GPU 322

BABCOCK & WILCOX

7.7.1

File

SEQUENCE OF EVENTS

1. SFRCS 1/2 TRIP CLOSED S/U FW VLV TO #2 OTSG

2. SFRCS FULL TRIP ON LOW OTSG 2 LVL
INITIATED ISOLATION OF BOTH OTSG'S
STATED AUX FW PUMP. #1 - OK (FEED'S #1)
#2 - ONLY CAME UP TO 2600 RPM
DIDNT FEED IN AUTO

3. RX TRIP MANUAL (PZR LVL >290 IN)

4. ELECTROMATIC RELIEF VLV WAS STUCK OPEN RCS PRESS DECREASING.

5. SFAS TRIP ON LOW RCS PRESS @ 1600 # LEVEL 2 TRIP
ISOLATION OF MOST OF CTMT, START HPI PUMPS.
ISOLATION OF QUENCH TANK INCLUDED

6. QUENCH TANK RUPTURE DISK BLEW OUT

7. P1A2 AND P1B1 RCP'S TRIPPED SIMULTANEOUSLY

8. HPI PUMPS TURNED OFF ONCE PZR LVL >220 IN.

9. PZR LVL INDICATION >320 IN.
ESTABLISHED MAX LETDOWN NO AFFECT ON LVL.

10. CLOSED ELECTROMATIC RELIEF ISO VLV ≈ 20 MIN AFTER RX TRIP.

11. PZR LEVEL DECREASED TO ≈ 10 IN. PUT 2 HU PUMPS ON TO TRY AND REDUCE RATE OF DECREASE. LOST PZR HTRS AT 40 IN. INTERLOCK

