

P. A. Morris, DRL
THRU: L. D. Low, CO

RE: VIEWGRAPHS USED BY COMPLIANCE AT AUGUST
ACRS MEETING

Please find enclosed a copy of the viewgraphs
used by Compliance at the August ACRS meeting.

Enclosures:

1. Compliance review of piping
systems stresses and in-
stallations.
2. Concrete cracking in Turkey Point 3
containment dome.
3. Humboldt Bay electrical power failure
occurrence--sequence of events.

cc w/encls:

M. M. Mann, DR
S. H. Hansauer, DR
E. G. Case, DRS
A. Giambusso, CO
L. Kornblith, CO

R. H. Engelken, CO

8/19/70

*SD-250
50-133
RD-8, Incidents
X-RD-8, Construction Experience*

8305190351 710319
PDR ADOCK 05000250
A PDR

OFFICE ▶	CO	CO	CO			
SURNAME ▶	JKeppler:eJ JPO'Reilly 8/19/70	RHEngelken 8/19/70	LDLow			
DATE ▶						

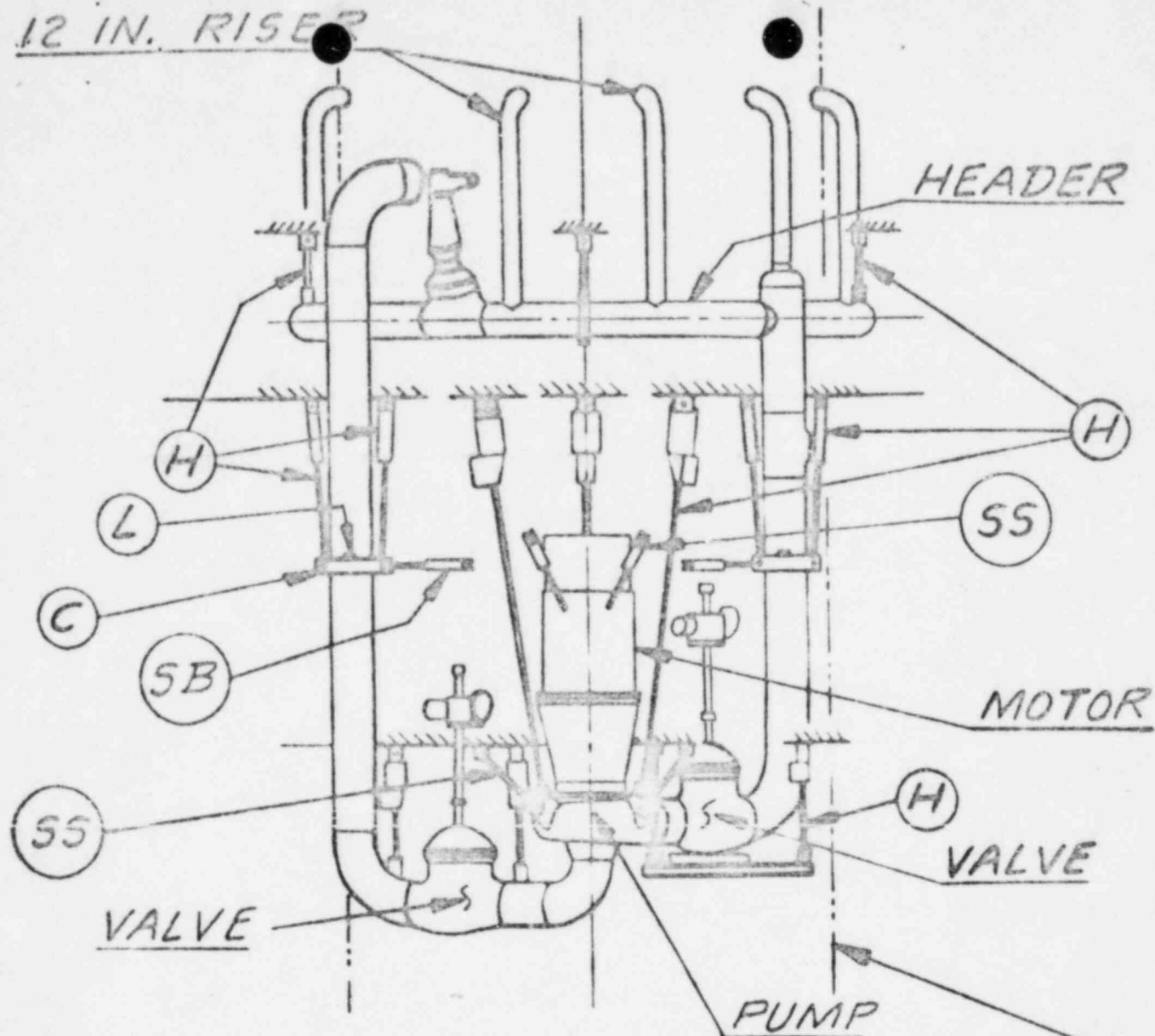
REVIEW
OF
PIPING SYSTEMS STRESSES
AND
INSTALLATION

