MASTER 07-505-91

NINE MILE POINT NUCLEAR STATION UNIT 2

REACTOR ANALYST PROCEDURE

PROCEDURE NO. N2-RAP-6

POST REACTOR SCRAM ANALYSIS AND EVALUATION

FOR INFORMATION ONLY

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APPROVALS	SIGNATURES	DATE AND INITIALS REVISION 1	REVISION 2	REVISION 3
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Summary of Pages

Revision 1 (Effective 10/5/87)

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VERIFIED BY John Elber
NOT TO BE USED AFTER 8-19-91/0900
DATE/TIME

Periodic Review 10/30/89, No Changes

NIAGARA MOHAWK POWER CORPORATION

THIS PROCEDURE NOT TO BE USED AFTER OCTOBER 1991 SUBJECT TO PERIODIC REVIEW.

*Changes per Section 11.5 AP-2.0 Gary L. Snyder (Signature) 12/5/88 (Date)

*Changes per Section 11.5, AP-2.0 Gary L. Snyder (Signed) 3/3/89 (Date)

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POST REACTOR SCRAM ANALYSIS AND EVALUATION

1.0 PURPOSE

The purpose of this procedure is to provide the review and evaluation of specific parameters associated with a Reactor Scram from all operating conditions. This procedure is designed to evaluate system performance from an initiation or isolation standpoint. The determination of safety system initiation, proper flow paths and system operation will be done using post trip logs, control room instrumentation, recorders, alarms and indicating lights. A secondary purpose of this procedure is to evaluate proper functioning of a station system using the General Electric Transient Analysis REcording System (GETARS).

2.0 DESCRIPTION

Following a Reactor Scram various systems associated with maintaining Core Coolant Inventory and Reactor Containment Integrity must be directly monitored for proper sequential actuation and operation.

3.0 ACCEPTANCE CRITERIA

1) All parameters monitored must satisfy either Tech Spec or expected system performance.
2) Scram Discharge volume surveillance requirements must be satisfied per Technical Specification 4.1.3.1.4.
3) Max cooldown of 100°F/hr not exceeded per Technical Specification 3.4.6.1.
4) Support/Snubber inspections satisfactory per Tech Specs 4.7.5.d when required.

4.0 RESPONSIBILITIES AND CONDUCT

4.1 The Reactor Analyst Department will be directly responsible for data gathering and process evaluation. The analysis will be completed by the Unit Reactor Analyst or Site Reactor Analyst. In the event that those individuals are unavailable, the analysis will be conducted by a senior member of Technical Services or Operations.

4.2 At the conclusion of the scram analysis, a report summary with recommendation will be included in this procedure. The scram report and this report will be sent to SORC for review.

5.0 PREREQUISITES

5.1 Reactor scrammed.

6.0 ATTACHMENTS

A. Scram Summary Sheet

B. Pre-Scram Information Sheet - (for existing steady state conditions prior to Scram).

C. System Response Sheets

D. Plant Personnel Statements

E. Logic Check Sheet

F. Evaluation Check Sheet

G. Final Assessment

H. Procedure Closeout Sheet

7.0 REFERENCE

A. Generic Letter 83-28

8.0 PROCEDURE

8.1 After a Reactor Scram, with the permission of the SSS and knowledge of the CSO, collect the following when available:

a) Sequence of Events Log
b) NSSS Post Trip Log
c) BOP Post Trip Log
d) Alarm typer printout
e) Turbine Trip Recall Log
f) Trend recording of various parameters needed to support analysis. Cut the original out, tape to a blank sheet and attach to this procedure. Mark on the remaining trend paper that the missing section is with RAP-6.
g) GETARS (STDP 93 thru 99)
h) SPDS
i) Event Historical Recording on the Radwaste Computer. Notify Computer Group to edit desired groups.

8.2 Reactor Analyst Technician should complete the "Scram Summary", "Pre Scram Information" and "System Response Sheets" as specified and include comments in the appropriate locations as required. The use of N/A is permitted if the system is not operating during the transient. "Not available" may be written in spaces requesting data if no data is available. 1

8.3 Include all supporting graphs, trends, alarm printouts and reference material with the complete data sheets and forward to the Reactor Analyst or alternate per 4.1 for his review and analysis.

8.3.1 Originals of trends should be removed, at a convenient time for the CSO, and attached to this procedure.

In general, the following trends (arranged by panel) are desired (only select trends affected by the scram):

8.3.1 (Cont'd)

P601

Service Water/RHR Temperature
Post Accident Monitor (only if tripped to P.A.S.T. speed)

P602

Total Recirc Flow
Recirc Pump Suction Temperature (speed - 1"/hour)

P603

APRM/IRM (only one necessary, unless all are different)
SRM
Reactor Pressure/Turbine Steam Flow
Core Pressure Drop/Total Core Flow
Reactor Steam Flow/Feedwater Flow
Reactor Water Level

P842

Turbine Bearing Metal Temperatures
Turbine Bearing Drain and Thrust Brg. Temp.
Turbine Temperatures
Turbine Vibration

P875

DW and Suppression Chamber Temp
SBGTS Discharge Flow/Filter 1B Diff Pressure

P873

SBGTS Discharge Flow/Filter 1A Diff Pressure
DW Equip Drain Leak Rate
DW Floor Drain Leak Rate
DW Equip Drain Pump Flow 3A, 3B
DW Equip Drain Tank Level
DW Equip Drain Pump Flow 1A, 1B
DW Equip Drain Tank Level

P614

Vessel Temperature	PT 1	Vessel Head Flange
	2	Vessel Bottom Head
	3	Bottom Head Drain
	4	Shell Flange

8.4 The Reactor Analyst or alternate will review the "Pre-Scram Information" and "System Response Sheets" and supporting information and will then complete the "Logic Check Sheets".

8.5 The Reactor Analyst will then complete the Logic Check, Evaluation Check and Final Assessment.

8.6 Reactor Analyst and Department Technician will closeout the procedure per Procedure Closeout Sheet.

Scram Summary

Scram # 91-01
(obtain # from Rx. Analyst's file)

Date 8-13-91

Time 0548

Sensor(s) causing scram:

Short narrative: See attached summary

Pre-Scram Information

FROM 0500 DAILY PERIODIC LOG

Computer Point		Units	
	Date & Time of Scram	8-13-91	0549
	Reactor Mode Switch Position	RUN	
	Power Level	3322.84 MWt	1126.13 MWe (SPGQA02)
FWSLA 101	Rx. Water Level	183.59 in	
FWSPA 101	Rx. Pressure	1004.25 psig	
RCSTA 103, 105	Recirc. Temp.	529 / 531 °F	
NMPFA 101	Loop A Flow	15.96 mlbs/Hr	✓ (60Hz) or ____ (15Hz)
NMPFA 103	Loop B Flow	15.82 mlbs/Hr	✓ (60Hz) or ____ (15Hz)
NSSFA 101/01S	Total Core Flow	106.62 mlbs/Hr	
	Control Mode (Recirc)	LOOP MAN (Loop Manual, Loop Auto, Flux Auto)	
CMSPA01	Drywell Pressure	0.17 psig	
CMSTU01	Drywell Temperature	111.29 °F	
CMSLA02/Chart Recorder	Suppression Pool Level	200.2 Feet	
CMSTU03	Suppression Pool Temp	91.12 °F	

Service Water Pumps on Line

✓ A ✓ B ✓ C ✓ D ✓ E ____ F

Circ. Water Pumps on Line

✓ A ✓ B ✓ C ✓ D ✓ E ✓ F

Feedwater: (FWS)

FROM 0500 DAILY PERIODIC LOG

			Units
CNMFA05	Feed Pump Flow A	NOT RUNNING	KGPM/Min
CNMFA06	Feed Pump Flow B	15.62	KGPM/Min
CNMFA07	Feed Pump Flow C	15.44	KGPM/Min
FWSFU01/ FWSFA100 and FWSFA101	Total Feedwater Flow	14.18	MLBS/HR

Feedwater Control Mode (check)

✓ 3 Element ________ Single Element

✓ Startup Controller ____ Man ✓ Auto

✓ Master Controller ____ Man ✓ Auto

Were condensate and feedwater lineups normal? ✓ (Yes) ____ (No)
If no, explain:

Were electrical lineups normal? ✓ (Yes) ____ (No)
If no, explain:

Were any surveillance procedures, tests or other evolutions in progress that may have effected station operation? ____ (Yes) ✓ (No)
If yes, explain:

Check any ECCS Systems that were running and lineups at time of scram:

HPCS ________

LPCS ________ NONE

LPCI ________

System Response

Reactor Vessel (System 28):

Highest water level attained (during transient)	243"[1]	Post Accident Monitor ~~603-RCR 137, 140~~
	*	FWSLA101
	*	GETARS
Lowest water level attained (during transient)	124"	Post Accident Monitor (PAM) ~~603-RCR 137, 140~~
	*	FWSLA101
	*	GETARS 1

Level Control Comments: 1) Hi level extrapolated from available data
LV10 B&C locked up as-is on loss of control power

Highest Reactor Pressure attained (during transient)	1070	~~603-RCR 134, 135~~ PAM
	*	FWSPA101
	*	GETARS
Lowest Reactor Pressure attained (during transient)	532	~~603-RCR 134, 135~~ PAM
	*	FWSPA101
	*	GETARS

Pressure Control Comments:
* Not available due to loss of power to process computer and GETARS

Main Steam (System 01): (MSS)

	Before Scram	After Scram
• MSIV's (Indicate open or closed)		
Inside: AOV6C (F022C)	OPEN	OPEN
6D (F022D)		
6A (F022A)		
6B (F022B)		
Outside: AOV7C (F028C)		
7D (F028D)		
7A (F028A)		
7B (F028B)		

Comments: (Include cause of MSIV closure) 1

1

Relief/Safety Valves (SVV)
(open or closed)

	Before Scram	After Scram	Time Opened *	Time Closed *	Elapsed Time *
PSV 133 (F013A) [SVVBC01]	CLOSED	OPEN	NOT AVAILABLE DUE TO LOSS OF ELECTRICAL POWER TO PROCESS COMPUTER AND RESULTANT COMPUTER OUTAGE.		
PSV 128 (F013B) [SVVBC02]		OPEN			
PSV 137 (F013C) [SVVBC03]		CLOSED			
PSV 123 (F013D) [SVVBC04]					
PSV 136 (F013E) [SVVBC05]					
PSV 122 (F013F) [SVVBC06]					
PSV 132 (F013G) [SVVBC07]					
PSV 127 (F013H) [SVVBC08]					
PSV 131 (F013J) [SVVBC09]					
PSV 126 (F013K) [SVVBC10]					
PSV 135 (F013L) [SVVBC11]					
PSV 121 (F013M) [SVVBC12]					
PSV 134 (F013N) [SVVBC13]					
PSV 120 (F013P) [SVVBC14]					
PSV 130 (F013R) [SVVBC15]					
PSV 125 (F013S) [SVVBC16]					
PSV 129 (F013U) [SVVBC17]					
PSV 124 (F013V) [SVVBC18]					

(Cont'd)

- Any relief valve leaking? ✓ (Yes) ____ (No) (P-614 RCR) 1
  If yes, comment: PSV-122 AND PSV-135 ARE KNOWN TO LEAK BY
  AS SHOWN IN ATTACHED SRV CHART.

List times that any of the following ADS logic points alarmed. (Alarm Typer)

ADSBC 01	*	ADSBC 12	*	ADSBC 21	*
ADSBC 02	↓	ADSBC 15	↓	ADSBC 25	↓
ADSBC 03	↓	ADSBC 16	↓	ADSBC 26	↓
ADSBC 04	↓	ADSBC 17	↓	ADSBC 27	↓
ADSBC 11	↓	ADSBC 18	↓		

If no alarm, N/A. * NOT AVAILABLE DUE TO LOSS OF ELECTRICAL POWER TO PROCESS COMPUTER.

Recirculation System (System 29): (RCS) 1

- Were recirc pumps downshifted? ✓ (Yes) ____ (No)
  If yes, ✓ Auto ____ Manual.

- Were recirc flow control valves runback? ✓ (Yes) ____ (No)
  If yes, ✓ Auto ____ Manual.

- Were recirc pumps tripped? (RCSFC101,102-alarm typer) ____ (Yes) ✓ (No) 1
  If yes, ____ Auto ____ Manual.

- Were any problems experienced with the pumps? ____ (Yes) ✓ (No)
  If yes, explain:

- Were any problems experienced with recirc flow control valves? ____ (Yes) ✓ (No)

  If yes, explain:

- Comments:

Feedwater (System 06,07,08): (FWS)

- Max flow attained on feed pumps

A	*	Kgpm	(CNMFA 05)	BOP TRIP LOG
B	*	Kgpm	(CNMFA 06)	BOP TRIP LOG
C	*	Kgpm	(CNMFA 07)	BOP TRIP LOG

1

* NOT AVAILABLE DUE TO LOSS OF ELECTRICAL POWER TO PROCESS COMPUTER.

(Cont'd)

- Did any feed pump trip? ✓ (Yes) ___ (No)
  If yes, check which pumps tripped and provide cause.
  NOT RUNNING A cause:
  ✓ B cause: } ROOT CAUSE UNDER INVESTIGATION
  ✓ C cause:

- Were high level trips actuated? LEVEL 8 BMW 8/16/91 ✓ (Yes) * (No)
  If yes, did all 3 high level trip lights come on? (P603) ✓ (Yes ___ (No)

- Was there any control problems associated with either the controller or flow control valves? ✓ (Yes) ___ (No)
  If yes, explain: FLOW CONTROL VALVES FAILED AS IS DUE TO LOSS OF POWER.

- Did fourth point heater drain pumps trip? ✓ (Yes) ___ (No)
  (HDLBC 01, HDLBC 02, HDLBC 03)

- Comments:

Condensate (System 03): (CNM)

- Did any condensate pumps trip? ___ (Yes) ✓ (No)
  If yes, explain: (CNMBC05, 06, 07, 08)

- Did any condensate booster pump trip? ✓ (Yes) ___ (No)
  If yes, explain: (CNMBC 23, 24, 25, 26)
  BOOSTER PUMP 2A TRIPPED, ROOT CAUSE INVESTIGATION IN PROGRESS.