12. PUT HPI PUMPS ON TO RECOVER PZR LVL.

13. RCS STABILIZED OUT AT ≈ 1800 psig, 515°F ≈ 2 1/2 HRS AFTER RX TRIP

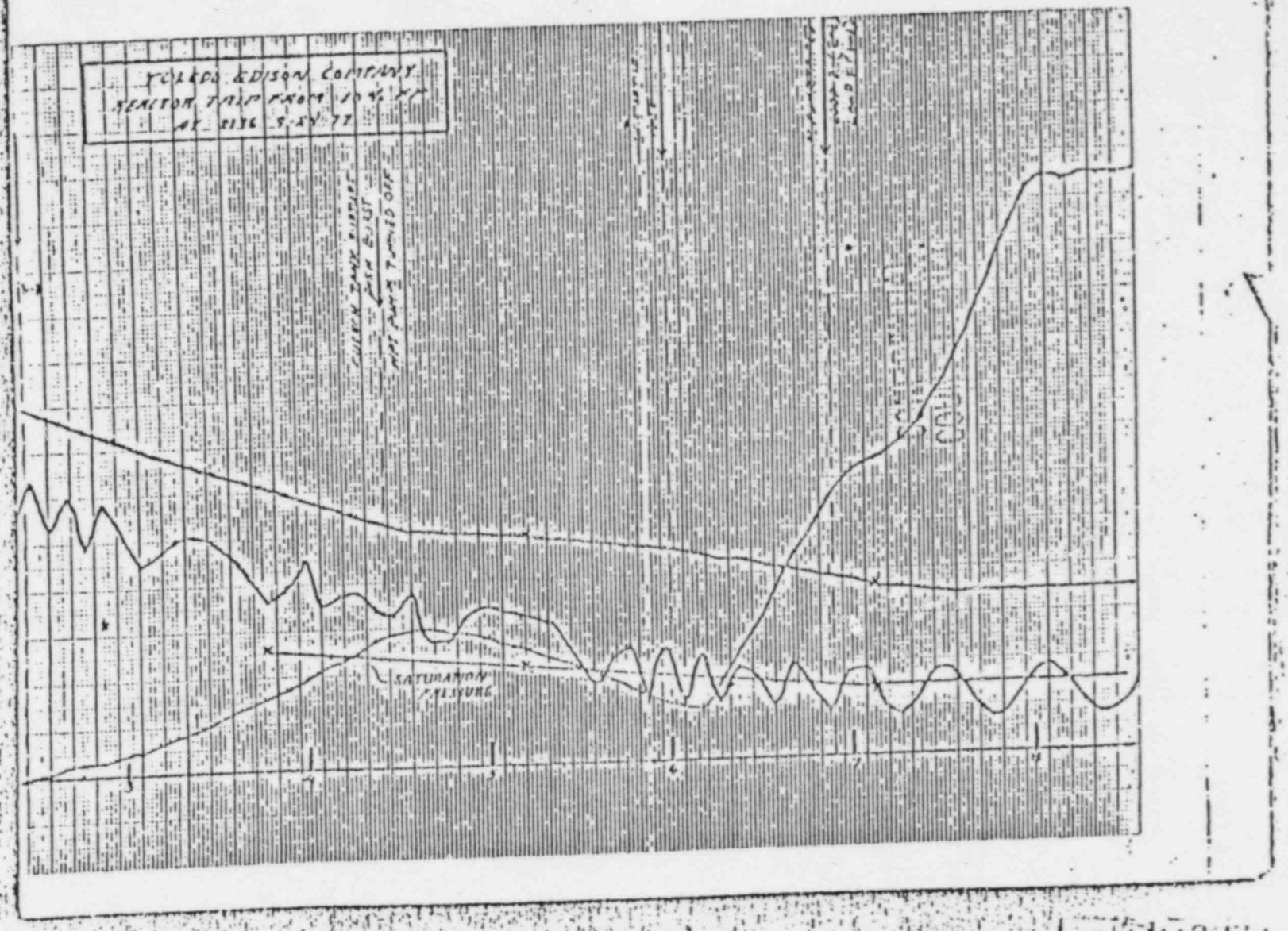
CONFIDENTIAL COUNSEL ONLY

C-1-4-12-512

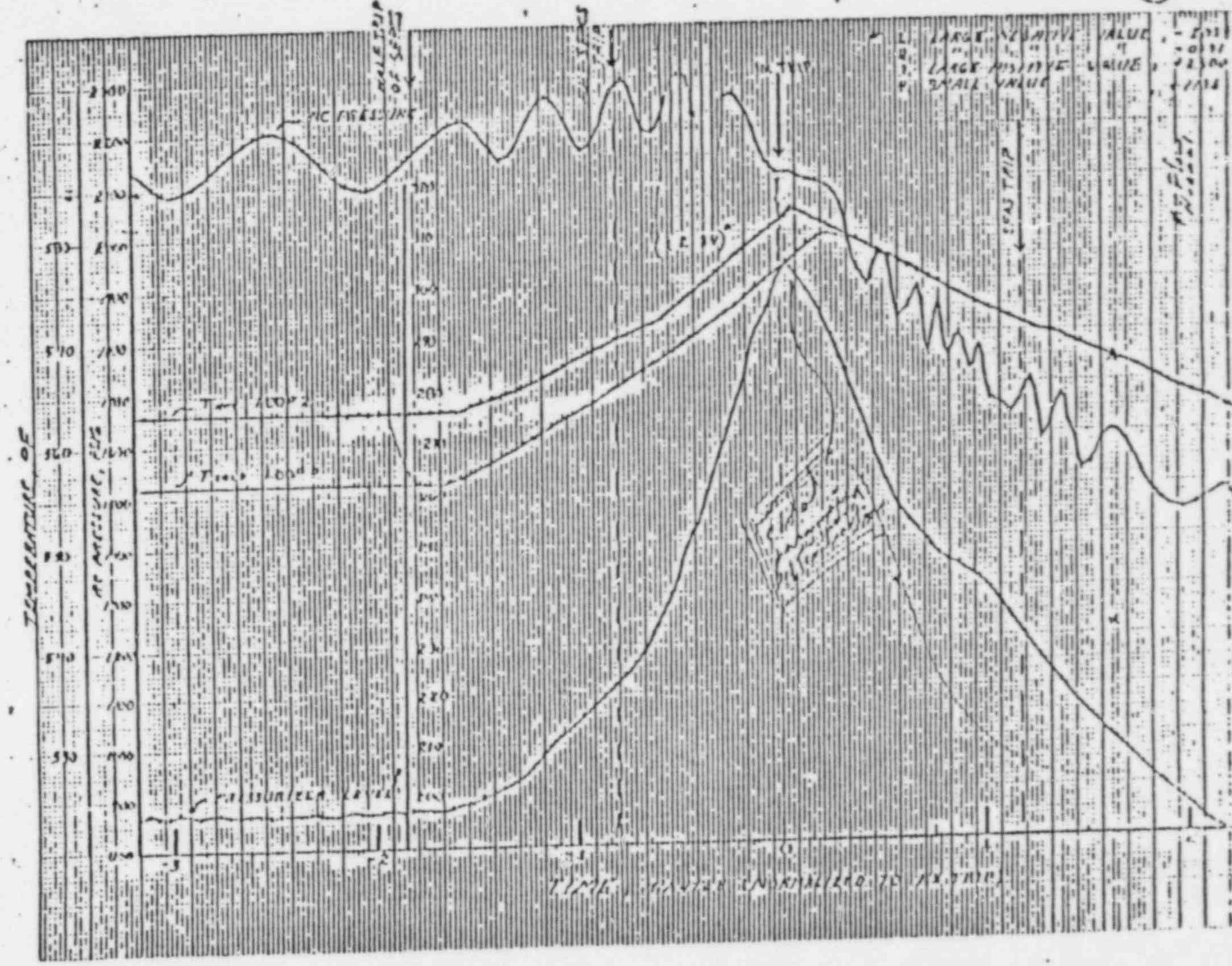
Exh. GPU 322 For ID
Date 7-1-81
J.R. Danyo

8307120821 810701
PDR ADOCK 05000289
S HDL

(2)