- o MILLSTONE
- o DRESDEN - 2
- o ROBINSON - 2

- PIPING STRESSES
- DESIGN & REVIEW
- CONCLUSIONS

Enclosure 1

12 IN. RISER



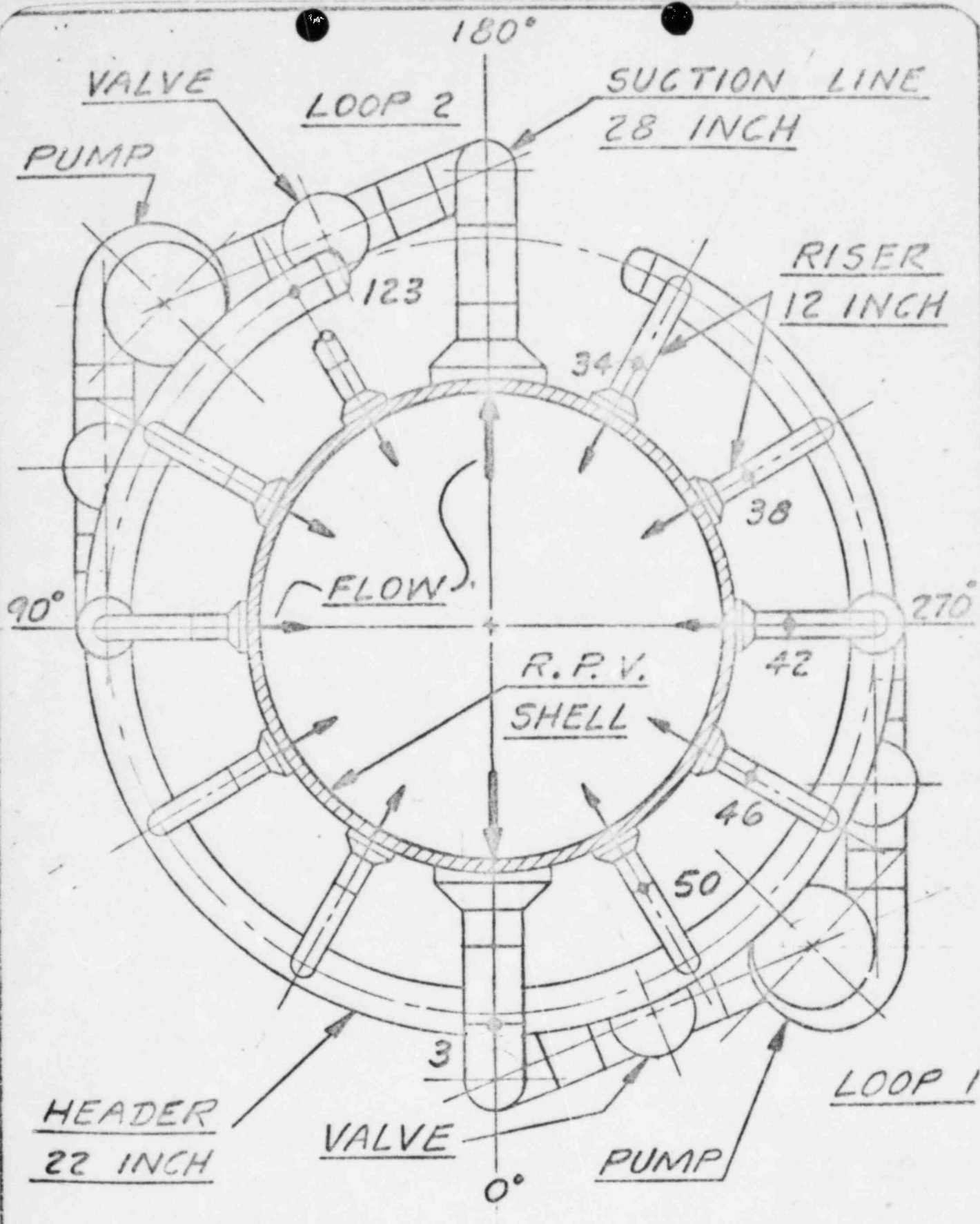
- C — COLLAR
- H — HANGER
- L — LUG
- SB — SWAY BRACE
- SS — SHOCK SUPPRESSOR

