LF = 1.5

- ATTACHED PIPING

  LF = 1.5

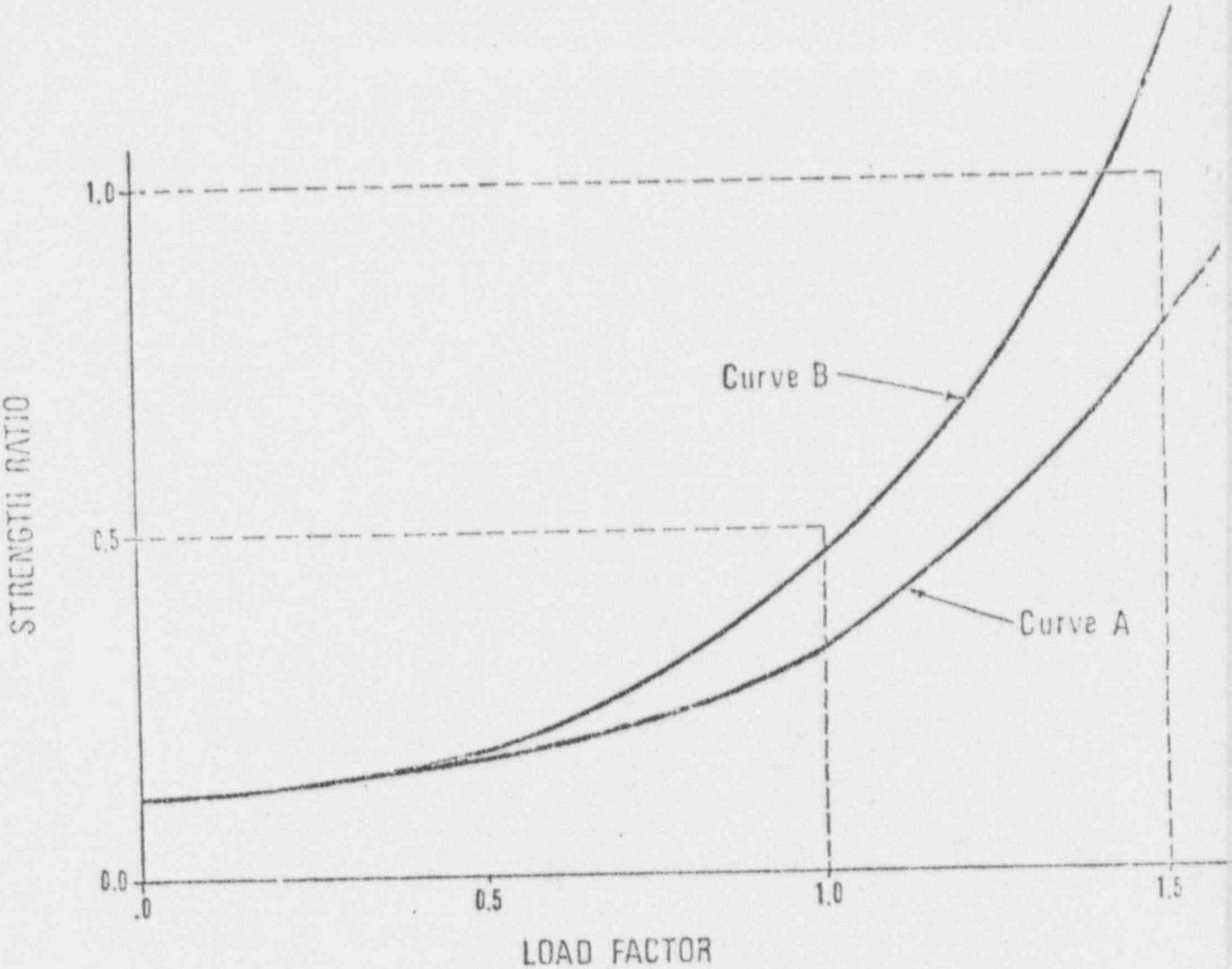

FIGURE 4.2–2 Criteria for Upward Load

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PLANT UNIQUE ACTION PLAN

- LF AT WHICH CRITERIA IS SATISFIED

- DESCRIBE PROPOSED ACTION

- DISCUSS WITH NRC

1/4 Scale MarkI Containment Test

Description Of Test Facility

Instrumentation

Test Objectives

Test Matrix

Uncertainity Analysis

Program Milestones

Description Of Test Facility

Scaled Up Model Of 1/12 Scale Fac

Torus Diameter = 93 inches

One Pair Of Downcomers (2-D

Section Width = 22.2 inches

Downcomer Submergence = 1 foo

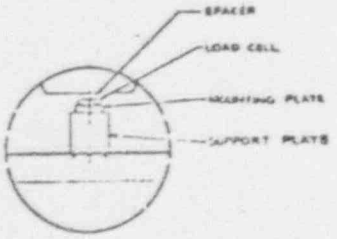
Volumes Increased by $(3)^3$

Drywell Charged By Pressurized Tank

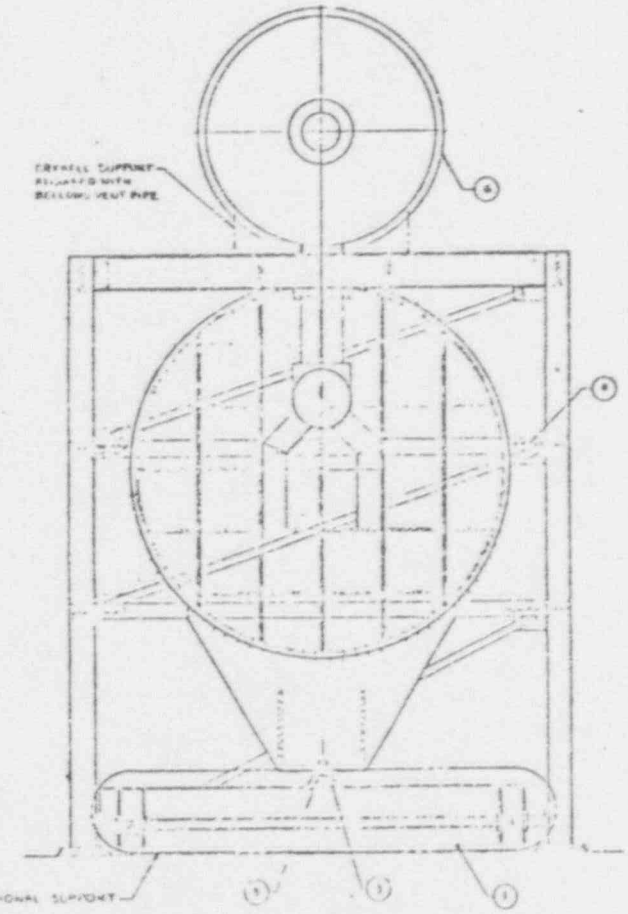
Improved Instrumentation (Later)

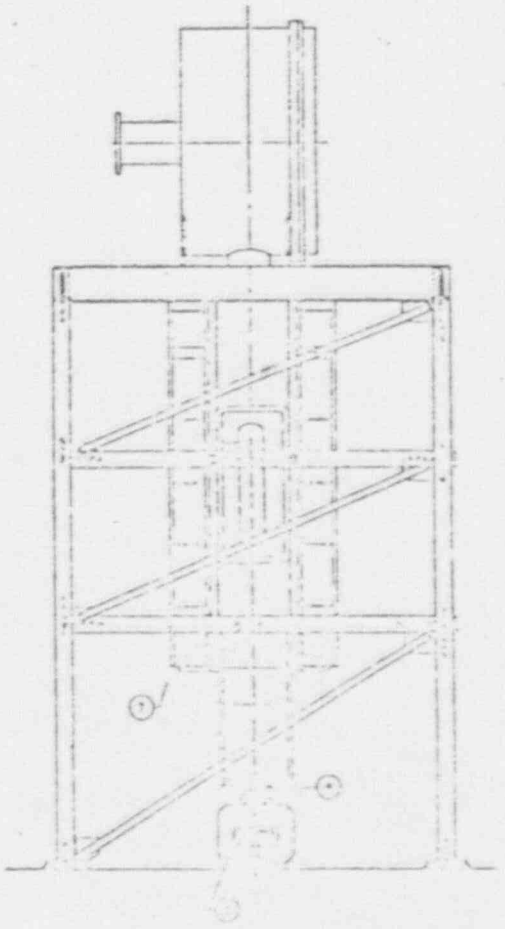
Improved Control of Test (Later)

Structural Interaction Minimized



STANDARD SUPPORT





Instrumentation

Improved

24 High Speed Data Channels

- 16 Pressure Transducers
- 2 Load Cells
- 2 Accelerometers
- 1 Diff. Pressure Transducer
- 1 Thermocouple
- 1 Spare
- 1 Camera Synchronization

Full View Front Window

Side Window

Improved Timing Indication

Larger Scale Facility