K+E 10 X 10 TO THE CENTIMETER　　46 1510



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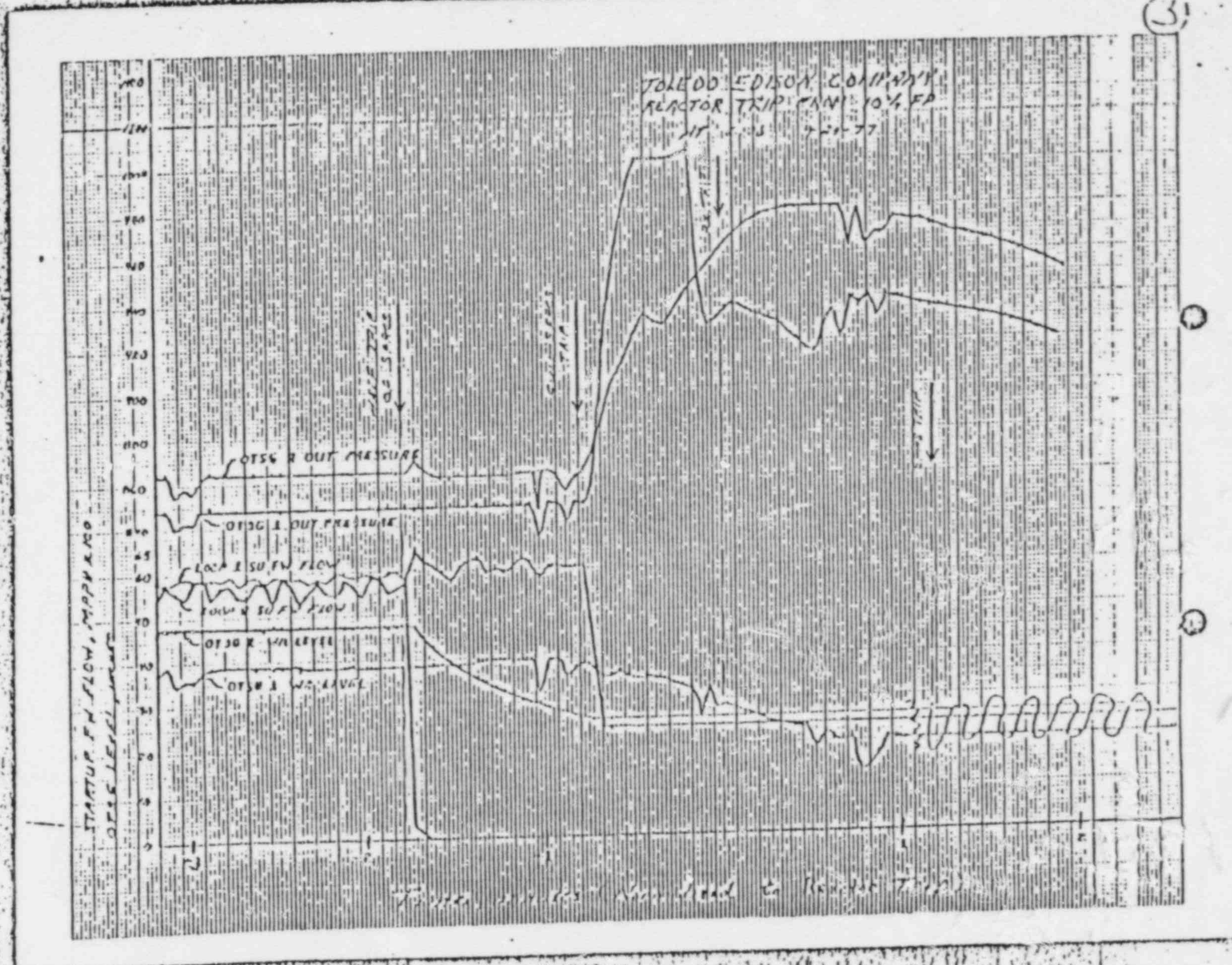