SHIELD WALL

RECIRC LOOP SUSPENSION

FIG. NO. 1M

1M



TOP VIEW OF REGIRC HEADER

FIG. NO. 2M

2M

POINTS OF MAXIMUM STRESS

RECIRC LOOP

TABLE NO. 1M

(1) PRESSURE + WEIGHT LOADING

POINTS 50 & 147

AT 12 IN. NOZZLE NEAREST
EQUALIZING VALVE

CALCULATED STRESS 7736 PSI

ALLOWABLE STRESS 14400 PSI

(2) THERMAL EXPANSION LOADING

POINT 56

AT TEE BELOW 4 INCH
BYPASS VALVE

CALC. STRESS 23750 PSI

ALLOW. STRESS 27037 PSI

(3) THERMAL EXPANSION LOADING

POINT 123

AT SWEEPOLET AT FREE
END OF RING HEADER

CALC. STRESS 20845 PSI

ALLOW. STRESS 27037 PSI

SAFE-END STRESSES
RECIRC LOOP

TABLE NO. 2M

LOCATION		PRESSURE + WEIGHT STRESS PSI	THERMAL EXPANSION STRESS PSI
PT.			
3	OUTLET	6900	4700
50	RISER	7200	380
34	RISER	6000	6800
38	RISER	6400	9200
42	RISER	6100	9400
46	RISER	5900	1300

ALLOWABLE STRESS } = 14400 PSI
FOR PRESS. + WGT.

ALLOWABLE STRESS } = 27037 PSI
FOR THERMAL
EXPANSION

4M

POINTS OF MAXIMUM STRESS

EXCLUDING RECIRC LOOPS

TABLE NO. 3M

LOCATION	EXPANSION STRESS, PSI	
	CALCULATED	ALLOWABLE
MS-INSIDE	12509	22500
MS-OUTSIDE	10904	22500
MS-DRAIN	13906	22500
MS-RELIEF	18740	22500
MS-RELIEF	21073	22500
MS-RELIEF	5536	22500
FW	5466	22500
FW	12058	27136
ISO. COND.	14621	27038
ISO. COND.	14512	27038
LPCI	16730	27768
LPCI	9205	27768
CORE SPRAY	22305	27933
CLEANUP	12000	27050
CLEANUP	7932	27050
STANDBY	9367	27850
HEAD SPRAY	17743	27850