- If Scram occurred at >80% CTP, did condensate demin bypass valve open (AOV109)? ✓ (Yes) ___ (No)

- If Scram occurred at >80% CTP, did low pressure heater string bypass valve open (AOV101)? ✓ (Yes) ___ (No)

- Comments:

* WERE UNABLE TO DETERMINE WHETHER HIGH LEVEL TRIPS ACTUATED DUE TO LOSS OF COMPUTER.

Turbine (System 21): (TMA) (PNL-851) 1

- Trip? ✓ (Yes) ___ (No)
  If yes: ✓ Auto ___ Manual
  If auto trip, explain the cause:
  CUSTOMER TRIP - GENERATOR PROTECTION
  SEE TURBINE FLAG ATTACHMENT

- Did bypass valves open? ✓ (Yes) ___ (No)
  If yes, did they function smoothly to control reactor pressure? (603-RCR) ✓ (Yes) ___ (No) 1
  Comments:

- Coast down time. (From turbine trip till on turning gear) NOT AVAILABLE - TURBINE WOULD NOT GO ON TURNING GEAR. 1

- Was turning gear oil pump started? ~~✓~~ (Yes) ✓ (No) 13791 8/16/91
  (TMLBC 05) ~~✓~~ Auto ___ Manual

- Was emergency bearing oil pump started? ~~✓~~ (Yes) ✓ (No) 8/22/91 1
  (TMLBC 03) ___ Auto ✓ Manual (2)

- Did turning gear engage? ___ (Yes) ✓ (No)
  How long after Scram? ___

- Comments:

1. TURNING GEAR OIL PUMP STARTED; SYSTEM ENGINEER STATED PUMP SHOULD HAVE WORKED.
2. EMERGENCY BEARING OIL PUMP IN PULL TO LOCK prior to event.

Service Water (System 11): (SWP) 1

- Did any pumps trip? (SWPBC 01,02,03,04,05,06) ___ (Yes) ✓ (No)
  If yes, what pumps?
  Cause:

- Comments:

Neutron Monitoring (System 92): (NME)

- Highest Power level attained:
  * (NSS Post Trip Log) 125% ‡ APRM Recorder (PNL 603)
  * GETARS (Channel E)
  ‡ APRM recorders failed as-is, spike due to repowering recorder
  Explain if highest reading wasn't from APRM's.

- Comments: * NOT AVAILABLE DUE TO LOSS OF ELECTRICAL POWER TO PROCESS COMPUTER AND GETARS.

Reactor Core Isolation Cooling (RCIC) (System 35): (ICS)

- Was RCIC started? ✓ (Yes) ~~✓~~ (No)
  If started: ___ Auto ✓ Manual

- Answer the following only if the system was started:

Reactor Core Isolation Cooling (RCIC) (System 35): (Cont'd)

(Record steady state values)

(GETARS, SOE Log, Alarm Types)

System flow 200-1600 GPM
Controller setting VARIOUS GPM FLOW CONTROLLED IN MANUAL
Turbine Speed 3000-4000 RPM
Pump Suction Pressure *
Pump Discharge Pressure *
Steam Line Flow *

Did RCIC trip at any time? ____(Yes) ✓ (No)
If tripped, what was the trip signal? ____
Explain trip circumstances:

- Comments: * NOT AVAILABLE DUE TO LOSS OF ELECTRICAL POWER TO PROCESS COMPUTER AND GETARS

(RHS) Residual Heat Removal (System 31):

- Indicate if any pumps were started: NONE 8/16/91

(GETARS, P-601, SOE Log)

✓ A, if initiated ✓ Manual or ____ Auto
____ B, if initiated ____ Manual or ____ Auto
____ C, if initiated ____ Manual or ____ Auto

- If any system was started, indicate the following parameters:

System	RHR Flow	SW Flow	Δ T RHR	Δ T SW	Radiation Level on SW
A	7450 gpm	7400 gpm	*	*	*
B					
C		NA	NA	NA	NA

- Other comments

Low Pressure Core Spray (System 32): (CSL)

(P-601, GETARS)

- Was LPCS initiated? ____(Yes) ✓ (No)
  If yes; ____ Auto ____ Manual

- System flow rate

- Comments:

* NOT AVAILABLE DUE TO COMPUTER OUTAGE

High Pressure Core Spray (HPCS) (System 33): (CSH)

(P-601, GETARS)

- Was HPCS initiated? ____(Yes) ✓ (No)
  If yes, how was it done? ____ Auto ____ Manual

- System flow rate ________ CST Level________
- Pump suction: _____ CST or ______ Supp. Pool
- Did automatic switchover from CST to suppression pool occur? ____(Yes)____(No)
- Other comments:

Containment (System 81,82,83):

- Highest Suppression Pool Water Level attained-PNL898 200.5 ft
- Lowest Suppression Pool Water Level attained-PNL898 200.5 ft
- Highest Suppression Chamber Air Temp-PNL875 104 °F
- Highest Drywell Pressure-PNL898 .65 psig
- Highest Drywell Air Temp-PNL875 167 °F
- Drywell Oxygen Concentration-PNL898 2.7 %
- Drywell Hydrogen Concentration-PNL898 0.5 %
- Highest Drywell Radiation Level attained-DRM B1, D1 *
- Drywell Floor Drain leakage rate-PNL 870, 873 0.5 GPM
- Drywell Equipment Drain leakage rate-PNL 870, 873 3.5 GPM

Has there been a change as a result of the scram? ✓ (Yes)____(No)
If yes, explain: Increased drywell temps due to loss of drywell cooling

- Other comments:
  * Not available due to loss of power to DRMS computer

Control Rod Drive (CRD) (System 30): (RDS) (Alarm typer, SOE)

NOTE: Valve closure time section is not to be completed until Modification 87-092 is installed.

- Valve Closure Time

Valve:	Vent-AOV124 (F010)	Vent AOV132 (F180)	Drain AOV123 (F011)	Drain AOV 130 (F181)
Comp Pt.	RDSZC105	RDSZC106	RDSZC107	RDSZC108
Time of Comp. Pt.	*	*	*	*
Scram Time	- *	- *	- *	*
Closure Time	*	*	*	*

TCN-

- Did CRD air pressure vent off as evidenced by receipt of digital alarm pt RDSPC05? ____(Yes) * (No)

- After Scram reset did RDSPC05 clear? ____(Yes) * (No)

* Process computer points not available

- Time that scram dump volume vent and drain (Alarm Typer) valve open:

  [Time of Comp pt.:

*	*	*	*
RDSZC01	RDSZC02	RDSZC03	RDSZC04

- Scram Dump Vol Drain Down Time

Time Comp Pt cleared	*	*
	RDSLC101 (LS126)	RDSLC102 (LS129)
Time Scram Reset	– *	*
Drain Down Time	= *	*

- Check on Scram Dump Vol Hi Lvl Rod Block Level Switches

Time in	*	*
	RDSLC103 (LS125)	RDSLC104 (LS127)
Time Cleared	*	8-16-91 * 071204
	RDSLC103	RDSLC104

- Comments: * ROD DRIVE SYSTEM COMPUTER POINTS NOT AVAILABLE DUE TO LOSS OF ELECTRICAL POWER TO PROCESS COMPUTER.

<u>Cleanup</u> (System 37): (WCS) (602 PNL)

- Was cleanup in service at time of scram? ✓ (Yes) ✓ (No)
  If yes, which pump was in service? ___ A ✓ B
- Did cleanup pump(s) trip? (WCSUC01,02) ✓ (Yes) ___ (No) |*
  If yes explain: Manual scram action
- Did cleanup system isolate? (WCSBC26,27) ___ (Yes) ✓ (No)*
  If yes, explain:

- Comments: * Cleanup system did isolate @ 1056 due to high delta flow when operators attempted to place system back in service

Electrical (Systems 69-74, 100A & B): 1

(NPS) • If Normal Station Transformer was supplying 2NPS-SWG001 and 2NPS-SWG003, was a normal fast transfer observed? ✓ (Yes) ___ (No)

• Were any problems encountered, on transfer from normal to reserve? ✓ (Yes) ___ (No)
If yes, explain: UPS 1A→D, G tripped off deenergizing their respective busses

(NNS) • Was Div. I diesel started? ___ (Yes) ✓ (No)
Initiation EGPBC15 EDG-1 running ___ Auto ___ Manual
EGPBC09 BRKR 101-1 closed

• Was Div II diesel started? ___ (Yes) ✓ (No) 1
Initiation EGPBC16 EDG-3 running ___ Auto ___ Manual
EGPBC10 BRKR 103-14 closed

• Was Div III diesel initiated ___ (Yes) ✓ (No)
Initiation CSHBC09 EDG-2 running ___ Auto ___ Manual
CSHUC12 BRKR 102-1 closed

• If any diesel generator was supplying its respective bus, record the following:

	FREQ	VOLTAGE	MAX LOAD
Div I	(GETARS)	(GETARS)	(GETARS)
II	(GETARS)	(GETARS)	(GETARS)
III	(GETARS)	(GETARS)	(GETARS)

1

• Did any diesel auto trip? (OPS) ___ (Yes) ✓ (No)
If yes, explain:

• Was any problem encountered with normal DC power supplies? (OPS) ___ (Yes) ✓ (No) 1
If yes, explain:

(Cont'd)

- Was any problem encountered with Emergency DC power supplies? (OPS) ___(Yes) ✓(No) 1
  If yes, explain:

- Comments:

Standby Gas (System 61):

(PNL 870, 871 RCR)
- Was Standby Gas System started? ___(Yes) ✓(No) 1
  Initiation ___ Auto ___ Manual
  If auto initiation, on which parameter? ______

- If it was running, did the system trip? ___(Yes) ✓(No)
  If yes, explain:

- Comments:

Radiation Levels (System 79,80): Obtain from DRMS Computer

Did any of the following DRMS computer points "ALERT" during the transient? (Explain any alerts)

DRMS Computer Point	LOC.	ALERT
RMS 101 thru 193*	Area Rad. Monitors	Y/N
RE 10A, B	Drywell	Y/N
RE 105	Stack Gas	Y/N
RE 13A, B	Off Gas	Y/N
RE 18A, B, C, D	Control Room	Y/N
RE 115, 131	RBCLC	Y/N
RE 152	TBCLC	Y/N
RE 157	Circ. Water	Y/N
RE 206	Turb. Bldg. Vent	Y/N
RE 23A, 23B	RHR SVC Water	Y/N

- Comments: DRMS not available, plant and field survey teams found no abnormal radiation levels

Supports/Snubbers

- Was a standby emergency system actuated? ___(Yes) ✓(No)

- If yes, what systems were actuated?

- If a system was actuated, notify the SSS that inspections may be required to meet the T. S. Surveillance requirements of 4.7.5.d.

______ SSS Notified ______ Time/Date

- Comments: Walkdowns were performed on sections of RWCU and RHR to verify no water hammer damage.

PLANT PERSONNEL STATEMENTS

1) On-shift STA should disperse these sheets and solicit comments from personnel involved in the scram.

2) Prepare a handwritten statement describing the trip event sequence and plant response as you remember it. Include your indications that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies. Also include any information you consider important to review this unscheduled reactor trip. *

See SSS Log For Exact Times

Comments: HEARD NOISE OBSERVED LOSS of ANNUNCIATOR EXCEPT for "LOSS of ANNUNCIATOR power ALARMS" on PCO1 ~~Verif~~ Tried to EVALUATE PLANT STATUS Recommended to SSS PLACE MODE SWITCH in Shut down ⇒ PLACE Rx Mode Switch to SHUT DOWN. Verify House Loads ~~[illegible]~~ XFER'd ~~[illegible]~~ Verified DC power AVAILABLE

OBSERVED Drywell unit Coolers Tripped ATTEMPTED to RESTART

During This Time WL & Pressure were Being verified on PGO1 PA-RECORDERS

RCS Pumps Downshifted (EOC-RPT) and (?) Hi Press ARI. Initiated

RCIC was INITIATED

RHR placed in SUPP pooling Cooling

Power Unknown AT this time

Verify SDV WAS full.

(Use additional sheets if necessary) [signature] 8/14/91 1000

Signature Date Time

ASSS/STA

Position

→ I TRIED TO TAKE Big Picture Approach

- Pressure was under control

- Cooldown was a concern
Secure
Condensate boosters at ~~lvl 8~~

- BOP of PLANT

→ Aux Boilers
→ Steam Condensing
→ Vacuum

- Contingency

→ HPCS
→ Restore RHR B & C

Very Very Concerned w/

→ Position of Rods

→ Loss of Drywell Cooling (Containment)

→ LEVEL & Pressure

PLANT PERSONNEL STATEMENTS

MY OBSERVATIONS ON 8/13/91 @ 0548 AND SHORTLY THEREAFTE

HEARD NOISE POPP SOUND

REALIZED LOST ANNUNCIATORS & SEVERAL METERS

--

WENT TO BACK PANEL APRM'S DOWNSCALE
→ RCS Pump Down Shifted
RECOMMENDED TO SSS PLACE MODE SWITCH IN SHUTDOWN

MODE SWITCH WAS PLACED IN SHUTDOWN

→ CALLED UNIT 1 to make ~~[illegible]~~ Anouncements ops to contr
→ CALLED UNIT 1 DECLARE SAE.
USED INDICATIONS ON P601 TO MONITOR RX PRESSURE & LEVEL

VERIFIED HOUSE LOADS TRANSFERRED

VERIFIED DC POWER WAS AVAILABLE

KNEW THERE WAS A PROBLEM WITH UPS 1 SERIES 'OPERATORS WERE DISPATCHED INITIAL COULD NOT RESTORE reported all UPS ⇒ MIKE GARBUS EVENTUALLY RESTORED

OBSERVED Drywell Unit Coolers Tripped
Very concerned with this
ATTEMPT overrides w/ Drywell Temperature ranging from 120 → 165

VERIFIED SDV WAS full & (I THINK) VALVES INDICATED CLOSED

RCIC WAS INITIATED

(Power) OR ROD POSITION were not known

1. Why did we lose drywell cooling and why could we not use LOCA bypass to restore?

2. What was highest RPV level and when? LVL 8 0613 ⇒ PAMS upscale Secured Boosters

3. Why no aux steam to reboilers?

4. Did we lose UPS-1H?

5. When did we start RHS + PIA in Supp Pool Cooling?

6. Did we close AOV101 (low press fw htr string bypass)?
AOV 101 IS STILL OPEN

7. Did we get RRCS initiated on Rubic's Cube?

8. Were there any APRM red lights on P608? No

9. Did any Condensate Booster trip / autostart (conflicting information)
A - TRIPPED
C - auto START
B - Remained in Service

1) DRYWELL COOLING WAS LOST BECAUSE UPS1A TRIPPED. THE LOGIC REQUIRES AN ENERGIZE TO FUNCTION RELAY TO ACTUATE TO SATISFY THE CIRCUIT FOR PROPER CCP (CIV) VALVE POSITION OR LOCA OVERRIDE.

