



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

MAR 3 1977

MEMORANDUM FOR: Gus C. Lainas, Chief, Containment Systems Branch, DSS  
FROM: T. M. Su, Containment Systems Branch, DSS  
THRU: J. Kudrick, Section A Leader, Containment Systems Branch, DSS  
SUBJECT: SRV DISCUSSION WITH THE MARK II OWNERS GROUP

Meetings were held on February 16 and 17, 1977, in San Jose, California with representatives of General Electric, Mark II owner group, NRC staff and our consultants (BNL). The minutes of these meetings will be prepared by Sydney Miner, the project manager for Mark II containment. This memo, however, is to apprise you about the discussions held on SRV loadings.

The discussion concentrated on two areas, namely, Monticello test results and the analytical model verification. The following summarizes this discussion:

Monticello Test Results

The test results indicate that the air bubble was deflected consistently to one side along the ramshead discharge. Cause of this deflection is not yet determined. Investigation of the tested ramsheads to determine any dislocation or obstructions on the discharge will be conducted in the next scheduled outage.

It is anticipated that this phenomenon of deflected bubble will impose further difficulties for analytical model verification because of the instrumentation setup. Note that most of the pressure transducers were concentrated on one side of the discharge. There is only one pressure transducer in the side, which appears to be where the bubble was located.

Furthermore, the interference of the I-beam, which supports the ramshead discharge, on the bubble pressure field appears significant. The applicability of the Monticello test for those plants without the I-beam should be evaluated.

Contact:  
T. M. Su, CSB  
492-7711

8604010085 860114  
PDR FOIA  
FIREST085-665 PDR

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MAR 3 1977

Gus C. Lainas

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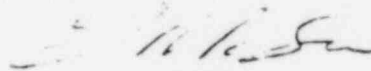
The applicability of the Monticello test for Mark II containment was also discussed. We indicated that concerns of fluid/structure interaction and orientation of the ramshead discharge should be considered. The Monticello is a steel containment while most of the Mark II designs are concrete containments. Also, the ramsheads for Monticello are oriented parallel with the boundaries while the Mark II containments such as Shoreham and Zimmer have the ramsheads oriented toward the boundaries.

Final report on Monticello test will be issued in April 1977.

Analytical Model

GE indicated that the existing analytical model is being modified. Details of this modification has not been presented. However, GE indicated that one of the key assumptions, i.e., bubble formation efficiency, has been deleted in the modified model. A description of this model will be issued in June 1977.

The comparison of model with test data, however, will be made on the basis of existing model. Report on this comparison will be issued in the second quarter of 1977.



T. M. Su  
Containment Systems Branch  
Division of Systems Safety

cc: R. Tedesco  
C. Anderson  
J. Kudrick  
J. Shapaker  
S. Miner  
T. Su  
File: BWR Pool SV/RV Load  
Problems (Ramshead)

WE DON'T  
KNOW WHY

ADDS LOADS

PE UNIT 2  
(SADDLES)

LAST DATA

QUIZENT MTH - 5/7/77

WILL RUN  
SAT & SUN

5

EXTERNAL LOADS

stress & strain on piping!