5M

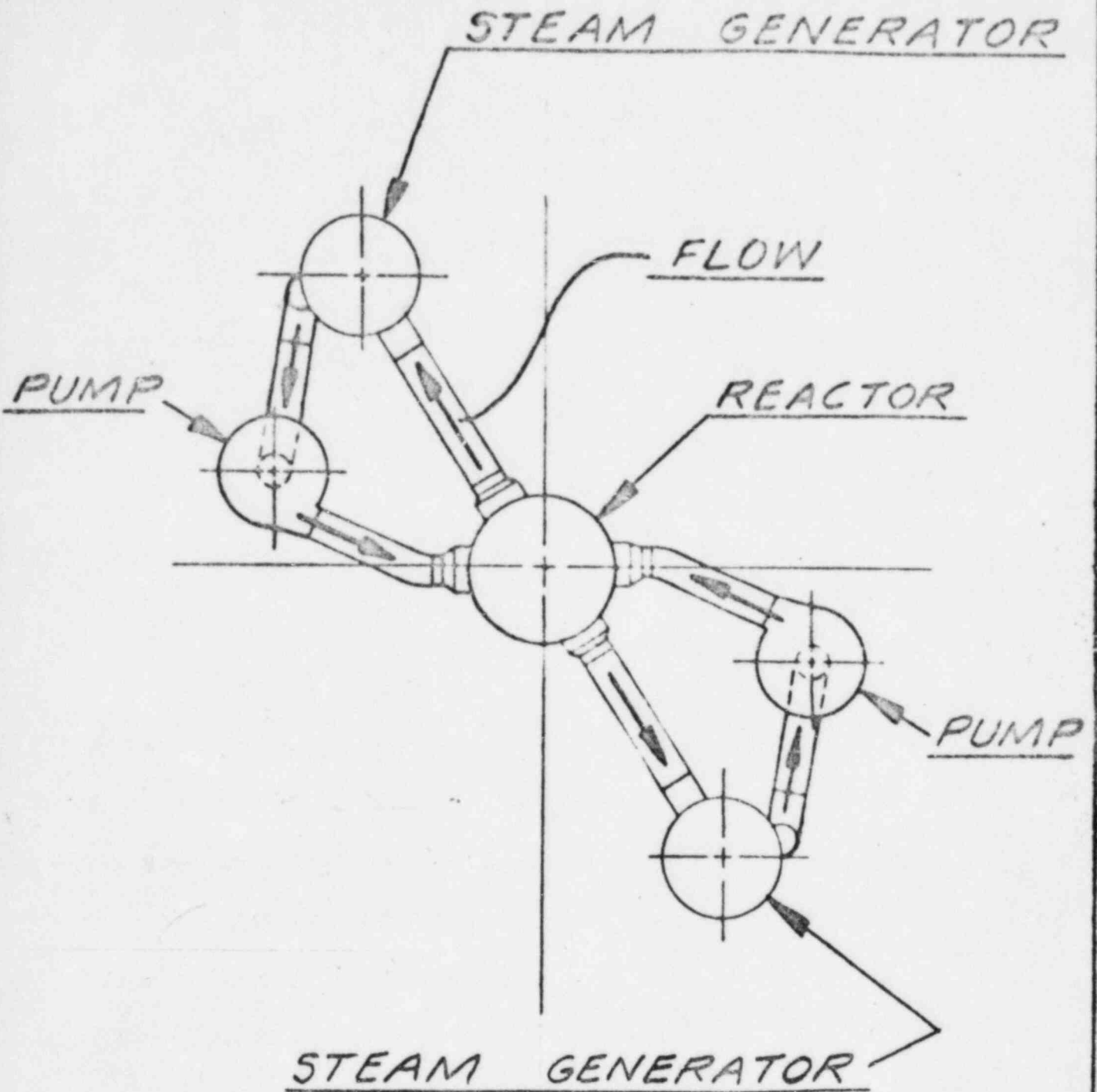
NOTE : EXPANSION STRESSES OF NOZZLES ARE LESS THAN ABOVE.