THE DRYWELL UNIT COOLER LOCA OVERRIDE AND VALVE POSITION LOGIC CIRCUITS HAD NO POWER. (REF: ESK-7DRS01 THE ULTIMATE POWER SOURCE IS 2VBS-UPS1A.) THE ASSOCIATED RELAYS THAT SEND A PERMISSIVE SIGNAL TO THE UNIT COOLER START WERE DE-ENERGIZED WITH THEIR NORMAL OPEN CONTACTS OPEN. THEREFORE THE CONTACTORS FOR THE DRYWELL UNIT COOLERS COULD NOT ENERGIZE.

REFERENCES ESK-6DRS01 & 02, ESK-7DRS01, EE-11J

2)THE HIGHEST LEVEL KNOWN IS 202.3". POST ACCIDENT MONITORING RECORDERS WERE UP SCALE AND THE UPS's WERE NOT RESTORED WHEN LEVEL PEAKED THIS OCCURRED AT APPROXIMATELY 0612.

3)THERE WAS NO AUXILIARY (MAIN) STEAM TO THE REBOILERS BECAUSE THE AUTOMATIC SWAP FROM EXTRACTION STEAM (2ESS-STV104) TO MAIN STEAM (2ASS-STV112) WAS NOT AVAILABLE BECAUSE 2ASS-PV113 MAIN STEAM TO REBOILER PRESSURE CONTROL VALVE WILL NOT CONTROL PRESSURE REFER TO WORK REQUEST 193207 DATED 7/8/91. LAST KNOWN POSITION CLOSED.

4)IT IS NOT KNOWN ~~WHY~~ IF UPS1H FAILED. TSC NOTIFIED TO CHECK on UPS1H
TSC later reported UPS 1H normal. Tom

5)SUPPRESSION POOL COOLING WAS STARTED SHORTLY AFTER RCIC WAS INITIATED(0555), AND WAS RUNNING BEFORE ANNUNCIATORS WERE RESTORED (0622).

6)NO, THE LOW PRESSURE FEEDWATER HEATER STRING BYPASS 2CNM-AOV101 IS STILL OPEN.

7) YES REDUNDANT REACTIVITY CONTROL SYSTEM (RRCS) WAS INITIATED ON RUBIC'S CUBE. THE INDICATIONS ON THE RRCS DISPLAY WHEN RESET WERE AS FOLLOWS: -ARI INIT, ARI READY TO RESET,
READY TO RESET, & LFMG TRANSFER
REACTOR OPERATOR M. BODOH RESET RRCS, REACTOR OPERATOR D. RATHBUN RESET ARI RESPECTIVELY.

8)NO RED LIGHTS WERE NOTED ON P608. REACTOR OPERATOR D. HANZCYK NOTED NO RED LIGHTS ON P608. SENIOR REACTOR OPERATOR M. ERON NOTED NO RED LIGHTS ON P608.

9)YES, CONDENSATE BOOSTER PUMP 2CNM-P1A TRIPPED AND CONDENSATE BOOSTER PUMP 2CNM-P1C AUTOMATICALLY STARTED. THIS WAS CONFIRMED BY REACTOR OPERATOR M. BODOH AND SENIOR REACTOR OPERATOR M. ERON WHEN CONDENSATE BOOSTER PUMPS WERE SECURED.

PLANT PERSONNEL STATEMENTS

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Comments:

I was the reactor operator tasked with placing reactor water cleanup system into full reject. ~~Ay~~ I was located at the pump control switch at Panel 602 in the main control room.

I suggested to SSS Conway to put cleanup into full reject as it was one of the post scram actions and I felt that it would assist in level control with shut down cooling on line.

As an immediate scram action, the 602 panel operator tripped the running cleanup pump (WCS-P1B.)

I Realized that normal entering into full reject could not be accomplished since pump was tripped. I utilized E.4.0 of OP 37 to support the pump start. What I did not realize was that E.4.0 was written for cold conditions. (There was a note prior to E.1.0 cautioning that it was for startup conditions.)

Following the steps in E.4.0, I started 2WCS-P1B (The fact that temperature of water ~~water~~ was some 360° did not concern me as I knew that we could enter full reject with water temperature at 500+°.)

Following the pump start, within a few seconds, the Δ flow timers initiated. I did not expect to see this occur because I did not anticipate flow to be greater than 100 gpm. In response to the Δ flow timers, I shut 2WCS-MOV 110. System flow was noted at being ≈800 gpm.

— over —

(Use additional sheets if necessary) James F. Emery 8-14-91 / 1055

Signature / Date Time

NAOE

Position

Δ Flow timers timed out and the system isolated. (Report from the operators in the pump room was that the pump seals looked good and that by the time the ~~discharge valve~~ transient occurred, the discharge valve was ≈ 50% open. Discharge valve was subsequently shut with a holdout placed on the pump control switch for P1B.)

Report was then received that serious water hammer was occurring in the WCS heat exchanger room. In response to this, 2WCS-MOV107, 110 + FV135 were shut. The piping with FV135 was verified to be "moving."

≈15 minutes later, report came from the heat exchanger room that the water hammer was subsiding.

Team that was backwashing 2WCS-F/D A reported that 2WCS-AOV27A (isolation valve downstream of 2WCS-FV16A) opened during the water hammer transient. A holdout was ~~also~~ to be placed on 2WCS-V70A but as of 8-13-91 @ 1830, holdout was not in place because operator did not know if V70A fully shut. (2WCS-AOV27A was WR'd.) V70A is manual isolation for AOV27A.

Causes of Actuation - in my opinion:

- I thought that a sense of urgency existed. I knew that our conditions required us to be in full reject. The system had been shut down for several hours, so I thought that we were already tardy in placing it in reject. Also felt that it would assist in level control.
- I misused the procedure as the section in the startup section didn't cover the conditions that we were in - this was unintentional.
- Procedural inadequacy in that the warning not to perform section E.4.0 was in front of E.1.0. Also, the procedure needs specific guidance for covering placing us in full reject in the conditions that we were in, i.e., no pump, no filters and hot or a caution warning not to use full reject if those conditions exist. (Al DeGracia young is supposedly correcting the procedure)
- I did not hold an adequate prejob brief, I was working with 3 other RO's and we should have sat down and verified that our actions were correct.
- Finally SSS Conway originally ordered this task. However, by the time that we were ready to start the pump, SSS Moyer was in charge. I did not inform him of this evolution (At the time, many such auxiliary evolutions were in progress. ~~and he~~)

PLANT PERSONNEL STATEMENTS

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Comments:

The first indication of trouble was a sharp drop and recovery in the Control Room Light Level. The CSO (?) said we have lost all annunciators. Tom Tuttle and I were starting our Turnover. We walked away from the SEPC/STA desk (around behind the fire panel) and truly there were no annunciators, no full core display, no indication of the status of RPS. The PAM Recorders indicated Normal Water Level & pressure.

Mike Conway ordered the mode switch placed in shutdown and entered the EOP's. He also had an operator monitoring Reactor Water Level & Reactor pressure on the PAM Recorders.

I got out the classification Chart (EAP-2) and suggested 2 possible classifications to Don Bosnic. He was inclined to go with the Site Area Emergency because of the Loss of all annunciators and a transient (Reactor Scram), I subsequently made this suggestion to Mike Conway and he declared a "Site Area Emergency" at 0600.

When the Notification was finished (6:06) on the RECS Line by Krukowski (a Rad Waste Operator) a Notification to the NRC was started (continued on back)

(Use additional sheets if necessary) [signature] 8-13-91 10:37

Signature Date Time

SEPC

Position

The NRC wanted to know (among other things) how we knew the Reactor was shut down. Three SRM's indicated that the Reactor was shutdown and that the Neutron Count was in the Source Range. [SRM A was INOP; SRM C indicated 2000 to 4000 Counts; SRM B and D showed 300 Counts]

A sufficient number of UPS were restored to "Black Power" by Dave Hansic to get Control Room Annunciators and indication restored. The RC&IS display (Red LED's) did not show all Rods in so Mark Bodah & Dave Rathbun used RC&IS and the full core display to determine which Rods might still be out (not fully inserted). They narrowed it down to 6 questionable rods which was eventually narrowed down to "ALL Rods In".

Subsequent control of the Reactor Water Level and pressure were: - R.J. Reynolds on Turbine Bypass Valves for press. Control
- Jim Graff on Water Level Control with the Condensate Booster pump 2A and Condensate pump 1A & 1B.
- J. Lawrence and Rich DeLong Monitoring the Reactor Vessel Cool down Rate.
- Bob Spooner Making Entries in N2-OP-101C
- Mike Carbus Maintaining a Log of Events.

Denny
8-13-91
10:37 AM

PLANT PERSONNEL STATEMENTS

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Comments: I WAS ON ~~THE~~ MY WAY TO THE LOCKER ROOM AND THE LIGHTS WENT OUT. WENT BACK TO THE CONTROL ROOM TO SEE WHAT HAPPENED. CSO SAID WE SCRAM AND SENT US NLOT OUT ON JOBS IN THE PLANTS.

(Use additional sheets if necessary) Todd M Kelly 8-13-91 0841

Signature Date Time

AUX OP "B"

Position

<u>PLANT PERSONNEL STATEMENTS</u>

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Comments: ARRIVED TO WORK @ ~0600 8/13/91

ARRIVED IN CONTROL ROOM SHORTLY AFTER ARRIVAL AT WORK. MONITORED CONTROL ROOM ACTIVITIES & DISCUSSED PLANT CONDITIONS FOR SEVERAL MINUTES.

MYSELF & M. GARBUS PROCEEDED TO 237' NORMAL SWGR TO DETERMINE UPS 1'S STATUS. SEVERAL OPERATORS IN THE AREA (D. HANCZYK, ETC). INFORMED BY DAVE HANCZYK THAT THEY HAD ATTEMPTED TO RE-START THE TRIPPED UPS'S & WERE UNSUCCESSFUL. I RECOMENDED THAT WE DIVERT OUR EFFORTS TO BYPASSING THE UPS'S & RE-ENERGIZED DOWNSTREAM LOADS. (KNOWING THAT THE CONTROL ROOM NEEDED MORE INDICATORS).

—OVER—

(Use additional sheets if necessary)

[signature] 8/13/91 1045

Signature Date Time

CSO => SURVIELLANCE (EXTRA)

Position

PLANT PERSONNEL STATEMENTS

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Comments:

SEE ATTACHED

(Use additional sheets if necessary)

D Barna 8-13-91 / 1525
Signature Date Time

ONCOMING ASSS
Position

0550 I ENTERED THE PLANT THRU SECURITY & AS I WALKED BETWEEN SECURITY & THE PLANT I HEARD A LOUD BANG (SOUNDED LIKE A LARGE DOOR SLAMMED SHUT). AT THE SAME TIME MANY OF THE OUTDOOR LIGHTS WENT OUT. AS I ENTERED THE PLANT I ALSO NOTICED MANY LIGHTS WERE OUT (INSIDE THE CONTROL BUILDING)

0553 I ENTERED THE CONTROL ROOM EXPECTING ALOT OF ANNUNCIATOR ALARMS BUT IT WAS QUIET. THE ANNUNCIATOR BOARDS WERE BLACK. THE INDICATOR LIGHTS WERE STILL ON FOR THE CONTROL PANEL EQUIPMENT. 603 FULL CORE DISPLAY WAS BLANK. SCRAM SOLENOID LIGHTS WERE OUT. ~~A COUPLE OF~~ "A" NARROW RANGE LEVEL INSTRUMENT READ DOWNSCALE, "B" & "C" INDICATED NORMAL BAND. MODE SWITCH WAS IN SHUTDOWN. 601 INDICATORS (QUICK SCAN) LOOKED NORMAL. PAM RECORDERS WERE TRENDING & WERE BEING USED FOR LEVEL & PRESSURE INDICATION.
EOC RPT BKRS WERE OPEN (NO INDICATION OF RECIRC PUMP SPEED) - 1 & 2 BKRS WERE CLOSED WHICH MEANT RCS WAS PROBABLY IN SLOW SPEED

0553 M. EROM ASKED ME TO CALL FOR THE COMMUNICATION AID & I DID THAT - COMM. AID SHOWED UP AT ABOUT 0602

I HEARD MARK JUDAH GIVING LEVEL TRENDS. LEVEL DROPPING 165 ↓. ~~BRIAN HILLIKER~~ SOMEONE WAS TOLD TO ~~RCT~~ INITIATE ICS. THERE APPEARED TO BE A PROBLEM INITIATING ICS MANUALLY BUT WITHIN A COUPLE OF MINUTE ICS WAS RUNNING BEING CONTROLLED MANUALLY BY BRIAN HILLIKER. ~~LEVEL~~

0556 LEVEL ↓ TO L3. MIKE CONWAY ENTERED RPV CONTROL EOP AND SINCE NO ROD INDICATION ENTERED C5.

TB

~0602 LEVEL BEING RESTORED BY ICS > 159 RISING

BETWEEN 0602 & 0700 LEVEL ROSE TO L8 & TRIPPED ICS. LEVEL ~~CONTROL WAS TRANSFERRED TO CONDENSATE~~ DROPPED TO ABOUT 140 BEFORE LEVEL CONTROL WAS REGAINED USING CONDENSATE SYSTEM.