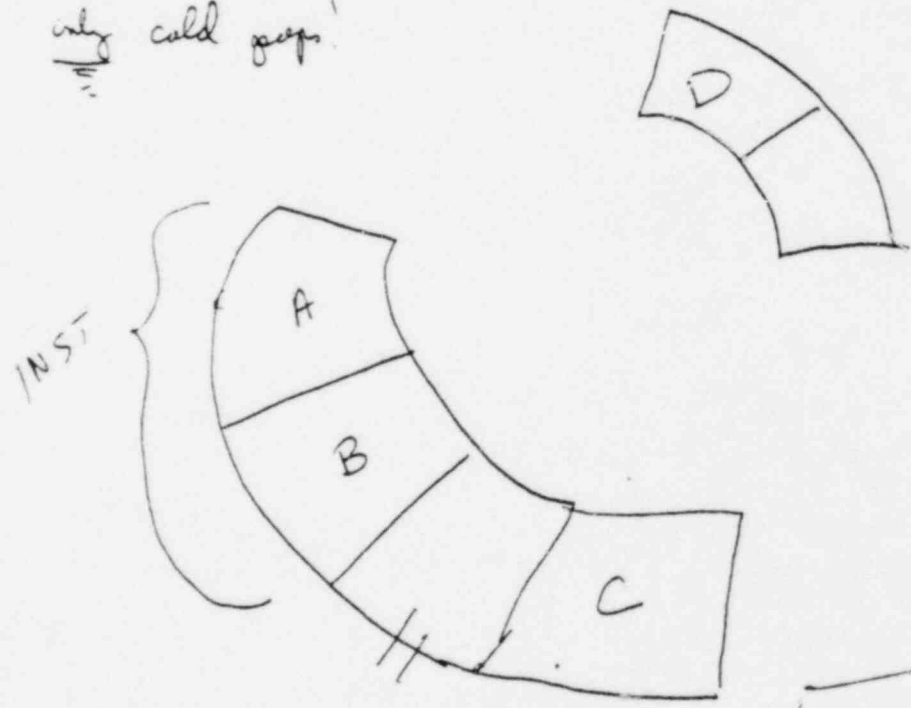
no sequential pops

See pop

only cold pops!

900 PSI  
≡

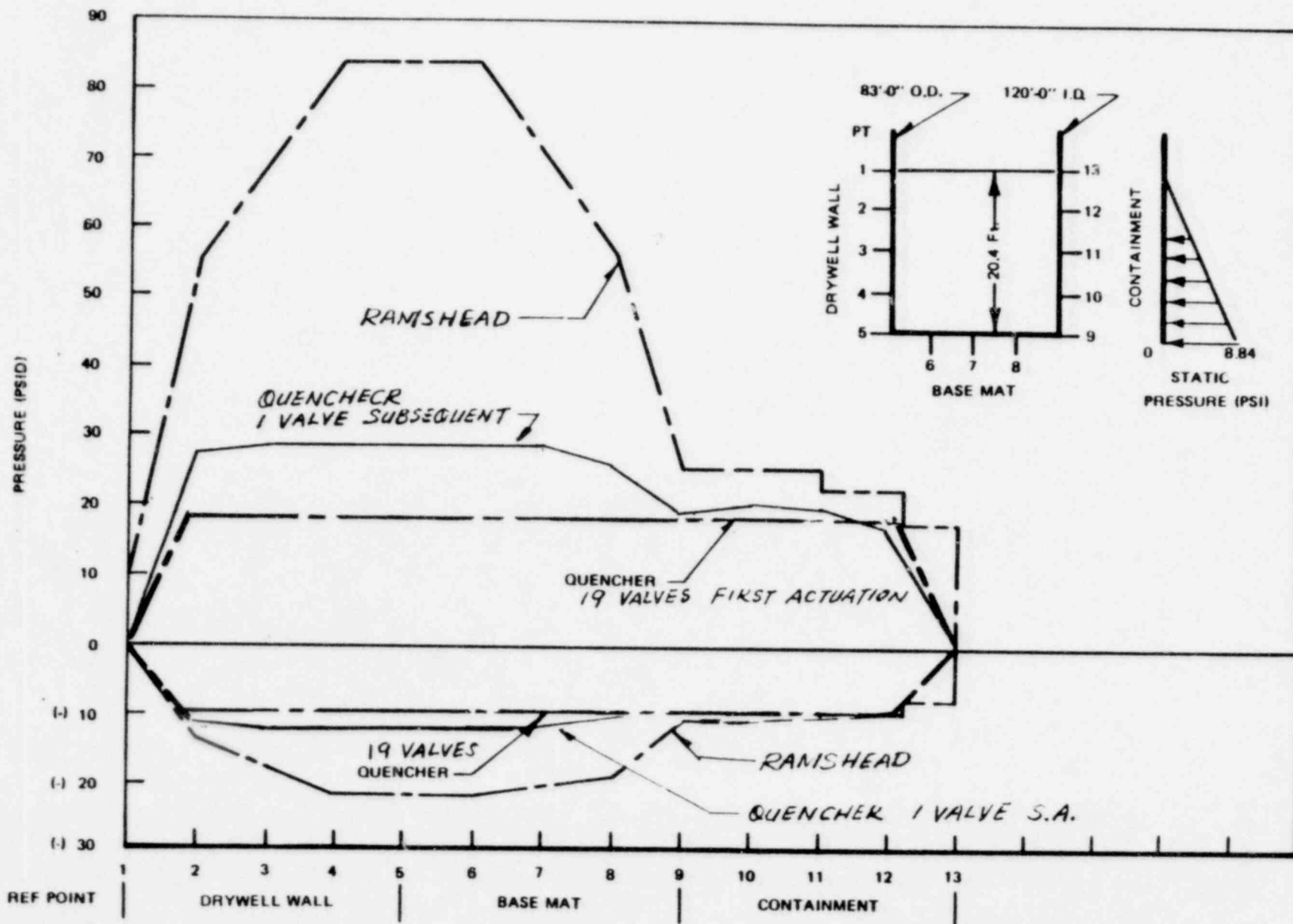
No facing further instruments



A, B, C, D  
A/B 3x

PIPE  
INST.