EXPANSION STRESS COMPARISON

TABLE NO. 1 MD

LOCATION	MILLSTONE I	DRESDEN II
MAIN STEAM	12569	6696
FEEDWATER	12058	5634
CORE SPRAY	22305	11597
ISOLATION CONDENSER	14621	18730

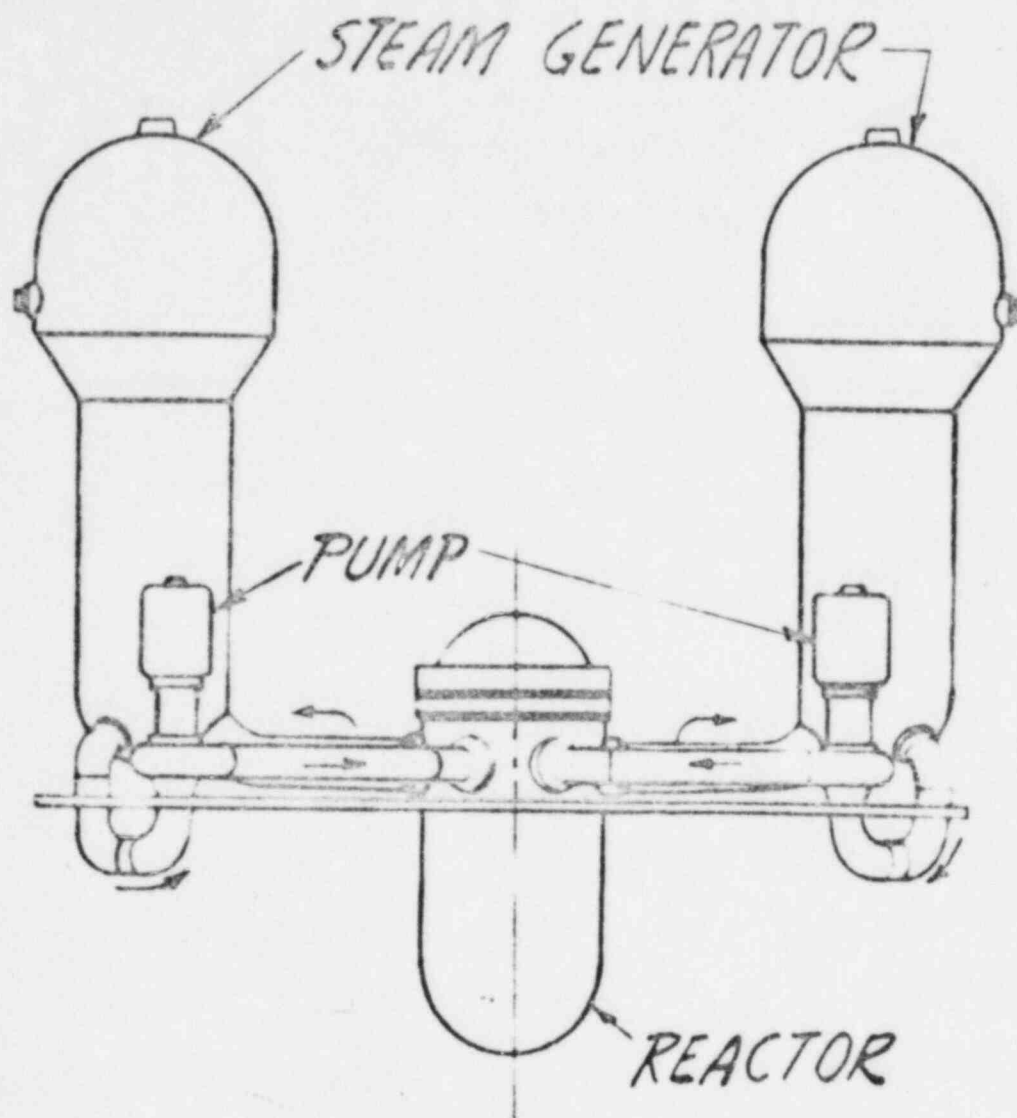
1 MD



TYPICAL PWR PRIMARY LOOPS
TOP VIEW

1R

FIG. NO. 1R



TYPICAL PWR PRIMARY LOOPS
ELEVATION

2R

FIG. NO. 2R

POINTS OF MAXIMUM STRESS
EXCLUDING PRIMARY LOOPS
TABLE NO. 1R

LOCATION	EXPANSION STRESS, PSI	
	CALCULATED	ALLOWABLE
26 MS-1-18	11715	20625
26 MS-2-43	6088	↓
26 MS-3-65	6472	↓
16 FW-9-2	15948	22500
16 FW-10-43	13609	↓
16 FW-11-79	11992	↓
12 RC-10-1	12463	27440
3 RC-32-18	5590	27850
4 RC-28-161	6951	27440
4 RC-29- ↓	↓	↓
4 RC-30- ↓	↓	↓
12 RC-11-31	22424	22500
4 RC-12- ↓	↓	↓
4 RC-13- ↓	↓	↓
4 RC-14- ↓	↓	↓
LINE NO.	SIGNIFIES SAME POINT	
3R		