- Less Relative Uncertainity
- Longer Transient
- Higher Absolute Pressure
- Lower Scale Up Factor

Test Objectives

Primary: Assess Validity Of Scaling Laws

- Peak Downward Pressure Load
- Peak Upward Pressure Load
- Net Pressure Load History
- Pool Swell History
- Phenomena Time Phasing
- Vent Clearing Transient
- Influence Of Breakthrough

Boundary Conditions Set By Scaling Laws

Verify Base Case and $\Delta P_{DW/WW}$

Input For Uncertainity Analysis

Secondary: Measure Vent Impact And Drag Loads

PROPOSED TEST MATRIX

RUN	SUBMERGENCE, FEET	TORUS PRESSURE PSI	DRYWELL/TORUS DELTA P, IN - H_2O	DRYWELL PRESSURIZATION RATE, PSI/SEC	ENTHALPY FLUX BTU/SEC
MEDIUM ORIFICE RUNS					
1 - 8	1.0	3.68	0	24.2	360
9 & 10	"	"	6.0	"	"
11 & 12	"	"	12.0	"	"
LARGE ORIFICE RUNS					
13 - 20	1.0	3.68	0	36.4	600
21 & 22	"	"	6.0	"	"
23 & 24	"	"	12.0	"	"

Uncertainity Analysis

Uncertainities To Be Considered

Instrument Uncertainity

Scatter In Results

Analysis Will Be Included In Test Report

Program Milestones

Completed

Scope And Objectives	4/13/7
Preliminary Design	5/11/7

Forecasted

Approve Final Design	7/3/7
Complete Facility Fabrication And Installation	8/29/7
Complete Tests	9/30/7
Submit Test Report	4Q76