Have they  
been repaired?



8

file  
Submerged  
structure

SUBMERGED STRUCTURE LOADS  
GENERIC PROGRAM

- PROGRAM OBJECTIVES
- PROGRAM STATUS TO DATE

### TYPICAL MARK II SUBMERGED STRUCTURES

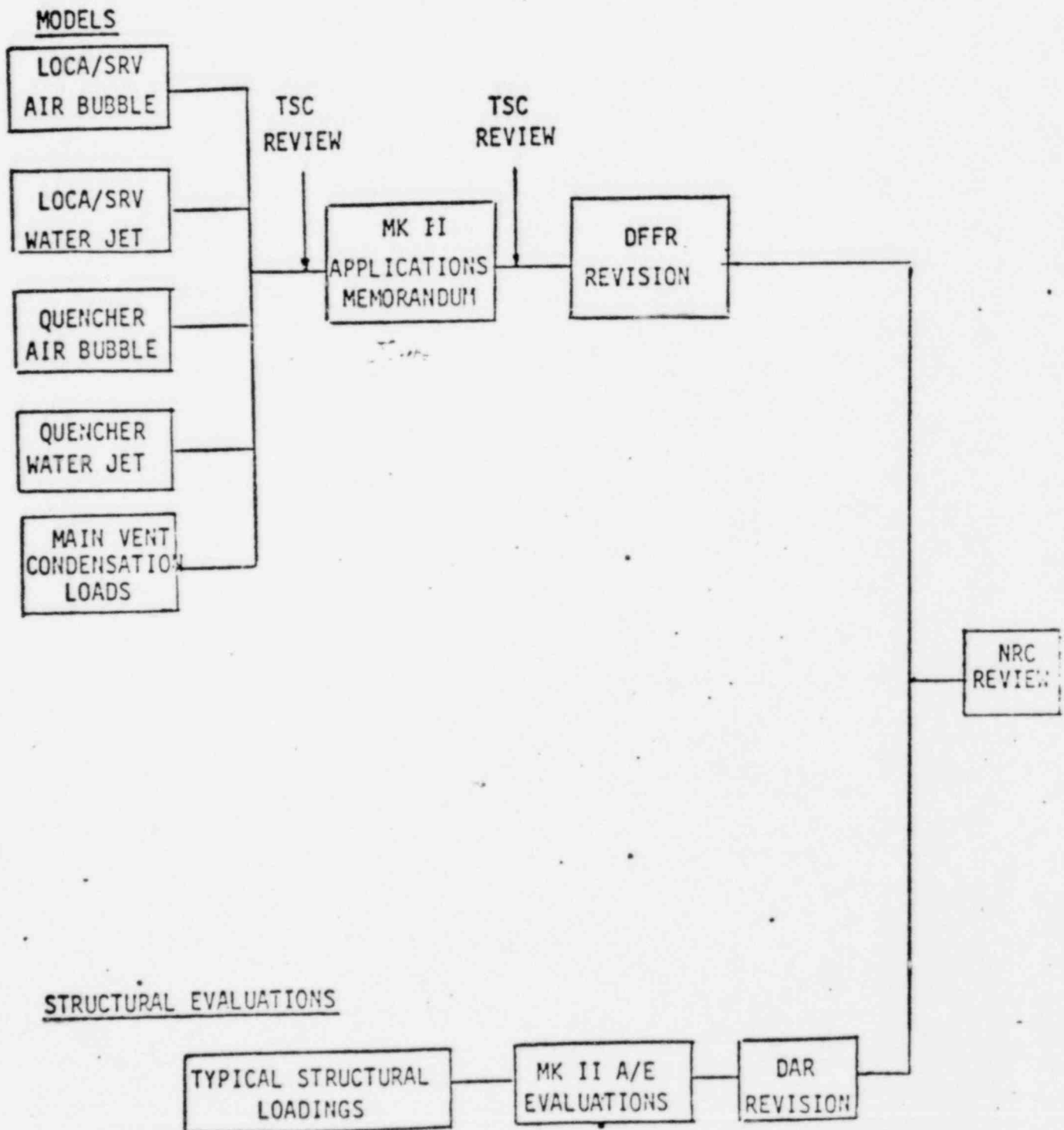
- S/RV LINES AND SUPPORTS
- MAIN VENT AND BRACING SYSTEM
- DIAPHRAGM FLOOR SUPPORT COLUMNS
- ECCS SUCTION AND RETURN LINES