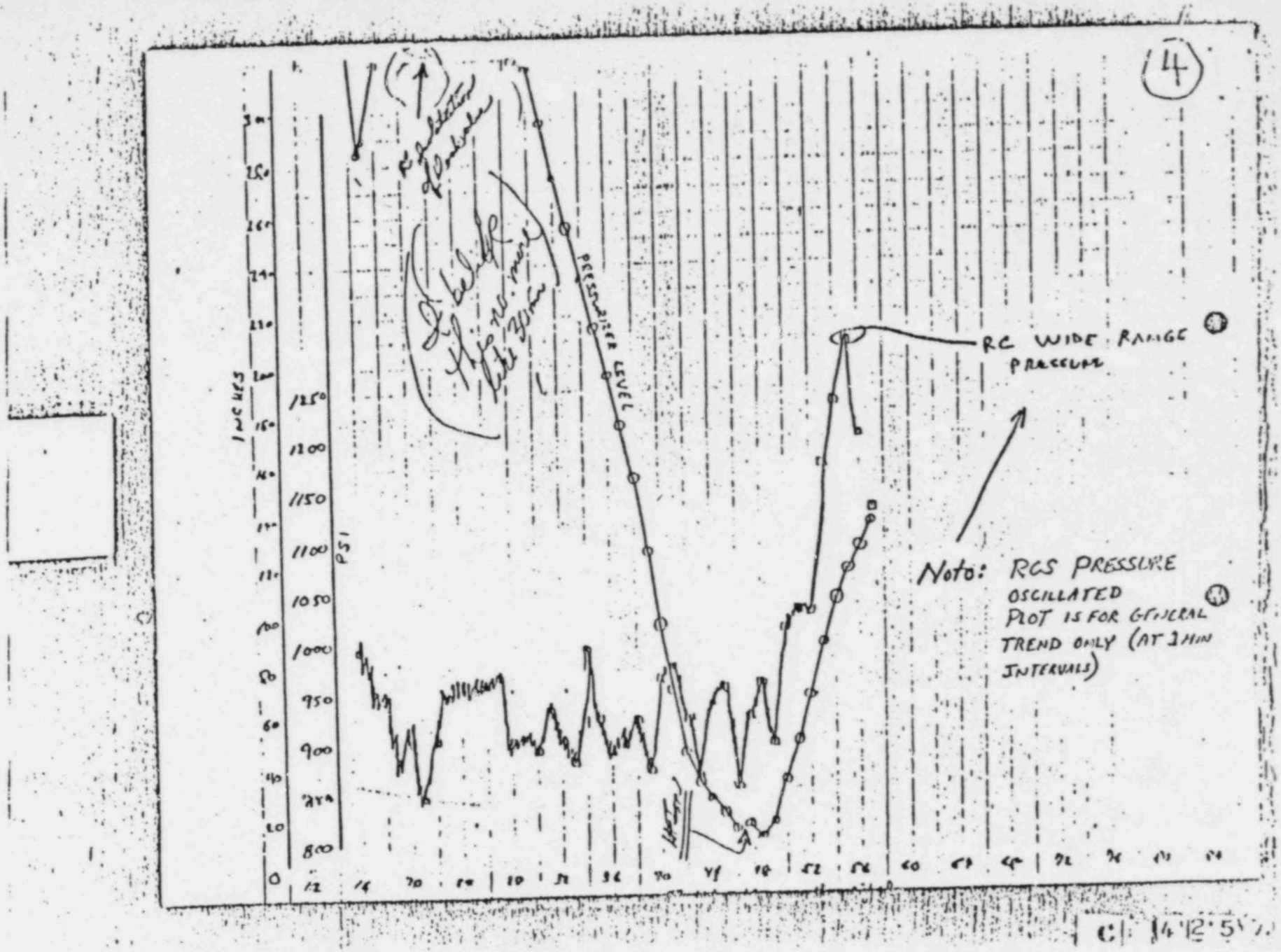
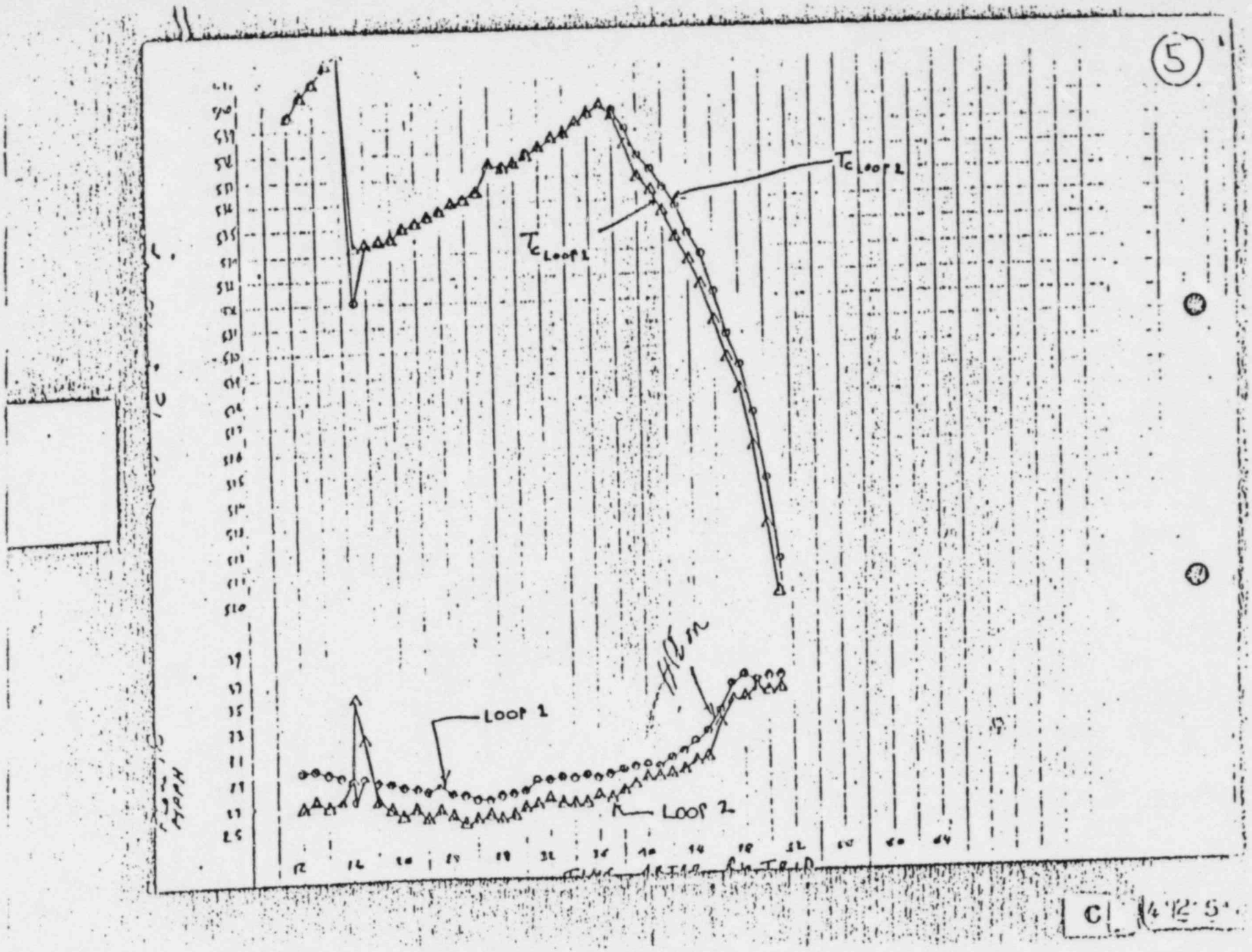
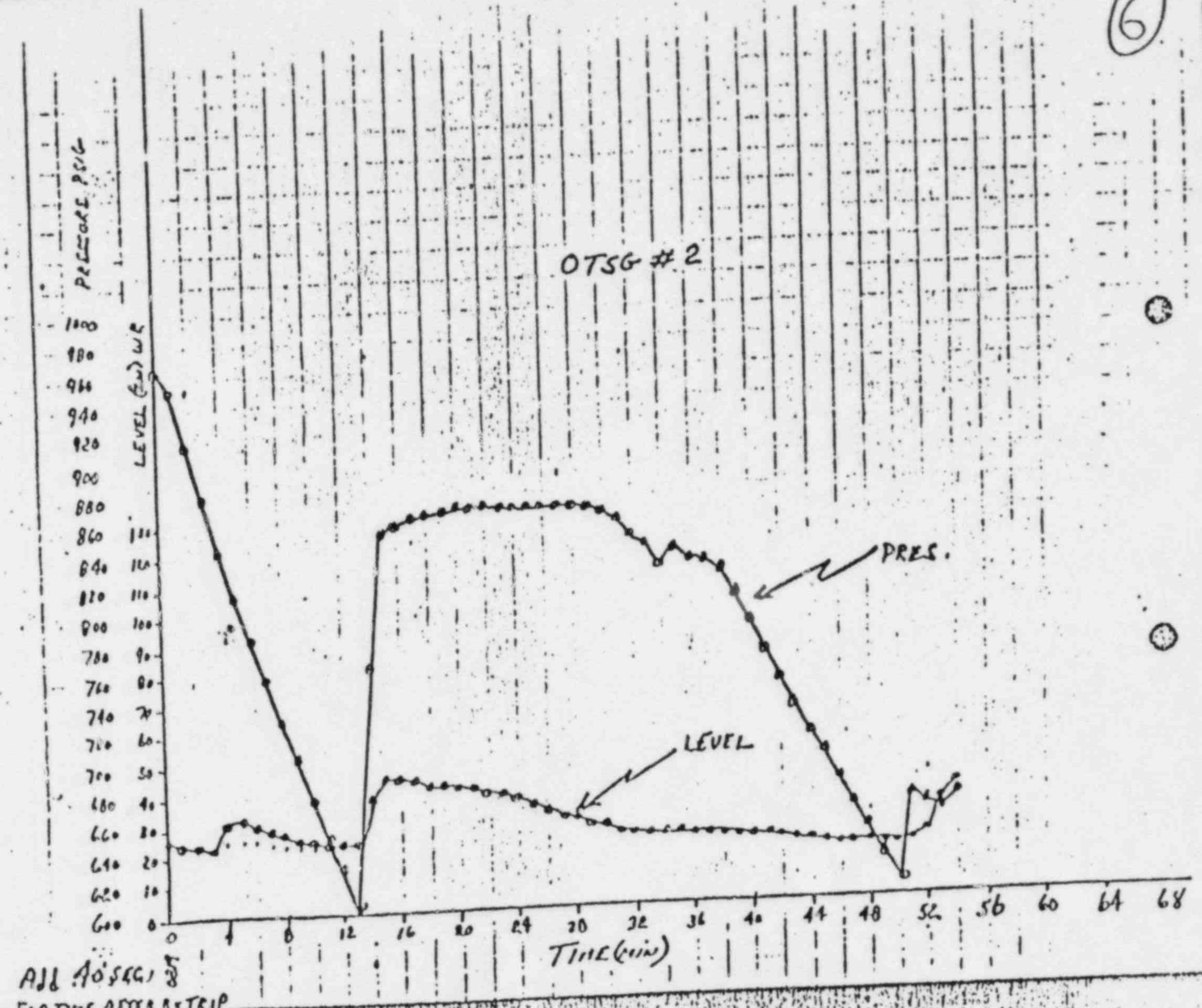