0622 ANNUNCIATOR POWER CAME BACK ON (MIKE CONWAY HAD SENT DAVE HANCZYK TO RESTORE POWER TO UPS (1 SERIES) LOADS WHICH BROUGHT BACK THE ANNUNCIATORS & BEGAN THE RESTORATION OF THE COMPUTER SYSTEMS). UPS WERE NOW ON MAINT. SUPPLY

~0625 I TOOK OVER PHONE COMMUNICATIONS WITH THE NRC CONTROL CENTER AND ~~WAS~~ LOST TRACK OF PLANT SPECIFICS BUT KEPT A GENERAL OVERVIEW

I DID THE LOG RECONSTRUCTION FROM NOTES TAKEN DURING THE EVENT BY SEVERAL INDIVIDUALS

PLANT PERSONNEL STATEMENTS

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2) Prepare a handwritten statement describing the trip event sequence and plant response as you remember it. Include your indications that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies, and any identified procedure deficiencies. Also include any information you consider important to review this unscheduled reactor trip. | *

Comments:

I WAS IN THE REACTOR BUILDING 215' ELE. HANGING A MARKUP ON THE RHS SYSTEM. AT APPROX 0550 THE LIGHTS WENT OUT AT WHICH TIME I EXITED THE REACTOR BUILDING AND WENT TO THE CONTROL ROOM. I WAS THEN SENT ON VARIOUS JOBS PER THE CSO.

(Use additional sheets if necessary) Philip R Nichols 8-13-91 / 0841

Signature Date Time

AUX OP "B"

Position

PLANT PERSONNEL STATEMENTS

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Comments: Arrived @ 0600, Mode sw had been placed in S/D, No annunciators normal level & pressure ind. not availible feed pumps not running, RCIC in service. Went to UPS's, found AC & DC inputs & UPS output bkrs tripped open
Closed CB 4 (Maint Supply) restored UPS 1's which restored annunciators & indication
Checked Switchyard noted Mn Xfmr 1B (center phase) covered with oil, placed both fan/pump switches in off. Returned to Control Rm to help with shutdown

(Use additional sheets if necessary) W Harbus 8/13/91 0900

Signature Date Time

sitting

Position

PLANT PERSONNEL STATEMENTS

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Comments:

- ARRIVED IN CONTROL ROOM AT ≈ 5:45 AM AND BEGAN TURNOVER WITH AL DENNY (OFF GOING STA-SEPC)
- FEW MINUTES LATER, CONTROL ROOM LIGHTS FLICKERED AND WE WENT OUT TO MAIN AREA AND FOUND NO ANNUNICATOR WINDOWS LIT AND THE PROCESS & RAD WASTE COMPUTER SCREENS BLANK - ALSO, RECORDERS WERE NOT WORKING
- IMMEDIATELY CHECKED 3D MONICORE TERMINAL AND FOUND IT DOWN ALSO
- ASSISTED IN TRYING TO FIND GOOD INDICATIONS OF RX PARAMETERS & ROD POSITIONS - COULD NOT DO SO
- OPERATORS DID ~~SEE THAT~~ THE RECIRC PUMPS HAD TRIPPED
- SSS TOLD OPERATOR TO PUT MODE SWITCH IN S/D
- DID HAVE INDICATION OF ERCS "RUBICS CUBE" ARI INITIATION
- ASSISTED AL DENNY WITH SEPC DUTIES/EVENT CLASSIFICATION
- NOTIFIED 1st C, DAVE SKINNER, T. TOMLINSON
- ASSISTED IN ANSWERING PHONES & COMMUNICATING PARAMETERS TO PSC
- NOTICED SRU TAILPIECE TEMP RECORDER - WHEN IT REGAINED POWER, PSU 133 & 125 WHERE AT HIGHER TEMPS THAN BEFORE THE SCRAM - ALL OTHER PSU'S WERE EQUAL TO OR LOWER THAN BEFORE THE SCRAM

(Use additional sheets if necessary) [signature] / 8/13/91 10:30

Signature Date Time

~~STA~~ ONCOMING STA-SEPC

Position

PLANT PERSONNEL STATEMENTS

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Comments:

At approximately ~~0650~~ 0550, I was in the hallway outside the control room when I saw the lights go out, then back on. Following this there was a loud humming sound (diesels?) and then I heard the fire panel on 306' (by elevator) alarming. I re-entered the control room and, on reaching front panels, noticed all annunciators, core display, and digital readouts were blank. (All were off). I was then sent out on various jobs as directed.

(Use additional sheets if necessary)

Thomas [signature], 0845
Signature Date Time

Aux. Opr. "B"
Position

PLANT PERSONNEL STATEMENTS

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Comments: I was riding down the control Building elevator When all lights were lost in the cab. I then responded to the Control room Where upon entering I noticed no core indication and loss of indication of most Annunciators and meters. ~~when~~ After noticing lack of indication the S.S.S instructed me to watch ~~vr~~ Reactor ~~[illegible]~~ vessel pressure and Reactor Water level. Pressure started out @ 940 # and vessel level was @ 180" Pressure level was decreasing @ a steady rate THE SSS instructed me to relay vessel level and pressure level as they either rose or dropped on the wide range meters. Level steadily decreased until we reached 154" where upon the SSS instructed the License operator to start injecting RCIC to raise level. The License attempted to raise Level w/ RCIC in Auto but had trouble in Auto so switched to manual. Level eventually started to increase and pressure started to decrease. ~~for About 10 min. we~~ and the Licensed operator then started to back off of RCIC Flow due to level increase. THE Level ended up exceeding the wide band Limits w/ the RCIC shutdown. THE SSS. then placed an E operator on the panel and thus relieved me of my duties in the control room and placed me in the plant

(Use additional sheets if necessary)

[signature] 8-13-91 / 0856
Signature Date Time

NAOC.
Position

PLANT PERSONNEL STATEMENTS

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Comments: A Responded to the Control Room after plant SCRAM. Immediately went to the relay room to investigate possible cause for the SCRAM. Noted Mn. Generator 86's tripped for both primary & backup protection. Also noted generator differential overcurrent flagged. Returned to the control Rm to inform SSS and assist in SCRAM recovery. Stationed @ PNL 603. Carried out SCRAM actions & noted IRM's downscale on range 10. Attempted to determine rod position & vessel level. Followed SSS's direction in EOP's. After pwr. was restored, monitored level while continuing to determine rod position & Rx pwr. Informed SSS of highest reading SRM "C" @ ≈ 10⁴ + CPS & spurious short period on SRM "C". Feed restored to vessel via RCIC. Noted 6 rods w/ no position indication & informed SSS. Inconsistant indications between RSCS, RWM, Full Core Display & 4 rod display. Finally able to verify all rods FULL IN on RSCS & RWM. ~~Ep~~ Informed SSS & continued to monitor vessel level on WIDE RANGE level indication until level was restored on NARROW RANGE. Investigated Div. II high O_2 concentration.

(Use additional sheets if necessary) Mark A. Bodoh 8/13/91 / 0915

Signature Date Time

NAOE

Position

PLANT PERSONNEL STATEMENTS

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Comments:

2VBB-UPS1A HAS AN INTERNAL FAULT. CB-1 (AC BKR) TRIPS AND BKR 1 IN PNL 301 TRIPS WHEN TRYING TO RESTART UPS1A.

2VBB-UPS1B - CB1 WILL NOT CLOSE

2VBB-UPS1G - BKR 1 [illegible] TRIPPED AND BKR 1 TRIPPED IN PNL 301 ON 1ST ATTEMPT. RESET BKR 1 IN PNL 301 AND CB-1 ON UPS1G. UPS1G THEN RESTARTED

2VBB-UPS1C+D RESTARTED WITH NO PROBLEMS

(Use additional sheets if necessary) Robert B[illegible] [illegible] 1045

Signature Date Time

NADE

Position

PLANT PERSONNEL STATEMENTS

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Comments:

When I went [illegible]

[illegible]

[illegible] ATTEMPTED [illegible] THE [illegible]

[illegible] PROCEDURE [illegible]

[illegible] UPS'S [illegible]

[illegible] BKRS [illegible]

(Use additional sheets if necessary) [illegible]

Signature Date Time

[illegible]

Position

MARK DAVIS

PLANT PERSONNEL STATEMENTS

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PAGE 1

Comments:

Approximately 0548 heard a big pop in back of control room from relays, All annunciators
and the computers went off line. There were a few annunciators (≈ 3 to 4) on Pnl 601, 100 box
in left center that flashed without sound. Control Room was very quiet (usual noise of fans gone)
All pnl 603 recorders were frozen at normal operating values, and many of the indicators
downscale. Others provided readings, but was difficult to assess their accuracy. Noted
feed pumps had tripped, but condensate was still running. Mike Conway pointed out RCS downshift
at the same time. Unable to determine power, so Mike Erron went to go back panel and reported
APRMs downscale. Mode switch was placed in shutdown within one minute of event start. PAMS
still operating. and as Rx level lowered, manually initiated RCIC with pushbutton. RCIC started, but
fluctuated wildly in Auto, took control in manual. Rx Level 3 shortly after RCIC initiated
(Gaitronics did not operate and was unable to notify other operators immediately after mode switch to S/D, had to
wait for them to come into Control Room) There was no indication of ~~rod [illegible]~~ position available, so EOP's
were entered into RPV + C5. SAE declared @ 0604, had Unit 1 announce SAE there, no broadcast @ Unit 2.
Dispatched operators to UPS area to check status, reported back that UPS 1 series were tripped and locked out. (See
attached) In plant phones were not all working. (some did), loss of radio leaky wire also hampered communications.
Dave Hnoczyk + Mike Garber were sent down to UPS's to join Phil McEwen + Jim Sturm. UPS power restored on maintenance
@ ≈ 0622.

SEE PAGE 2

(Use additional sheets if necessary)

E. M. Davis 8-14-91 / 0500

Signature Date Time

CSO

Position

PLANT PERSONNEL STATEMENTS

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PAGE 2

Comments:

Very early in Event (probably before 0600, called Power Control to check for unusual problems on grid.
about an hour later received call from Tom Flynn Regional Control stating that 345 Scriba/Volney
20 line" line protection A package Relay 46 PTA line 20" was tripped ... and had loss of Guard Tone. was
unsure at that point whether that had caused trip, or our trip had caused his. Report on Main Transf.
B oil "leak" came through around that time. (see attached)

Other problems - inplant operators complained about lack of procedural guidance for UPS restoration
to maintenance from deenergized condition found.

From my viewpoint as Duty CSO: (1) Communications Systems were gone until power restored. (2) Once power was back,
the SAE provided immediate assistance from Computer Dept for Computer restart (A tech that reports to Control Room
for Accountability might be considered). (3) Prime PL2TSC should be removed from CSO console telephone, people that
picked up that line at CSO ~~ph~~ desk prevented operators from answering x2168. (4) By the time the OSC was
manned, RP had already reported no radiation in RB, + TB was close to this time frame, and a "Normal"
scram recovery was in progress. Having to dispatch operators to OSC greatly hampered recovery effort. (5) I don't
remember the time, but it was quite a while after SAE announced that Regional Control called a complained that they
had heard of SAE from Rochester, (6) Very difficult time getting turbine on gear. (7) UPS loss ~~...~~ caused CWS a MCGS
(bypass valves) to open which overflowed the basin. (8) It is fortunate that this event happened just before Turnover
INSTEAD of a couple of hours earlier, 2 E's on shift is not enough to cover any major event.

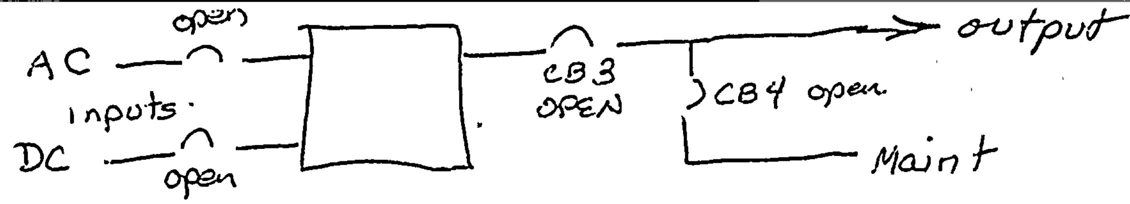
(Use additional sheets if necessary)

E. M. Dave 8-14-91 / 0550

Signature Date Time

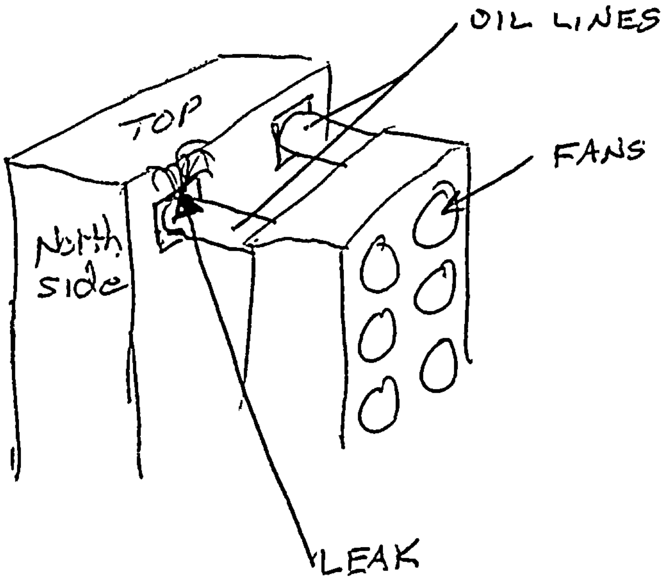
CSO

Position



PS 1's found in condition as ind. above, placed toggle sw for CB 3 to open & manually closed CB 4 (maint sply) which restored all your noise.

Mn Xfmr 1B noticed oil on wall, verified leak on Xfmr, placed fan/pump switches in off.