POINTS OF MAXIMUM STRESS
EXCLUDING PRIMARY LOOPS

TABLE NO. 1R CONT'D

LOCATION	EXPANSION STRESS, PSI	
	CALCULATED	ALLOWABLE
1()-4 1()- 1()- 3RC-77- 1½RC-86- ↓	15564 ↓	27440 ↓
2RC-40-27 2RC-39-157	13468 8575	27440 ↓
2RC-77-132	18905	27050
2SI-20-58 2SI-18- ↓	19789 ↓	27440 ↓
10SI-21-377 10SI-37- ↓ 10SI-23- ↓	21506 ↓	27440 ↓
14SI-15-309	8342	27440

POINTS OF MAXIMUM STRESS
EXCLUDING PRIMARY LOOPS
TABLE NO. 1R - CONT'D

LOCATION	EXPANSION STRESS, PSI	
	CALCULATED	ALLOWABLE
3CH-15A-49	15951	27440
2CH-17-44	17322	↓
2B-3A-21	15780	22500
2B-6-11	9662	↓
4RC-46-31	22424	27440

KEY TO LOCATION

MS _____ MAIN STEAM
 FW _____ FEEDWATER
 RC _____ REACTOR COOLANT
 SI _____ SAFETY INJECTION
 CH _____ CHEMICAL & VOL. CONTROL
 B _____ STEAM GENERATOR
 BLOWDOWN

NOTE

FIRST NO. IS PIPE DIAMETER
 LAST NO. IDENTIFIES POINT

POINTS OF MAXIMUM STRESS

PRIMARY LOOPS

TABLE NO. 2R

LOCATION	EXPANSION STRESS, PSI		
	CALCULATED	ALLOWABLE	
29-RPV-OUT	14945	27000	SUCTION
29-SG-IN	6735		
31-SG-OUT	1925		
31-PMP-IN	3554		
27½-PMP-OUT	5067	↓	DISCHARGE
27½-RPV-IN	4000		

RPV _____ REACTOR PRESSURE VESSEL

SG _____ STEAM GENERATOR

PMP _____ COOLANT PUMP

OUT _____ OUTLET

IN _____ INLET

NO. _____ PIPE I. D.

THESE STRESSES ARE IN PIPING
ADJACENT TO SAFE ENDS

GR

DESIGN & REVIEW :

MILLSTONE :

RECIRC. - G.E.

C.S. - EBASCO -

TELEDYNE

OTHER - EBASCO

DRESDEN - 2

C.S. - S&L - G.E.

OTHER - S&L

ROBINSON - 2

PRIMARY - WEST.

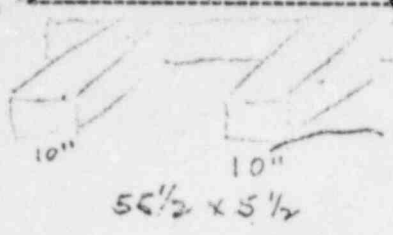
OTHER - EBASCO

CONCLUSIONS:

- CALCULATED STRESSES GENERALLY LOW
- CALCULATED STRESSES VARY WIDELY BETWEEN COMPARABLE SYSTEMS & PLANTS
- LACK OF DESIGN CONTROL (50.34 b) EVIDENT IN PIPING & HANGER SYSTEMS
 - INTERFACE COOR. INFORMAL
 - SPECS. NOT FUNCTIONAL
 - DESIGN - ANALYSIS COOR. MINIMAL