TOLEDO EDISON COMPANY
REACTOR TRIP FROM 10% FP
OTSG 2 OUT PRESSURE
OTSG 1 OUT PRESSURE
LOOP 1 SU FW FLOW
LOOP 2 SU FW FLOW
OTSG 2 WR LEVEL
OTSG 1 WR LEVEL
STARTUP FW FLOW, MPPH x 10

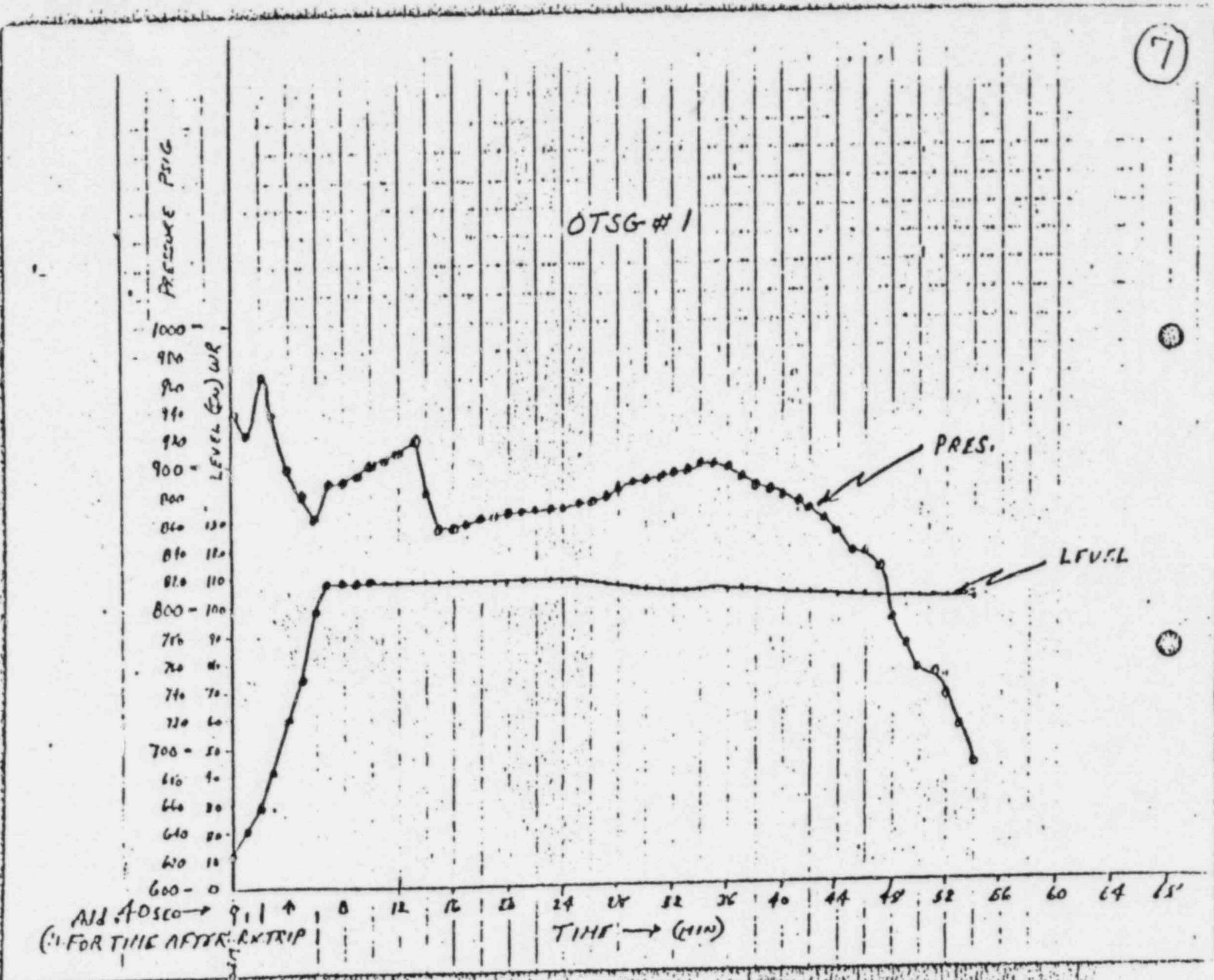

4
PRESSURIZER LEVEL
RC WIDE RANGE PRESSURE
Note: RCS PRESSURE OSCILLATED PLOT IS FOR GENERAL TREND ONLY (AT 3 MIN INTERVALS)
INCHES
PSI


5
$T_{C\ LOOP\ 2}$
$T_{C\ LOOP\ 2}$
LOOP 1
LOOP 2
C

(6)

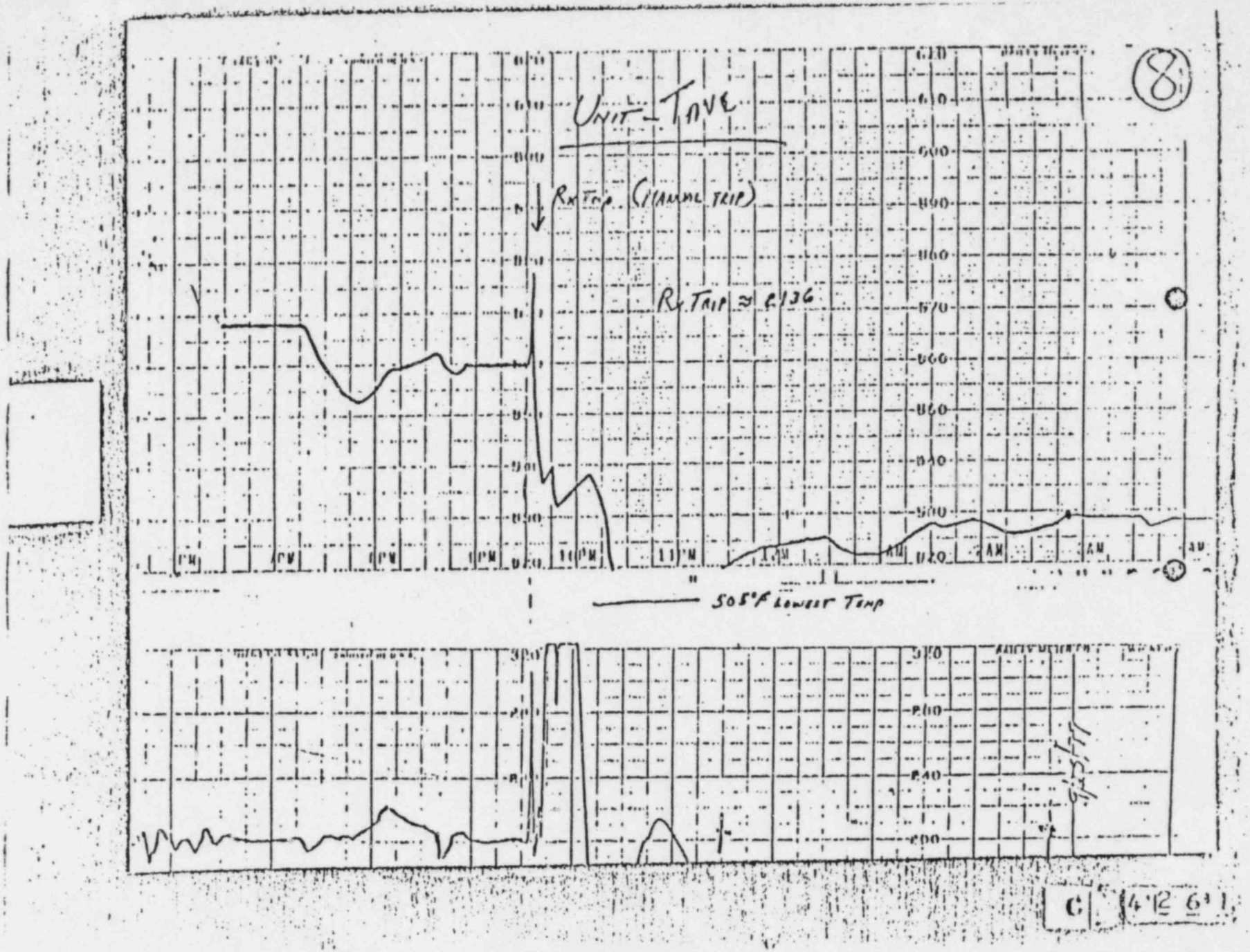

OTSG # 2
PRES.
LEVEL
PRESSURE PSIG
LEVEL (in) WR
TIME (min)
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68