### PROGRAM OBJECTIVE

PROVIDE ANALYTICAL METHODS TO DEFINE LOADS ON SUBMERGED STRUCTURES IN-  
MARK I, II & III SUPPRESSION POOLS DUE TO

- MAIN VENT AIR CLEARING BUBBLES (LOCA)
- MAIN VENT WATER JETS
- S/RV AIR CLEARING BUBBLES (RAISHEAD AND QUENCHER)
- S/RV WATER JETS (RAISHEAD AND QUENCHER)
- MAIN VENT STEAM CONDENSATION

SUBMERGED STRUCTURE LOADS EVALUATION PROGRAM  
MK II HIGHLIGHTS





## PROGRAM OBJECTIVES

### ANALYTICAL MODEL DEVELOPMENT

- APPLY ACCELERATION DRAG THEORY TO ACTUAL GEOMETRY
- CONDUCT LITERATURE SURVEY TO CONFIRM THEORY

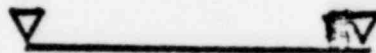
# PROGRAM SCHEDULE

1976			1977												1978							
10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8

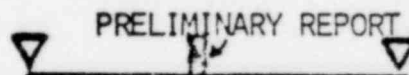
## PART I

### I. MODEL DEVELOPMENT

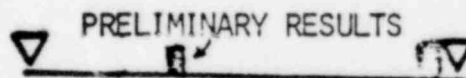
LOCA & S/RV



STEAM CONDENSATION



LITERATURE SURVEY &  
CONSULTATION



▽ - ▽ START AND COMPLETION DATE

■ OWNERS' REVIEW

SUMMARY OF PRELIMINARY RESULT.

- SRV PIPE PRESSURE
  - AVG. OF 275 PSIA (1 SIGMA =  $\pm 3\%$ ) FOR BASE CASE (COLD PIPE, COLD POOL) CONDITIONS.
    - MODEL  $\sim 40-50\%$  CONSERVATIVE.
  - HIGHEST MEASURED - 320 PSIA FOR SECOND ACTUATION CASE (1 MIN. BETWEEN ACTUATIONS).
- TORUS SHELL PRESSURE
  - AVG. PEAK PRESSURES OF +21 AND -10 PSID FOR BASE CASE. 1 SIGMA =  $\pm 9\%$  (POS.), 8% (NEG.)
  - MODEL OVERPREDICTS  $\sim 20\%$  ON POSITIVE AND UNDER PREDICTS 20-30% ON NEGATIVE.
- SUBSEQUENT ACTUATION EFFECTS
  - $\sim 80\%$  INCREASE IN PEAK POSITIVE RELATIVE TO 1ST ACTUATION.
  - $\sim 30\%$  INCREASE IN PEAK NEGATIVE RELATIVE TO 1ST ACTUATION.
  - HIGHEST MEASURED: +36 AND -16 PSID (SECOND ACTUATION, 30 SECOND BETWEEN ACTUATIONS)
    - NEW MODEL WILL INCLUDE 2ND ACTUATION
- MULTIPLE VALVE ACTUATION EFFECTS
  - DATA APPEARS TO BE AND WILL PROBABLY REMAIN INCONCLUSIVE.

- EFFECTS OF LEAKING SRV AND POOL TEMPERATURE:
  - ALL ELEVATED POOL TEMPERATURE TESTS DONE WITH LEAKING SRV.
  - POOL TEMPERATURE EFFECT CONSIDERED INSIGNIFICANT.
  - LEAKING SRV RESULTED IN A 33% INCREASE IN PEAK POSITIVE SHELL PRESSURES RELATIVE TO COLD CASE.
- TORUS SHELL PRESSURE OSCILLATION FREQUENCY
  - RANGED BETWEEN 4 HZ AND 8 HZ (COLD PIPE TESTS)
  - RANGED BETWEEN 4 HZ AND 12 HZ (HOT PIPE TESTS)

CONTAINMENT SYSTEMS BRANCH

~~G. LAINAS~~

~~C. KUDRYTO~~

~~C. ANDERSON~~

~~P. SARANOWSKY~~

~~S. BROWN~~

~~T. HUANG~~

N. SIJ

~~J. ZWOLINSKI~~

~~J. SHAPAKER~~

~~F. ELTAWILA~~

~~T. GREENE~~

~~W. MILSTEAD~~

~~D. PICKETT~~

~~C. TINKLER~~

Return to G. Lainas

CSB File