From Mike Garbus

548 Event start

Manually RCIC

0600 SAE Rx Scram + ~~loff of over~~ loss of ann.

0612 Level 8

0613 shutdown booster pump. CNM

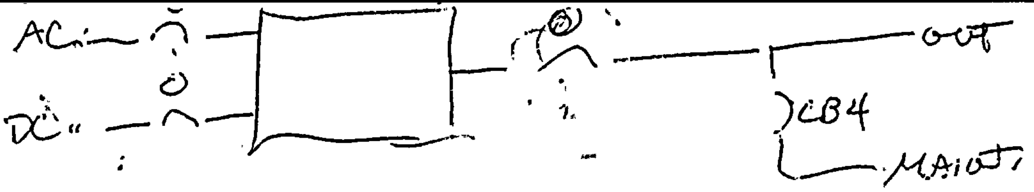
0627 UPS pwr. ~~[illegible]~~ Restored manually closed ~~down~~ CB4 [illegible]

RPS jumpers installed

0653 Scram Reset.

0655 RP no abnormal conditions ~~cond RB~~ in RB.

Tom Flynn
Regional Ctr 345 switchyard 20 line line prot. A package Relay 46PT
line 20 tripped. Loss of Guard tone.



Main Xfmr 1B fan switches in off

0700 - STARTED HPU B SUBLOOP A,

0722 Secured mn. stm to Clean stm. reboiler

ABS-~~A~~OV145 wouldn't open reestablished Mn stm

0728 ACU4A in service

0729 Start 2ARC P1A

0730 " " P1B

0732 RCS V145 open

0738 Started 2CN~~M~~ P1B

Conway relieved ~~B~~ by McCormick SED

0740 RCIC shutdown to stby.

0742 2ARC-V36 Remote oper broke, preventing closing

[illegible]6 Established Aux Blr stm to Reboilers AOV145 pinned open

0750 SPDS rtn to service

0755 Reopening RCS FCVs low speed pumps

0758 Off Gas secured in accord w/OP42

0804 EOF STAFFED

0805 Stack Gems inop

0806 RCS FCV'S AT 100% OPEN.

0820 Mode sw. locked in S/D

0821 ADS inhibit sw rtn to norm.

RPS jumpers removed.

0831 RP completed T.B. surveys OK for norm. access.

0847 Stack Gems operable

0850 RHR C in stby.

0853 RMS operating properly & Data Bases Verified

0907 UPS 1C on normal power supply

0915 UPS1D on norm sply

~~0922~~

0936 UPS 1B output bkr will not close (CB-3) still on maint sply.

0937 RCIC outbd check valve (40V156) has packing leak. 40V126 de-energized closed.

J Heller Notes

0627 entered CR — STA M. Evron

Manual scram — SSS M Connor

560# press

ind all Rods in except 1

SAE loss of all ind / plant transient

0556 L3 entered EOPs

0622 Ann. Power back

lost all plant indication except those powered off emergency UPS 2A/B

Pam recorders

CRD in.

0630 No ind 6 rods

DW parameters stable

0632 580 pr. lelow 170

Goals

→ restore FWS/Cond booster restore/stabilize level

→ control of press

1. Steam drains

0635 6 rods still not indicated

update by SSS

0640 EOP-6 Att. 1 complete except for 6 rods

0641 EOP-6 – Att. 14 still in progress

0641 Update plant status to offsite.

0642 2CNM-P2A S/U — no computer still avail

0643 direction to FX/Mantauch level 165-180" RPV level to Gerbevil using cond booster

Hogger S/U in progress

S Helker Notes

②

0644 Reynolds - bypass valves to enable booster eject
500-600

-note RHS-P1B all racked up for preplanned maintenance
Manual close DC supply breaker on UPS 1s to restore operator

0650
-0655 Talked w/ McCormick
0700 All rods ind in
0702 Updated TSC Raydean
0703 139" ↑ slowly Budeby

[Main Transformer B cooler leak - significant
Garbus

0705 update by Conway (still emerg director
RPV level Jim Greff Booster
Press RJ Bypass Valves
Higgens I/P
Steam Cond I/P
1 rod still not indicating full in. 14-31

0706 TB cam alarming.
Persons pulling from TB, Rad Prot survey teams on way

0708

0713 displays on digitals restored
0714 War room manned

JHERKER
Notes

0713

0714 150" stable

0715 ann. of carding in

0718 Dave Wilson - Security request to either send people to Volney

0718 158"

0721 Marty

0728 Marty T/O to M.C.

0730 S/U 2nd condensate pump C. Gerbevich

0742 Ray Dean to pursue booting RW computer

0746 Comm Aid.

0749 Update
Hoppers on
Aux Bl - => Reboiler

Jerry Herker

Big Picture

~~☐~~ Aux Blr on Reboiler
☐ Hoggers on
~~☐~~ C/O w/ bypass valves I/P
~~☐~~ Feed w/ Cond Booster I/P

Recover from SAE

~~☐~~ Restore RHS-B to operable ⟹ SDC
☐ RHR-B - in SDC
☐ SDC-A operable (MOV40A PMT) w/in 1hr 128#
☐ Get HPCS Markups ready
☑ HPCS outage schedule · Roy Crean
~~☐~~ Restore ADS
☐ Restore RHS-C
~~☐~~ Restore Scram signals
☐ WCS Back

0828 RPS interlocks and ADS interlocks restored.

0935 MJC called

1058 S/U WCS. PIB

Aflows isolated

ESF then pump trip off

is TSE going to do NRC notification

1540 Marty requests an operator to go to the ~~IES~~ OSC to meet Joe Ryan & RP to assist in RWCU piping walkdown

1615 NOTIFIED BY CHEM ENTERED ACTION LEVEL 2 OF NDD-CHE ~~E~~ BASED ON SULFATE OF 112 ppb vs 10
CONDUCTIV 1.01 LIMIT 1.
REQ'D ACTION COLD S/D in 24 HRS.

→ I told ECI to go ahead with C8001
it will take < 4-5 minutes more than slow closing.

est

CS001	slow close
9 min	6 min

J Heckert
Notes

12-11

1851 Walt Adams

talked w/ Harold Light of Main Transformer B

WR generated.

Need to procure tanker trucks to ~~pum~~ pump out oil.

Lamay/Doty pursuing —

results of ~~insp~~ inspection / oil sample oil no good,

possibly catastrophic failure of transformer internals

☐ CND isolation is open working with manual valve to close and put on CND's as necessary.

* CST/MUB levels
* D.W. Pressure

1414 loud humming noise from Cafeteria Xformer

1420 N2-ISP-NMS-M@008 shows uncharacteristically high, declared SRM C inop (A already inop). Enter T.S. 3.3.7.6 action C. (for testing), verify mode switch locked in S/D and all rods in.

1437 ~~[illegible]~~ Maint. leaving Scriba Swyd.

1440 W675 Complete - SAT

1505 RWCU; 3ED inquisitive ⇒ NO

1538 Main Turbine on Turning Gear
Need to do inspection of turbine prior to S/
1539 Report that Engineering walk down of RHS ⇒ nothing wrong found, OK.

1543 APRM D UPSC trips ⇒ noted drifting ↑ at back ⇒ bypassed APRM D and reset 1/2 ~~[illegible]~~ RPS trip Div II

1601 Report mov47's cannot be closed by procedure (in current 4/a), will have to figure out later. (84's got shut for Booster pump S/U)

1609 PTP N2-PM-@07 to bypass LPRM's 16-25D and 16-41B for APRM D.

1615 Notified by chem of entering action level 2 of NDD-CHE based on sulfates of 112 ppb vice 100 limit and conductivity of 1.02 umho/cm vice 1.0 limit.
Action req'd is to be in S/D w/in 24 hrs.

P/C 2204 ⇒ put on decks.

1621 Informed by Chem. that ABM B sampled unable to sample A (clogged)

1633 Directed Hold-out to be placed on 2RCS-V145 (Open) for Continuous Conductivity monitoring (RWCU isolated)

1643 SCM C passed NMS-M@008. Considered operable,

1651 CAL on the way

1918 Ryan/Halusic ⇒ Scrubber insp. on WCS system. (issued X-1-7)

SORC to terminate w/ Special Precautions to limit Scriba Swgd access.
Compromise independent off-site sources

Call

For Transformer info call Steve Doty
on Hear-Here

Main
Transformer B :

- Both Pressure Devices (Yellow Flags) ~~activated~~.

- Temperature Gage pegged (High Indicator) @ 180°C.
(Meter face Blown off)

- Oil leak at inlet to A Fan Bank continues to pour oil on ground (0745).

~~Info~~ from Bernie Coe
via Dave ~~Rathborn~~

Person involved 8/13

- ☑ Mike Conway SSS on duty
- ☑ Mike Eron ASSS on duty
- ☑ Al Danny SEPC on Mids
- ☐ Tom Tuttle SEPC on days
- ☑ Mark Davis CSO on Mids
- ☑ Mark Bodoh NAOE on Mids - worked at P603
- ☑ Brian Hilliker NAOE (relief shift) ran RCIC.
- ☑ Dave Hancyek NAOE on Mids - went down to UPSs
- ☑ Jim Stevens NAOC on Mids - went down to UPSs
- ☐ Aaron Armstrong NAOC on Mids - went down to UPSs
- ☑ Phil MacEwen NAOC on Days - went down to UPSs
- ☐ Mike Garbus CSO (relief shift) - went down to UPSs
- ☑ Bob Spooner CSO (extra shift) - went down to UPSs
- ☐ Dave Rathbun CSO (days) - worked on P603 using EOP6 Att 14.
- ☐ Eric Hoffman NAOC - monitored level & press on PAMs
- ☑ Don Bosnic ASSS (Days) - acted as phone talker & log keeper
- ☐ Jerry Helker Gen Supv Ops - control room advisor during event
- ☐ Kelly AOB verified local RPV level & press readings.
- ☐ Nichols AOB - went down to UPS w/ Hancyek
- ☐ Bob Bergenstock NAOE - went down to UPSs later in AM on DC team
- ☐ Brian Moore NAOE - Shutdown Cooling
- ☐ RJ Reynold NAOE control press w/ bypass valves
- ☐ J. Graff NAOE - RPV water control w/ Booster Pumps LV137
- ☐ Gorberich NAOE - S/U booster pumps
- ☐ Emery NAOE - S/U RWCU, steam seals, DW Cooling
- ☐ Lawrence NAOE - Turbine on jack
- ☐ Delong NAOC - monitored cooldown rate (N2-OSP-RCS-@001)
- ☐ J. Burr CSO - clean paperwork ~~on~~/Markups on RHS-B/K
- ☐ C. Smith NAOE - SDC
- ☐ D. Brockwell NAOC - Aux Boilers
- ☐ Dave Wilson Gen Eng - Reviewed TS / Admin
- ☐ Al DeGracia GenSup OpsSupp. Reviewed TS/Admin
- ☐

TONY:

PAT CARROLL, SECURITY CALLED WITH THE FOLLOWING.

- 8/13 @ ~ 0600 TWO SECURITY GUARDS (ROOT, OYXNER) WERE WALKING BY SWITCHYARD. HEARD "BANG" ASSUMED THAT THE PLANT SCRAMMED & OUTPUT BREAKERS WERE OPENING.
- IMMED. ATTEMPTED TO CONTACT THE SECURITY BASE VIA RADIO - RADIOS WOULD NOT FUNCTION.
- WENT DIRECTLY TO U2 SECURITY BUILDING & TOLD ON SHIFT SUPERVISOR - (CANALE)
- CANALE ATTEMPTED TO CALL U2 CONTROL ROOM BUT LINES WERE BUSY.
- CANALE THEN CALLED SITE SECURITY SUPERVISOR WHO THEN MADE CONTACT WITH U2 CONTROL ROOM @ APROX. 0608 HRS.

MONTE. 8/20

LOGIC CHECK SHEET

LOGIC APPROACH

Using information available from process computer, trend recorder and GETARS, SPDS, and Event Historical Recording, check that the below listed actions occurred.

Reactor Water Level

Trip Setpoint	Allowable	Action	Verification (Y/N or NA)	Explanation If No
L8 202.3	203.8	Turbine Trip	NO	DUE TO GENERATOR LOS (Already tripped)
		Feed Pump Trip	NA	
		HPCS Inj. Valve Closed	NA	
		RCIC Turbine S/D MOV 120 Steam Admiss + MOV 128	NA	
L7 187.3		Hi Water Level Alarm	NO	NO POWER TO ANNUNC
L4 178.3		Low Level Alarm	NO	NO POWER TO ANNUNCI
		FCV Runback with loss of 2 of 3 Feed Pumps	YES	
L3 159.3	157.8	Scram	*	
		Set Point Set Down	NO	LOST POWER TO FEEDWATR CONTROL SYSTEM.
		ADS Confirm L3	*	
		Gp5 Shutdown Cooling Isolation MOV 40 A/B, 67 A/B, 104, 112, 113	YES	TCN-(
		Gp4 MOV 142, 149 SOV 35 A/B, 36 A/B	YES	
		Recirc Pump Downshift to LFMG	*	DUE TO EITHER LOS OR EOC RPT.
L2 108.8	101.8	Control Bldg. Special Vent	NA	
		SBGTS Auto Start	NA	
		Normal Rx. Bldg. Supply & Exhaust Trip	NA	
		Rx. Bldg. Recirc. Fan Starts	NA	
		HPCS Starts; HPCS MOV 107 Reopens	NA	
		Div III D.G.	NA	
		Recirc Pump Trip	NA	
		ARI Initiation	NA	
		RCIC Initiation	NA	
		Prim. Cont. Isolation (except MSIVs @ L1 & SDC @ L3) (refer to T.S. for groups and valves)	NA	
		Post Accid. Monitoring to Fast 1"/Hr → 1"/Min	NA	
L1 17.8	10.8	Div I, II DG Start	NA	
		LPCI, LPCS	NA	
		MSIV Closure	NA	
		ADS Initiation	NA	