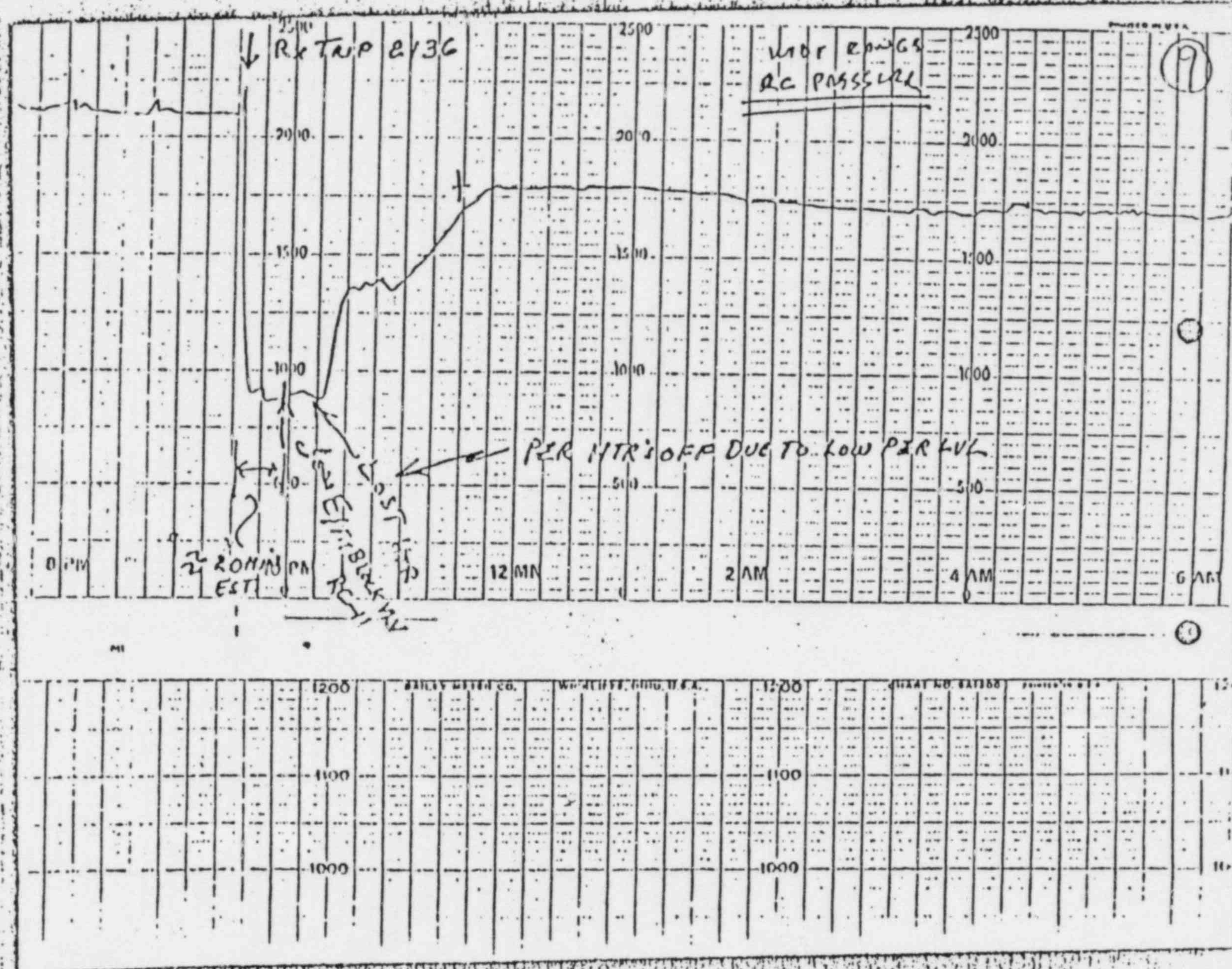
C 4 12 51



7
OTSG #1
PRESSURE PSIG
LEVEL (in) WR
PRES.
LEVEL
TIME → (MIN)
1000
900
800
700
600
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64