NORTH

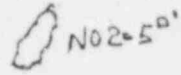
BUTT #10



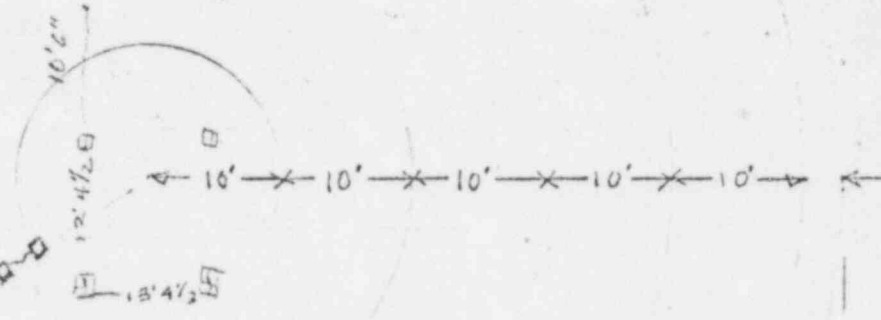
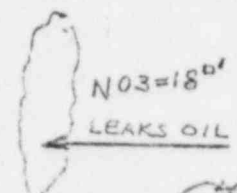
JOINT HAS OIL LEAK

BUTT NO1

CRACK'S OIL LEAK

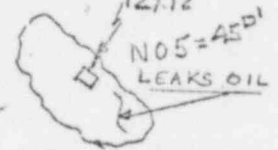


BUTT #5



4" x 4" x 6" DEEP BLOCK OUT FOR BLEED VALVES THESE HAVE CONNECTING CRACKS

EXPLORATORY 9" DEEP 12x12



BUTT #4
H2O LEAK

OIL LEAK AT POOR JOINT

OIL LEAK AT #8 VERT DOWEL

#8 DOWEL OIL LEAK

BUTT #3

53'-11"

90°R

SIGNATURE

SA Johnson

JM Varela

JE Lorenzen

DATE

8/12/70

TITLE

JM Varela's Hammer

SA Johnson

JOB NO.

5610

SUBJECT

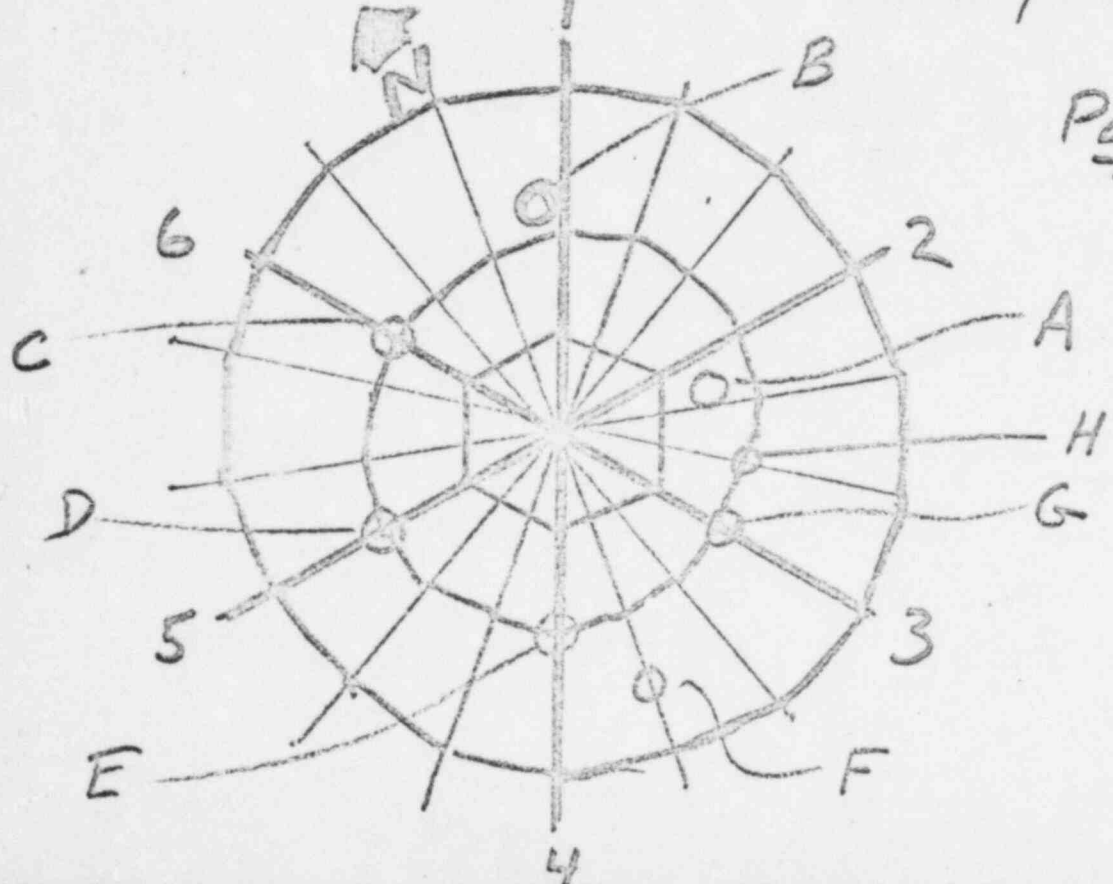
Readings - Underside #3 Centerline Dome.