* NOT ABLE TO DETERMINE DUE TO POWER FAILURE

LOGIC CHECK SHEET

Reactor Pressure

Trip Setpoint	Allowable	Action	Verification (Y/N or NA)	Explanation If No
1205 #	± 1%	4 Safety Relief Valve Lift in Safety Mode (PSV 137,127,134,129)	NA	
1195 #	± 1%	4 Safety Relief Valve Lift in Safety Mode (PSV 126,135,121,130)	NA	
1185 #	± 1%	4 Safety Relief Valve Lift in Safety Mode (PSV 122,132,120,125)	NA	
1175 #	± 1%	4 Safety Relief Valve Lift in Safety Mode (PSV 123,136,131,124)	NA	
1148 #	± 1%	2 Safety Relief Valve Lift in Safety Mode (PSV 128,133)	NA	
1116 #		4 Safety Relief Valve Lift in Relief Mode	NA	
1106 #		4 Safety Relief Valve Lift in Relief Mode	NA	
1096 #		4 Safety Relief Valve Lift in Relief Mode	NA	
1086 #		4 Safety Relief Valve Lift in Relief Mode	NA	
1076 #		2 Safety Relief Valve Lift in Relief Mode	YES	
1050 #		Recirc Pumps downshift to LFMG	*	
		1050 # and 25 sec TD and power greater than 4%, recirc trips to zero and FW control valves close		
1037 #	1057 #	Rx Scram	*	
766 #	746 #	MSIV closure when MSS in run	NA	
128 #	148 #	SDC mode of RHR isolates MOV 40 A/B, 67 A/B and 104, 112, 113	NA	
75 #	70 #	RCIC isolation ICS MOV 121, 128, 170 RCIC Vac. Bkr. isolation (MOV 148) coincident with Hi DW Press.	NA	

* NOT AVAILABLE DUE TO POWER FAILURE

Core Power (Neutron Monitoring)

Trip Setpoint	Allowable	Action	Verification (Y/N or NA)	Explanation If No
118%	120%	Fixed Neutron Flux Upscale Scram	*	
.66W + 51% with max of 113.5%	.66W + 54% with max of 115.5%	Flow Biased Upscale Scram	No	No evidence of flow biase scram.
15%	20%	APRM Setdown Scram in Startup	NA	
120/125%	122/125	IRM Scram	NA	
2 x 10^5		Scram on SRM with shorting links removed	NA	

Drywell Pressure

Trip Setpoint	Allowable	Action	Verification (Y/N or NA)	Explanation If No
1.68 #	1.88 #	Rx Scram Group 3,4,8,9 isolation Group 11 with low RCIC Steam Pressure of 75# Initiates SBGTS Trips Rx Bldg. Ventilation Start Div. I, II, III Diesel Generator Actuate Div. I RHSA and LPCS systems Actuate Div. II RHR B & C Systems Actuate Div. III (HPCS) System	NA	
1.5 #		Hi DW Press. Alarm Ct Purge FCV 125 closes if open		

Condenser Vacuum

Trip Setpoint	Allowable	Action	Verification (Y/N or NA)	Explanation If No
25" Hg		Alarm	NA	
22.1" Hg		Turbine Trip	NA	
8.5"Hg	7.6"Hg	MSIV Closure MSL Drains Closed	NA	

LOGIC CHECK SHEET

Turbine

Trip Setpoint	Allowable	Action	Verification (Y/N or NA)	Explanation If No
8 psig		Turbine Trip (TT) on Thrust Brg Wear	NA	
1100 psig		TT on Low EHC Fluid	NA	
225°F		TT on High Exhaust Hood Temp. TT on Moisture Sep. Level with time delay	NA	
105 psig		TT on low lube oil pressure from shaft pump when > 1300 RPM.	NA	
No Speed Feedback		TT	NA	
10 mils		TT with 15 min. Time Relay	NA	
12 mils		TT immediately	NA	
22.1" Hg Vac		TT	NA	
110% Speed		TT on mech. overspeed	NA	
112% Speed		TT on elec. overspeed	NA	
202.3"		TT on Rx. Water Hi Level	NA	
800 psig		TT on low ETS oil pressure	NA	
8 psig		TT on low bearing oil pressure	NA	
Elec. Fault		TT on various elect. faults	YES	DUE TO GENER Protection
Runback failure on loss of stator water cooling		TT if armature current is > 24551 amps after 2 minutes time delay or < 7006 amps after 3.5 minutes.	NA	
RCIC Initiation		TT	NA	
13 psig		Turbine runback on low pressure stator water	NA	
180°F		Turbine runback on high stator water temp.	NA	
15% mismatch		Turbine runback if cooling flow is 15% less than req'd flow based on generator load.	NA	

LOGIC CHECK SHEET

Turbine (Cont'd)

Trip Setpoint	Allowable	Action	Verification (Y/N or NA)	Explanation If No
190 psig		Turning gear oil pump starts on low oil pressure	YES	
180 psig		Emerg. Brg. oil pump starts	NO	IN PULL TO LOCK
15 psig		Turning gear oil pump starts on low bearing oil pressure	NO	CANNOT CONFIRM DUE TO POWER LO.
10 psig		Em. Brg oil press starts on low bearing oil press. Motor suction oil pump auto start on low brg oil pressure.	NO	IN PULL TO LOCK

Reactor Protection System (RPS) - not previously covered

TCN

Trip Setpoint	Allowable	Action	Verification (Y/N or NA)	Explanation If No
8% closed	12%	MSIV Closure Scram	NA	
3% NFPB	3.6%	Main Steam Line Hi Rad Scram.	NA	
46.5"	79.5"	Scram Dump Volume High Level Scram Transmitter	*	
46.5"	79.5"	Scram Dump Volume High Level Float Switch	* ~~NA~~	
5%	7%	TSV Closure Scram	YES	
530 psig	465 psig	TCV Fast Closure Scram on TCV Low Oil Pressure	YES	

* UNABLE TO DETERMINE DUE TO POWER FAILURE.

EVALUATION CHECK SHEET

SAFETY LIMITS

- Did Reactor Pressure exceed 1325 psig while in operating cond. 1, 2, 3, or 4? ____ Yes __X__ No
- Did Reactor Water Level drop below top of irradiated fuel (-14.4" on fuel zone instrument) while in operating cond. 3, 4, or 5? ____ Yes __X__ No
- Did thermal power exceed 25% of rated thermal power with reactor vessel steam dome pressure < 785 psig or core flow < 10% of rated flow (10.85 MLB/hr) while in operating cond. 1 or 2? ____ Yes __X__ No
- Did the minimum critical power ratio drop to < 1.06 while the reactor vessel steam dome pressure was > 785 psig and core flow greater than 10% of rated flow (10.85 MLB/hr) while in operating cond. 1 or 2? ____ Yes __X__ No
- If any of the above questions were answered yes, immediately notify the SSS for action.

________________ SSS Notified ________ Time / Date

- If any of the above were answered yes, then explain:

TRANSIENT

- Did the transient response of systems perform as expected according to Technical Specification, FSAR, Reload Licensing Analysis and Post Scram? __X__ Yes ____ No

  If no, explain:

- If any relief/safety valves did lift, did they lift and reseat at correct setpoints? __X__ Yes ____ No

SEE SRV ATTACHED CHART

EVALUATION CHECK SHEET

COOLDOWN

- Was a maximum water cooldown of 100°F in any hour exceeded? (ref. T.S. 3.4.6.1) ____ Yes __X__ No

  If yes, advise the SSS of the action statement in T.S. 3.4.6.1.

  ________________ SSS Notified ____ Time / ____ Date

  If yes, also notify Syracuse Engineering to perform an engineering evaluation to determine the effects of the out-of-limit condition on the structural integrity of the reactor coolant system.

  ____________ Initial ____________ Date

SCRAM DISCHARGE VOLUME

- Did the scram discharge volume drain and vent valves close within 30 seconds? (Not applicable until Modification 87-092 is installed) __*__ Yes ____ No
- Did the valves open upon scram reset? __X__ Yes ____ No

SUPPORTS/SNUBBERS

- Were there any supports or snubbers that failed inspection as a result of inspections per T.S. 4.7.5.d ____ Yes __*__ No

  If yes, explain:

  SEE ATTACHED ENGINEERING RWCU AND RHR LETTERS

* UNAVAILABLE DUE TO POWER LOSS.

FINAL ASSESSMENT SHEET

FINAL ASSESSMENT

- Attach scram summary write-up with recommendations. RBL Initials

- Did Plant Systems Function as designed? ____ Yes X No

- If Plant Systems did not function as designed, what was the abnormality and why?

  LOSS OF UPS'S

  ROOT CAUSE UNDER INVESTIGATION

- Is there a condition not understood? X Yes ____ No

NOTE: If there is a condition not understood, the Station Superintendent should be so notified and appropriate staff members called in to assist in evaluation.

If after further evaluation the scram is still not understood, SORC must review this report before authorization to restart.

If yes, explain conditions of concern.

- If after further evaluation the scram is still not understood, SORC must review this report before authorization to restart.

  Will SORC need to review this before restart? X Yes ____ No

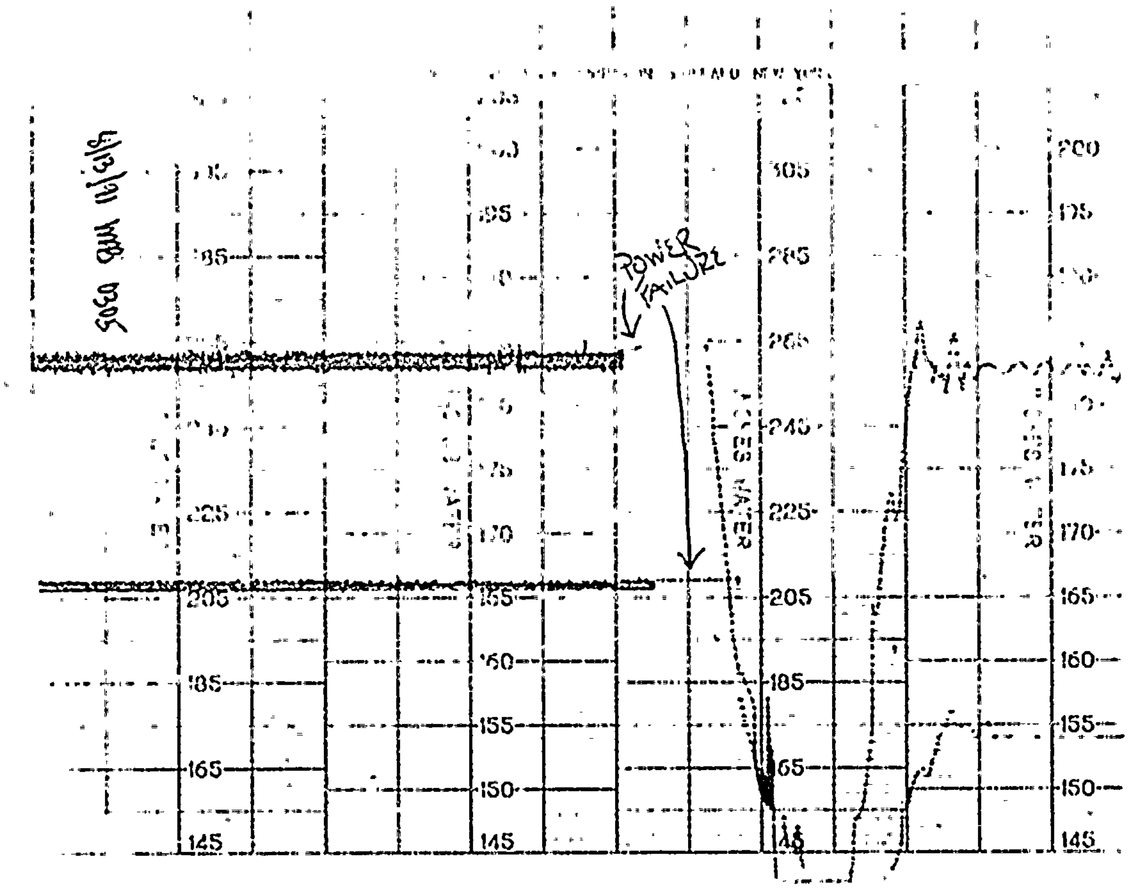
PROCEDURE CLOSEOUT SHEET

PROCEDURE CLOSEOUT

- Evaluation areas of this procedure completed satisfactorily.