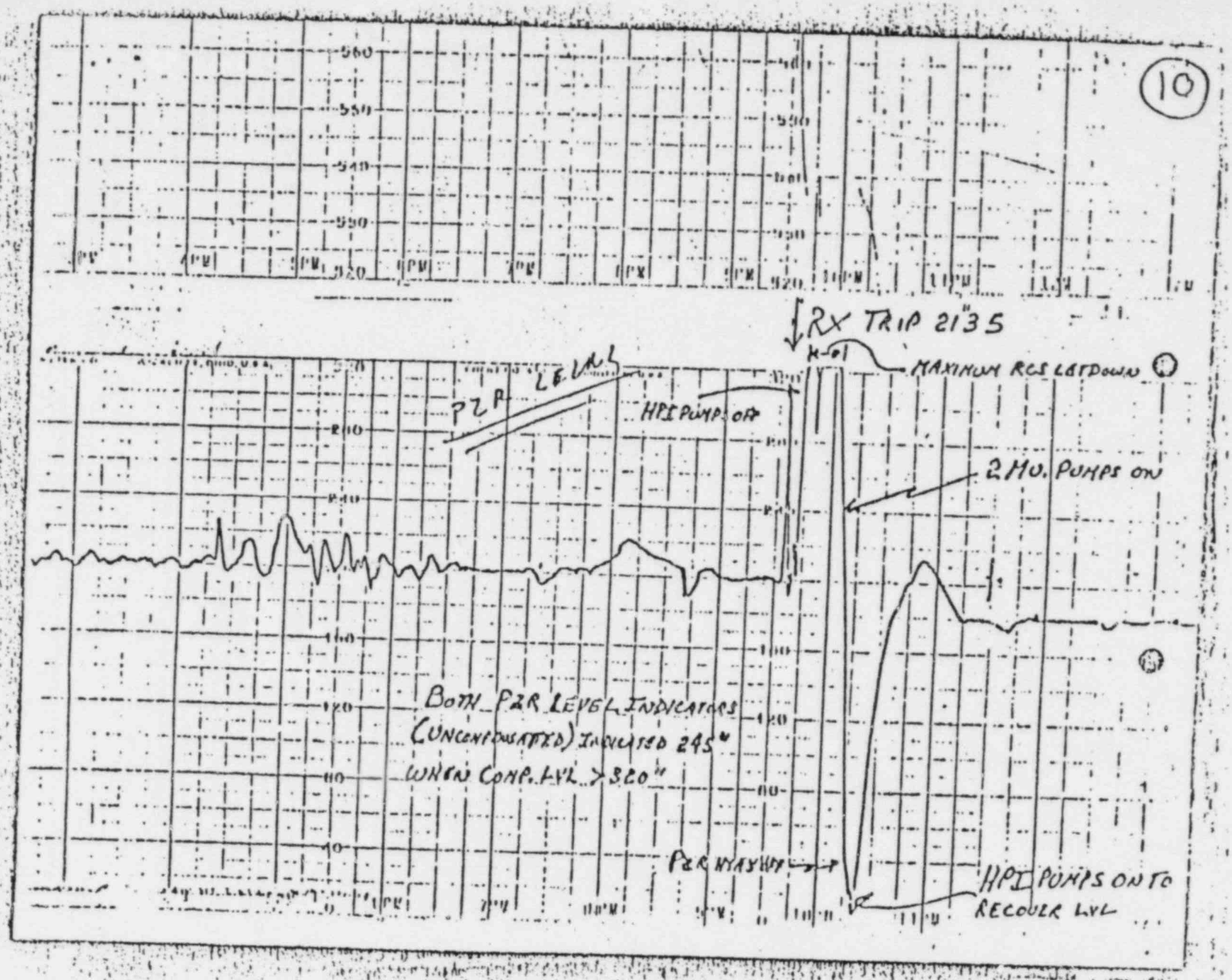
C. 4 12 6


8
UNIT - TAVE
RX TRIP (MANUAL TRIP)
RX TRIP ≈ 2136
505°F LOWEST TEMP
C 4 12 61



Rx TRIP @ 2136
WIDE RANGE
RC PRESSURE
PZR HTR'S OFF DUE TO LOW PZR LVL
~20 MIN EST
12 MN
2 AM
4 AM
6 AM
2500
2000
1500
1000
500
1200
1100
BAILEY METER CO.
WICKLIFFE, OHIO, U.S.A.

C 4 12 6 12


10
RX TRIP 2135
MAXIMUM RCS LOSDOWN
PZR LEVEL
HPI PUMPS OFF
2 MU. PUMPS ON
BOTH PZR LEVEL INDICATORS (UNCOMPENSATED) INDICATED 245" WHEN COMP. LVL > 320"
PZR HEATERS
HPI PUMPS ON TO RECOVER LVL
560
550
540
530
520
240
220
200
180
160
140
120
100
80
60
40
20
0

C 4263

TIME	AT	EVENT (FROM COMPUTER ALARM PRINTER)	COMMENT
21:34:20	-1:47	Main Steam Line Iso. Vlv. Solenoid Trouble	Half Trip of SFRCS - closed startup FW valve to #2 OTSG.
21:34:37	-1:30	SG 2 S/U Range Lvl Low (setpoint = 24")	Level was 40.67" before 21:34:20; now level 23.80".
21:34:56	-1:10	RCP 2-2 Disc CLO. WR Temp HI (setpoint 560.6) (T_a)	CLO Temp. was 556 at 21:34:20.
21:35:16	- :51	RC Pzr. Level HI (setpoint 213")	Level was 203.1 at 21:34:20.
21:35:18	- :49	SG SU Range Low Level CH 2 Trip	SFRCS Trip.
21:35:23	- :44	MN STM Iso. Vlv. Closed	Isolation Valves closed by SFRCS.
21:35:25	- :42	RC Loop 2 HLG NR Temp High (setpoint 565.3)	HLG Temp. 569.1.
21:35:32	- :35	RC Pzr. Level HI	222.5"
21:35:45	- :22	SG 1 Out Stm Press. High	1022 psig.
21:35:51	- :16	MN FW Stop Vlv. Closed	Closed by SFRCS.
21:35:55	- :12	RC Pzr. Power Rlf. Vlv. Out Temp. High	Electromatic Relief Vlv. Lifted
21:36:04	- :03	AFP Disc Vlv. to SG Open	Aux. Feed Pump Begins Supply of Water to SG's.
21:36:07	0:00	CRD Trip Confirm	Reactor Tripped Manually Due to HI Pzr. Level.
21:36:26	0:19	RPS Trip Low Pressure	Reactor already tripped.
21:37:17	1:10	SFAS Trip RC less than 1600 psi	
21:37:18	1:11	High Pressure Inj. Valves not closed	Valves opened by SFAS.
21:37:18	1:11	Pzr. Quench Tank Out Vlv. closed.	Valve closed by SFAS.
21:37:19	1:12	RCP Seal Return Iso. Vlv. Closed.	
21:37:20	1:13	RCP Seal Inj. Iso. Valve Closed.	
21:37:22	1:15	Letdown Iso. Vlv. closed.	
21:37:34	1:27	High Pressure Inj. Flow Normal	

C 4126:41

TIME	ΔT	EVENT (FROM COMPUTER ALARM PRINTER)	COMMENT
21:37:40	1:33	RCP Seal Inj. & Seal Return Flow Low	
21:37:45	1:38	RCP 1-1, 1-2, & 2-2 3rd Seal Cav. Press. High	1370, 1096 & 1042 RCS Press = 1490 psi
21:38:15	2:08	RC M.U. Flow Normal	
21:38:15	2:08	RCP 2-2 3rd Seal Cavity Press. 822.2	
21:38:30	2:23	RCP Seal Return Flow Normal	
21:39:12	3:05	Pzr. Quench Tank Press. High	
21:39:26	3:19	RCP 2-2 CLG Temp. Low	Temp = 553.9
21:40:22	4:15	Containment Normal Sump Pump On	Rupture Disc had blown.
21:40:34	4:27	High Pressure Inj. Turned Off	
21:42:07	6:00	NI 1 & NI 2 High Startup Rate	4.609 DPM
21:43:11	7:04	RCP 1-1 and 2-2 tripped	
21:54:46	18:39	Pzr. Quench Tank Normal/Iso. Vlv. Open	
22:03:21	27:14	CC 1 DNCMH in AVG Temp. 275.4	
22:08:54	32:47	Pzr. Level Normal	152.5"
22:12:32	36:25	RC Pzr. Avg. Lvl. Low	
22:22:56	46:49	Start HPI #2	Started by operators to help recover Pzr. Level.