SHEET NO.

1

Suspicious Areas Based Upon Hammer Soundings

- A #2 Main Truss Beyond Cap Plate
- B 20' Out From Σ (4 sq. ft) just W. of # Main Truss
- C #6 Main Truss (NNW) 2nd Purline from Center.
- D #5 Main Truss - 2nd Purline From Center
- E #4 Main Truss, 2nd Purline Out.
- F Between #3 & #4 Main Trusses at 2nd Intermediate Truss - 2nd Purline Out.
- G #3 Main Truss - 2nd Purline Out
- H #2 Intermediate Truss Between #2 & #3 Main Trusses at 2nd Purline from Center.



PLAN VIEW

HUMBOLDT BAY REACTOR

SEQUENCE OF EVENTS - ELECTRICAL POWER FAILURE OCCURRENCE

Date

Event

7/17/70 0921

Fault at Humboldt substation caused generator OCBs to open on Units 2 and 3.

Unit 2 remained in service, as designed.

Unit 3 scrambled (backup overcurrent relay time delay improperly set).

Power not available to Unit 3's 2.4 kv bus, which powers feed pumps.

Emergency generator started - 60 kw (propane).

Emergency condenser failed to operate (set at 1200 psig).

One safety valve relieved (set at 1230 psig).

0922

Autodepressurization system 60-second timer started.

Enclama 3

HUMBOLDT BAY REACTOR

SEQUENCE OF EVENTS - ELECTRICAL POWER FAILURE OCCURRENCE

(slide 2)

<u>Date</u>	<u>Event</u>
7/17/70 0923	Reactor depressurization initiated (400,000 lbs/hr).
0928	Operator manually terminated depressurization system (pressure at 170 psig).
0935	Low pressure core flood system started - 150 psig.
0936	Low pressure core spray system started - 150 psig.
0939	Power to 2.4 kv bus restored. Feedwater pumps started. Reactor vessel water level restored.
0940	Emergency low pressure core cooling systems shut down.
7/18/70 ----	Primary system leak rate test conducted at operating pressure. No leakage.

HUMBOLDT BAY REACTOR

SEQUENCE OF EVENTS - ELECTRICAL POWER FAILURE OCCURRENCE

(slide 3)

<u>Date</u>		<u>Event</u>
7/25/70	2130	Reactor startup initiated. Drywell pressure started increasing.
	2230	Water level in bottom of drywell increased by 12 gallons.
	2300	Water level increased by 35 gallons.
	2312	Water level increased by 45 gallons. Reactor shut down.
7/26/70	-----	Visual inspection of primary piping showed 4-inch crack in 1-1/2 inch unisolatable SS water level monitoring line. Metallurgical examinations revealed two cracks, showed pipe to be cold worked and sensitized, and that failure resulted from stress corrosion cracking.
8/7/70	-----	Reactor returned to operation following repairs.