[signature] 8/30/91 / 1645
Rx. Analyst or Alternate — Date /Time

- SSS notified of completion. — [initials] Initials
- Forward Copies of this procedure to: Reactor Analyst Scram File, and Operations Superintendent. — [initials] Initials
- Record Scram information in the Scram History file and update Scram Timing History if applicable. — NA Initials
- Forward original of this procedure to the SORC Secretary. — [initials] Initials



RED => NARROW

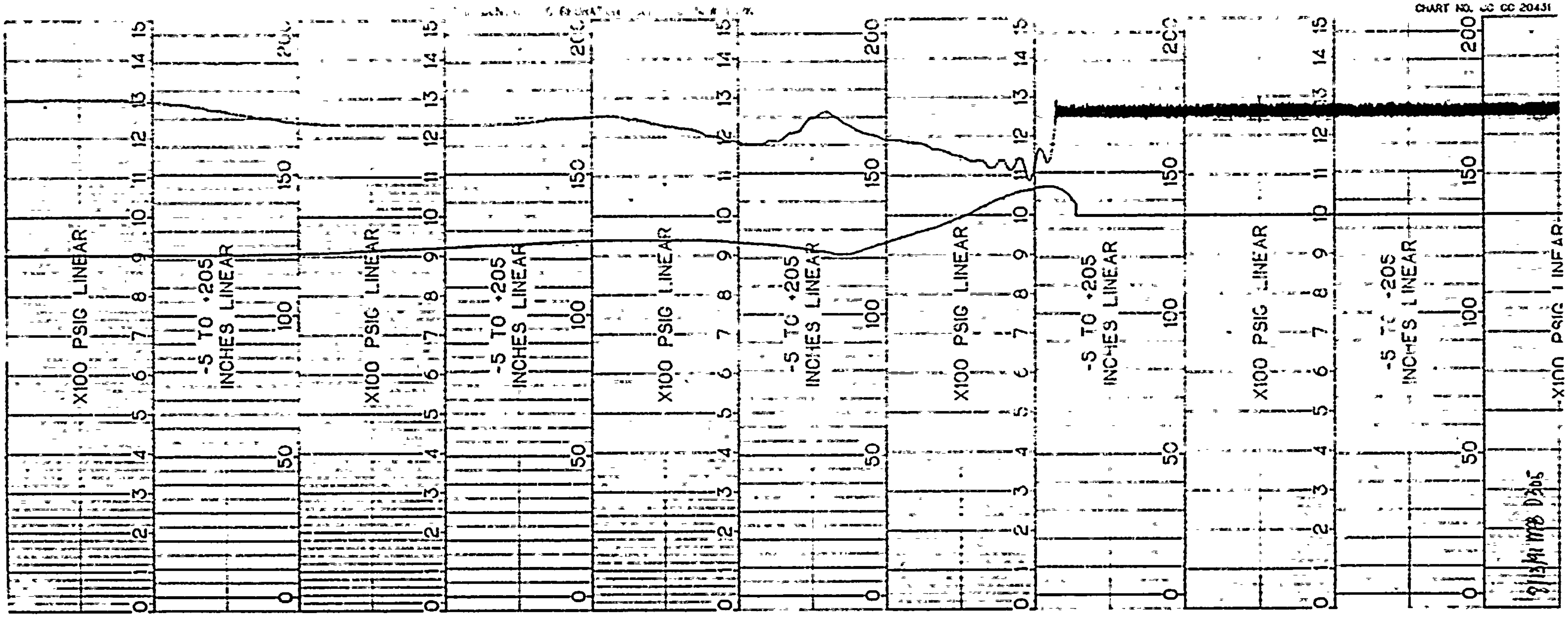
BLUE => UPSET

REACTOR WATER LEVEL (RED + BLUE)

RCR C33-R608

N2-RAP-6

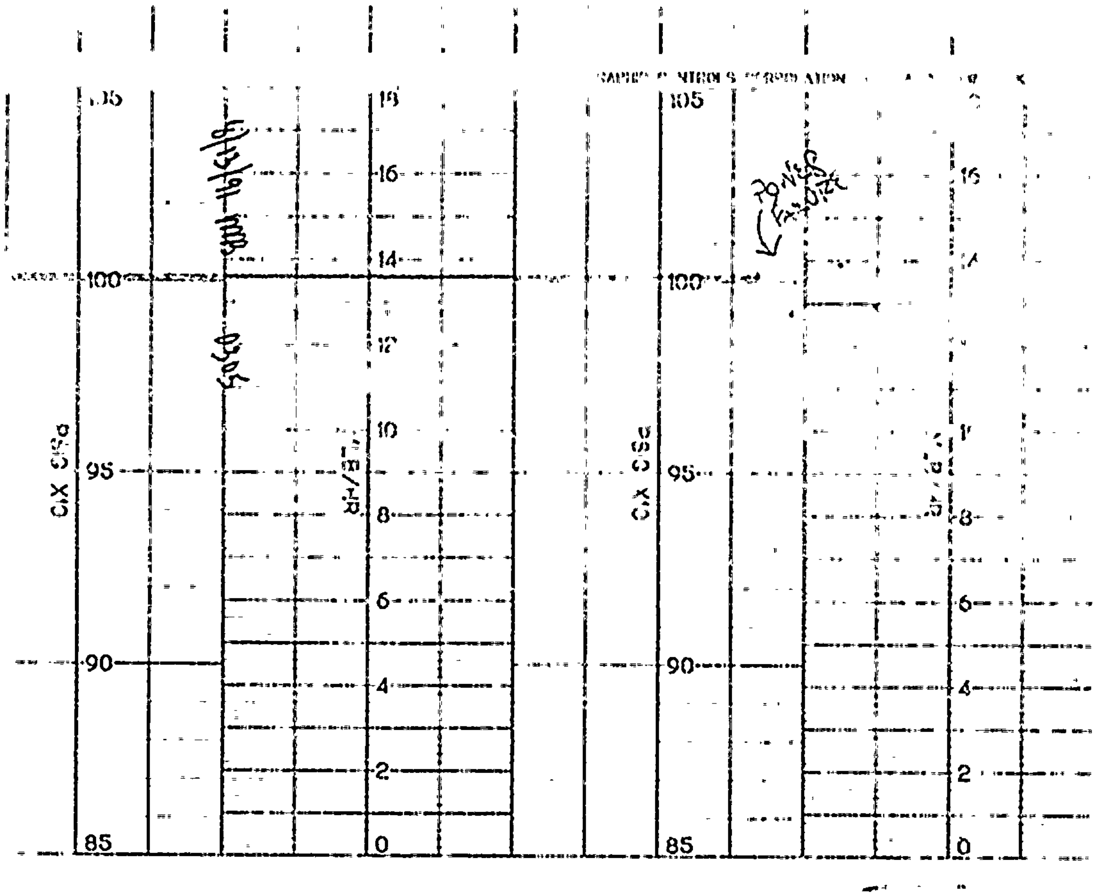
← CHART



REACTOR PRESSURE (RED) & REACTOR WATER LEVEL (BLUE)