THE TOLEDO EDISON COMPANY
TELEPHONE CALL DOCUMENTATION

ORIGINATOR: Dick Knopp	COMPANY/ORGANIZATION: NRC Region III	FILE: TT 3.1	
CALL MADE TO: Jack Evans	COMPANY/ORGANIZATION: Toledo Edison	ROUTE TO: 1.	2.
CONFERENCE CALL PARTIES		3.	4.
STATION/UNIT: Davis-Besse Station	DATE: September 28 19 77	TIME: 11:45 A.M.	5.

SUBJECT:

The incident is accelerating fairly fast in Operation Headquarters and Licensing.

There is a hold on our starting up until we have answered an Immediate Action Letter they will be issuing after additional inspectors have visited the Site.

Terry Harpster, Reactor Inspection, Bill Little, Head of Nuclear Support Region III, and someone from NRR Reactor Systems Branch will return to the Site probably late Thursday, after Harpster has briefed Dick Knopp in Region III.

The things that the NRC is concerned about are:

1. Cool down rate
2. The electromagnetic relief valve sticking open
3. SteamGenerator going dry, auxiliary feedpump and steam generator level indication to the operators.

(At the exit interview of NRC personnel on Friday, TECo must make sure of what the NRCs concerns are from a safety standpoint and restraints to our starting up. We need a concise definition of each of their concerns to avoid a hassle the following week.)

COPIES TO:
J. S. Grant, L. E. Roe, J. D. Lenardson, E. C. Novak, TEBM, Frost, LCS, IEE

PREPARED BY: JTE/lo

DATE: 9/28/77

THE TOLEDO EDISON COMPANY
TELEPHONE CALL DOCUMENTATION

FILE T.T. 31

ORIGINATOR: [illegible] Engle
COMPANY/ORGANIZATION: NRC - Licensing
RECEIVER: J Evans

CONFERENCE CALL PARTIES

STATION/UNIT: D.B #1 | DATE: 9/28 19 77 | TIME: 1430

SUBJECT: NRC Site inspection - SFRC Incident 9/24/77

Following people will visit site 9:00 AM 9/30/77

Terry Harpster - Inspector Region III
Bill Little - Head of Nuclear Support Branch Region
Jerry Mazetics - Sec Chief Reactor Systems Branch
Andy Szukiewicz - Elec Instr. & Controls Branch
John Engle - Licensing Proj. Mgr.
Vince [illegible] - Aud Power & Containment
Frank Cherny - Mech Eng Branch

LCS TDM JGE FRM

COPIES TO: Site Office, Faist, ECN, JDL, LER, JSG

PREPARED BY: [illegible] | DATE: 9/28/77

C 1426

DAVIS-BESSE I

LOSS OF FW/RCS DEPRESSURIZATION TRANSIENT

on 9/24/77

List of Concerns:

1. Electromatic Relief - can rapid cycling of valve cause damage that would result in pilot v1v/stem binding up mechanically in "open position".

   Resolution: Crosby (B&W)

2. Startup FW Valve Inadvertent Closure on 1/2 Trip of SFRCS - no explanation of cause of 1/2 trip.

   Resolution: TECo

3. SFRCS - when actuated caused a "loss of FW" to both OTSG, and auto start of steam driven aux. FW pumps. B&W Engineering should pursue logic of SFRCS system and its impact on primary system , i.e. Loss of FW (SFRCS initiation) should trip reactor!).

   Resolution: B&W

4. Fuel Assemblies/Pins -

   a. Exceeded fuel in compression limits and rapid depressurization.
   b. Flashing steam in core due to low RCS pressure high temperature during blowdown.
   c. TECo requested to analyze RCS samples for failed fuel, however, may not be detectable until heatup.
   d. Fuel Assembly Lift Forces - 2 phase fluid, 4 RCP's were running during transient, RCS temp. greater than 500°F (lift temp normal conditions).

   Resolution: B&W

5. RCS -

   a. Rapid depressurization.
   b. Rapid cooldown (exceeded 100°F/hr. rate of change) ΔT & Pzr.
   c. Formation of steam pockets in hot legs (and core) with RCP's running.
   d. Pzr. greater than 290 in. with reactor critical.
   e. Pzr. level greater than 320 in. with RCP's running.
   f. Boric Acid on external pipe surfaces, RCP casings.

   Resolution: B&W

FRF:nlf
9/27/77

List of Concerns - continued:

6. OTSG - (#2) A OTSG had approximately 10x20 ft. insulation blown off.

   a. Stress conditions in shell - 500 - 550°F steam inside, ambient (50-90°F) air temp & 212+°F steam impinging on outside.
   b. Boric Acid deposits on OTSG Shell.
   c. Loss of FW to both OTSG's - (see item #3).
   d. Boiling of A OTSG dry, possibly B OTSG also.
   e. Rapid depressurization of RCS on OTSG's.
   f. Differential Temperature and Pressure conditions across OTSG tubes due to transient on RCS and Steam Side - OTSG.
   g. Damage to shell thermocouples.

   Resolution: TDD

   Resolution: (a - f) = B&W

7. RCP's -

   a. Rapid depressurization, initiation of SIAS.
   b. Loss of Seal Injection and Seal Return for approximately 2 1/2 minutes, to three RCP's, 4th RCP approx. 6 minutes. CW not lost during transient.
   c. RCS limits possibly exceeded.
   d. Operated four RCP's without seal injection and controlled bleedoff line closed for approximately 2 1/2 minutes.

   Resolution: B&W

8. RCP's -

   a. RCP #2 operating in steam environment. Possibility of finding water in the oil. TDD to investigate.
   b. Air Cooler fouling due to Boric Acid crystallization.
   c. Moisture in motor windings - TDD to re-megger.

   Responsibility: B&W to check with Westinghouse.

9. CEDM's - tripped with no problem. Total gas in solution at time of incident approximately 22 cc/kg. Some gas may have come out of solution and collected in CEDM's. During cooldown on 9/26/77, CEDM Groups 1 - 4 pulled to 100% for shutdown margin. Rods were apparently run in rather than tripped after cooldown.

   Resolution: Recommend putting N_2 overpressure in Pzr and resetting all CEDM's on next heatup. B&W evaluation.

FEF:mlf
9/27/77