PAM RCR B22-R623A

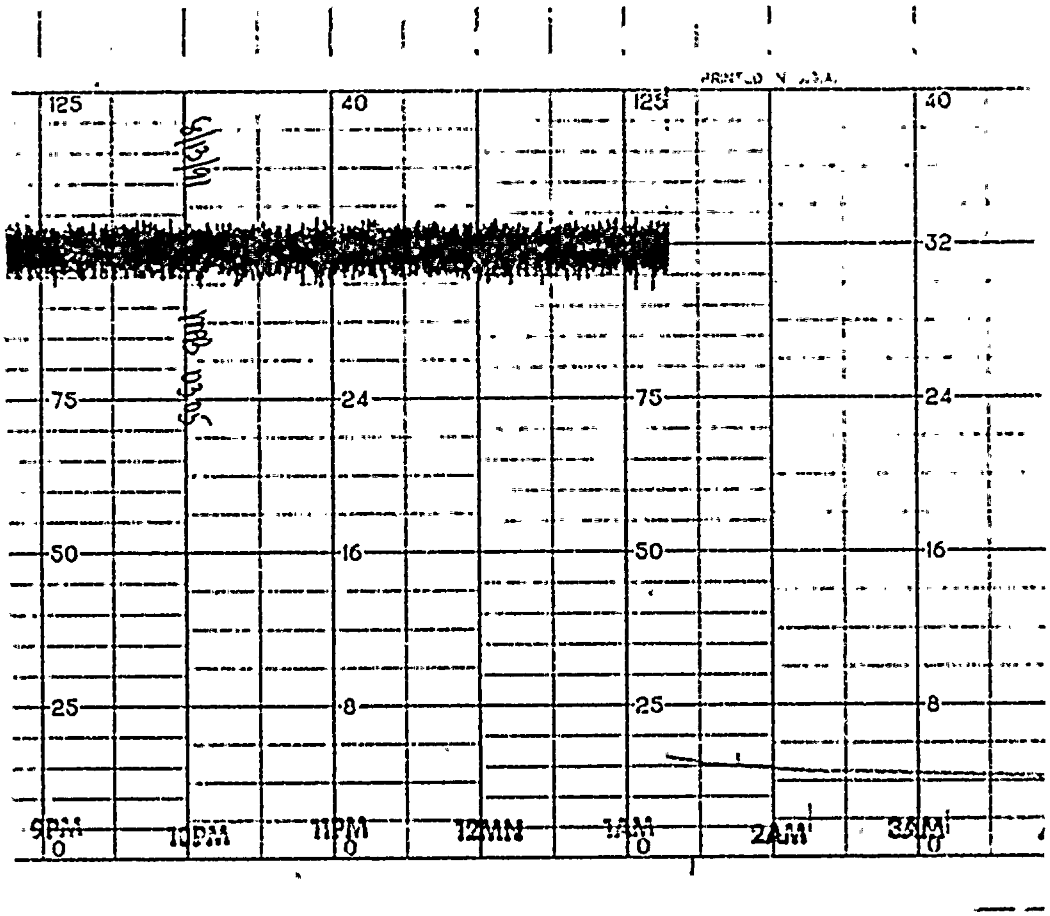
N2-RAP-6



RED => RX PRESS

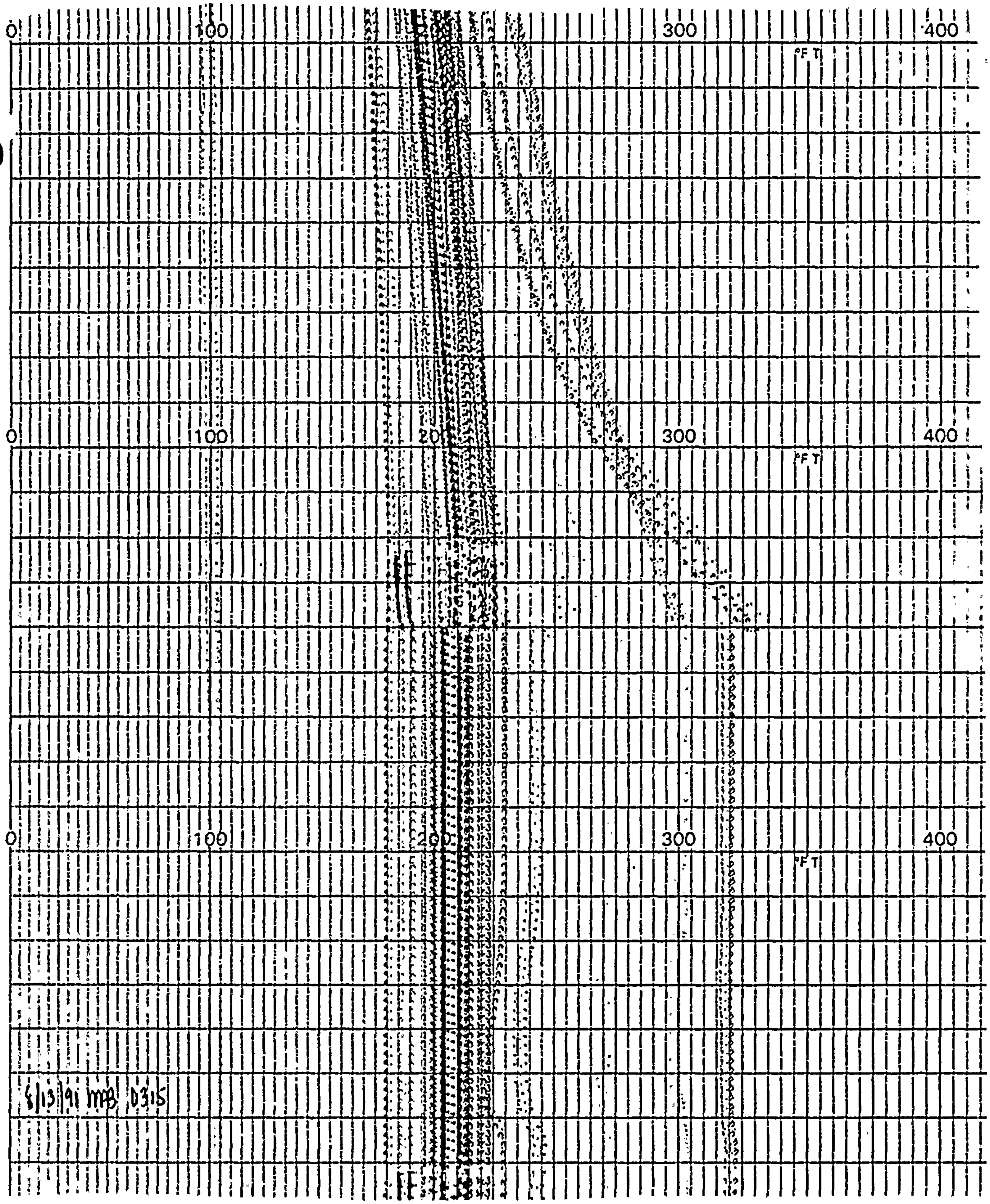
REACTOR PRESSURE (RED)
RCR C33-R609

N2-RAP-6



APRM CHANNEL 'E'
RCR C51-R603C

N2-RAP-6

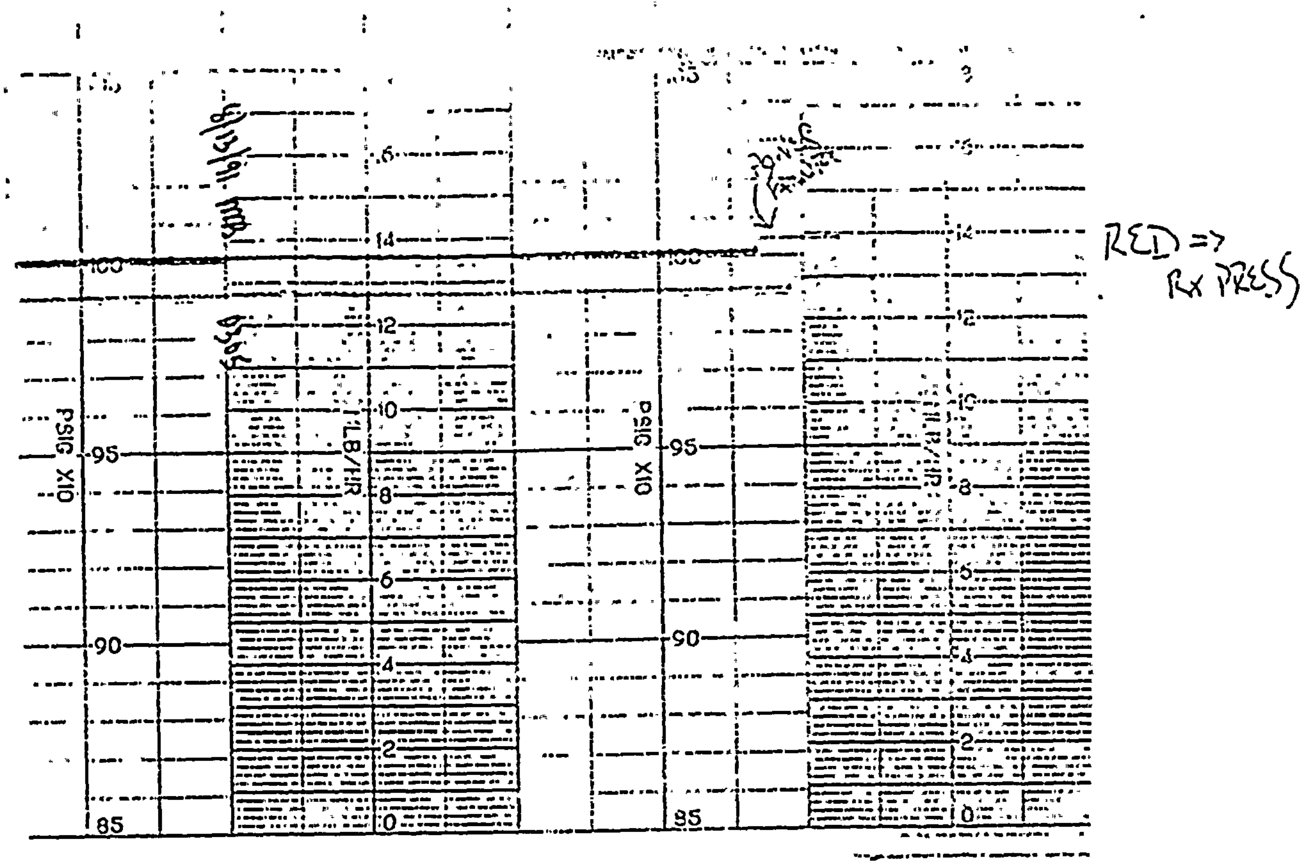


STEAM RELIEF VALVES

TRACE 8 => PSV 133
TRACE 9 => PSV 128
> SET POINT 1076 PSIG

N2-RAP-4

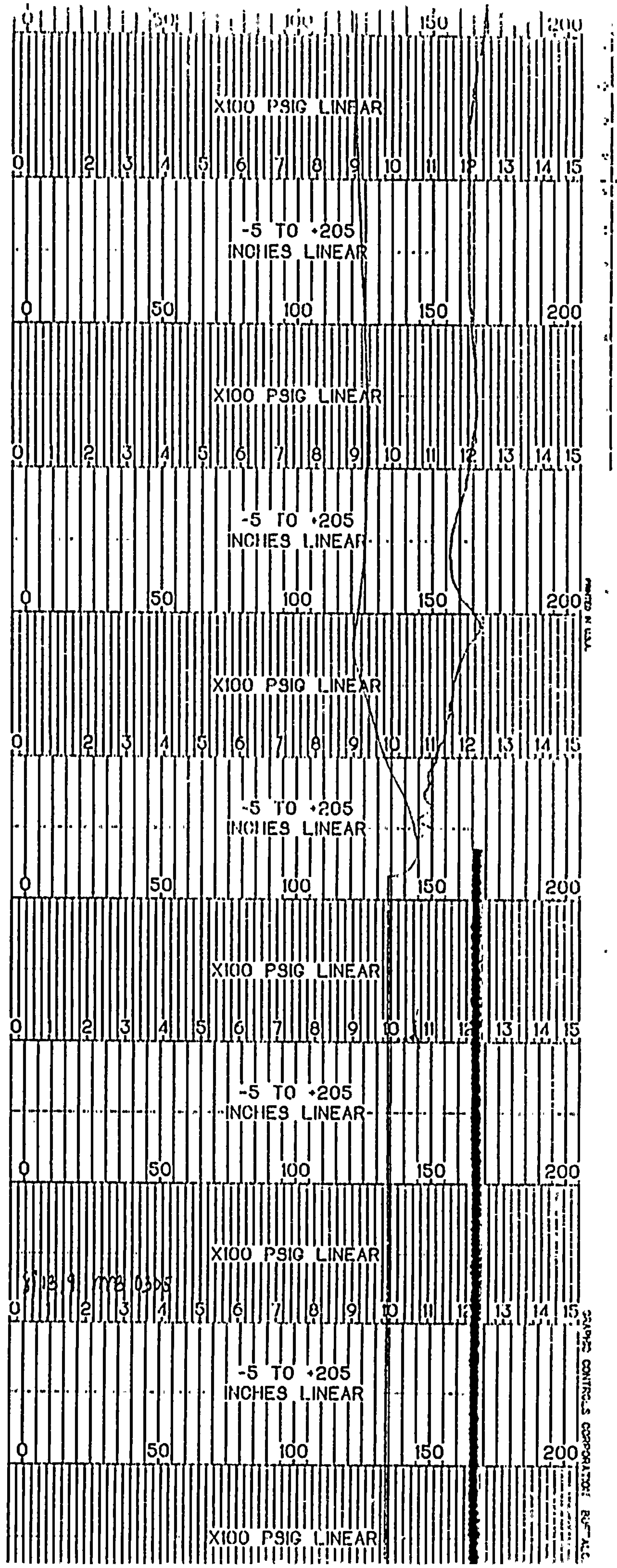
CHART SPEED: (S) 1 inch per Hour
(F) 1 inch per Minute

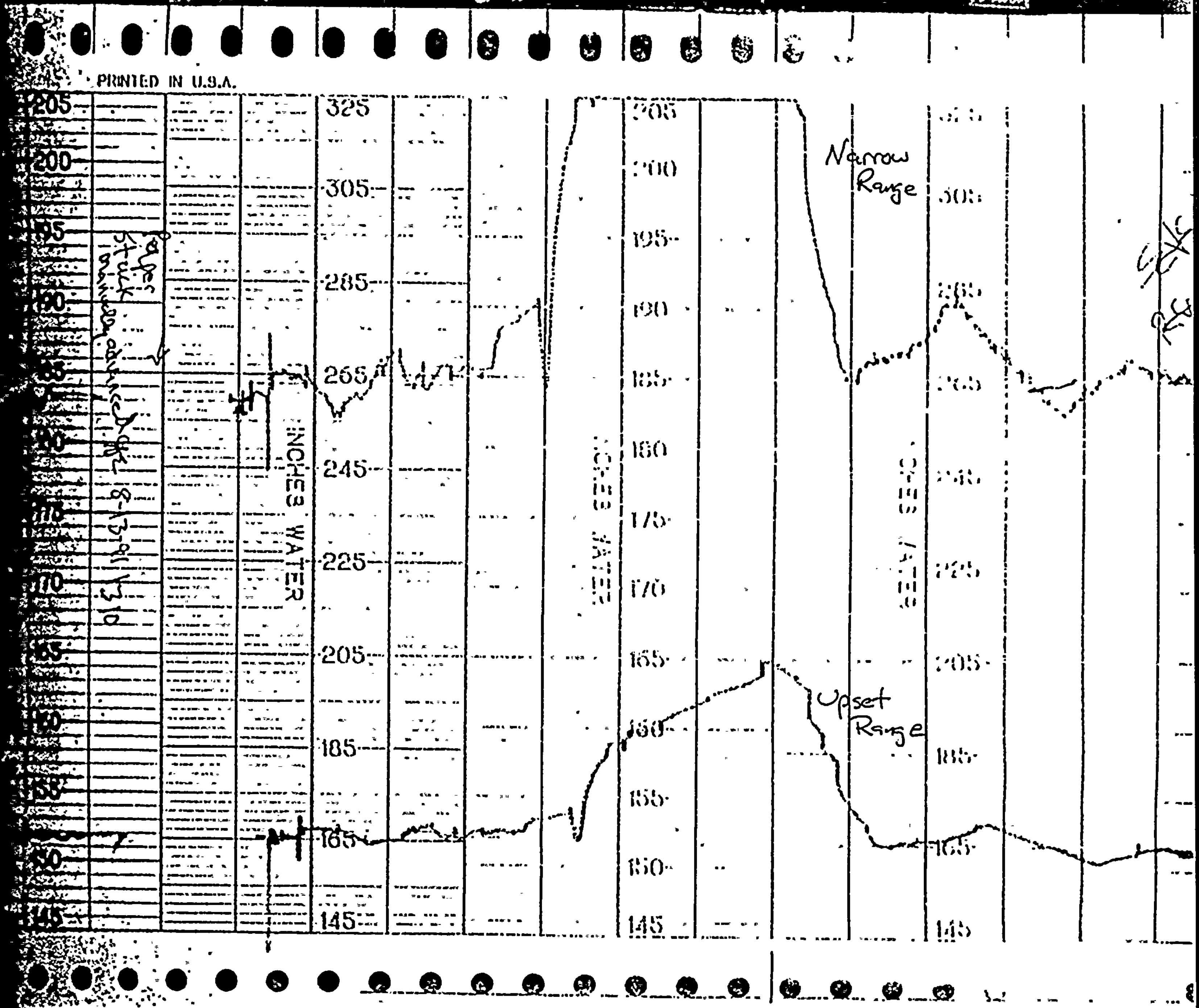


REACTOR PRESSURE (RED)
RCR C33-R609

N2-RAP-6

Div 2 PAM recorder




PRINTED IN U.S.A.
INCHES WATER
325
305
285
265
245
225
205
185
165
145
Narrow Range
Upset Range
Paper Stuck manually advanced 8-13-91 1310

CSO LOG PLANT STATUS CHECKLIST

~~MODE SW POS.~~	RUN	~~SUPPPOOL LVL (FT)~~	200.17
~~Rx POWER %.~~	100	~~SUPPPOOL AVG TEMP~~	77
~~Rx PRESS.~~	1004	~~Rx BLDG ΔP (H_2O)~~	-.65
~~Rx Temp °F.~~	530	~~CST LEVEL (FT)~~	39.3
~~Rx LVL (INCHES)~~	183.1	[illegible]	72.9
~~MW THERMAL~~	3323	~~CWS FLUME TEMP~~	87.5
~~MW ELECT.~~	1122	~~DER LEAK RATE GPM~~	2.10
~~Rx ROD LINE~~	101.162	~~DFR LEAK RATE GPM~~	.67

A Shift on

2349 CCP Feed and bleed stopped

2353 P-T-P N2-OSP-LOG-W001

0010 P-T-P N2-OSP-LOG-W@001

0027 When the annunciator test was preformed at Div I Diesel Control Panel (local) computer point EGPUC11 – EDG1 OVERSPEED TRIP – alarmed and would not clear. No annunciators remained alarmed, and an inspection of the overspeed trip switches indicated no problems. Verified that there is no impact on Diesel operability, computer pt is bad. WR

0109 House loads have been shifted to the Normal Station Service Transformer

0144 N2-OSP-LOG-W@001 complete

0202 RHS*P1A started for Sup. Chamber spray

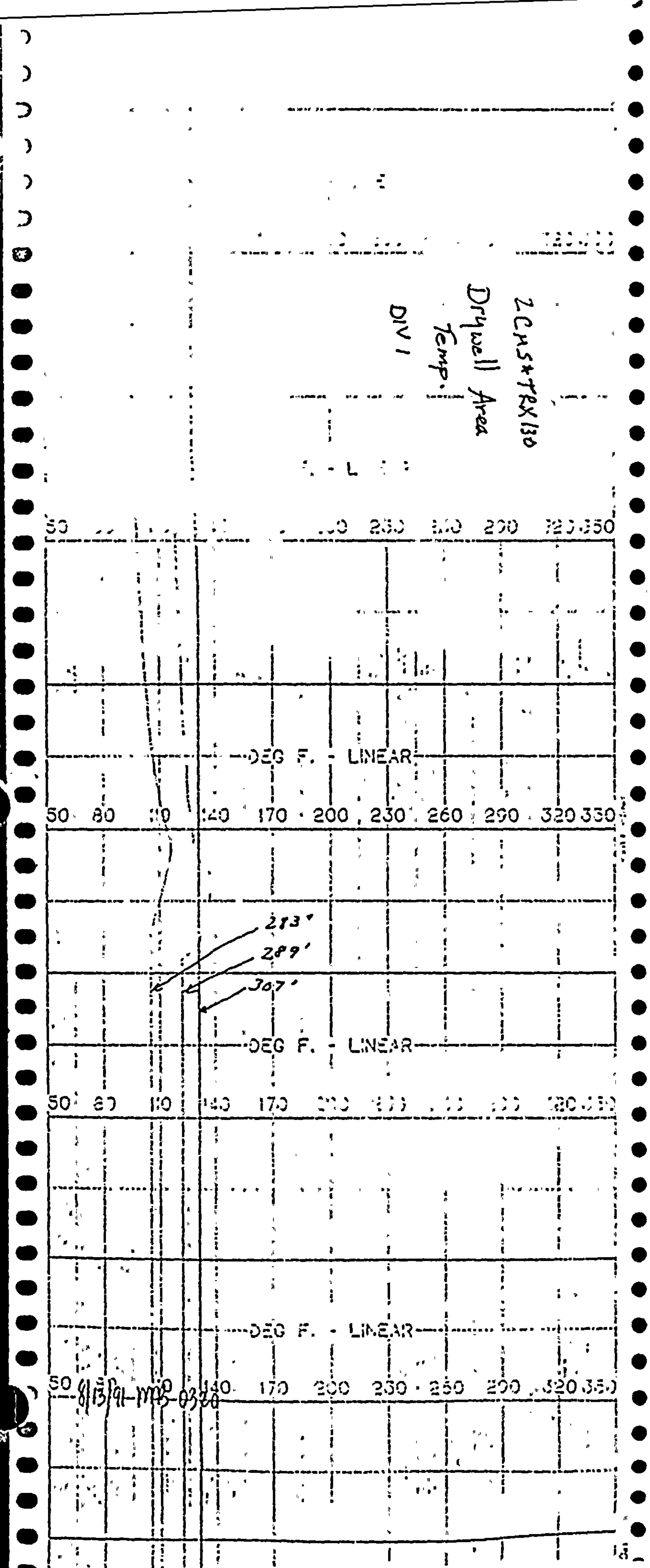
0244 RHS*P1A stopped

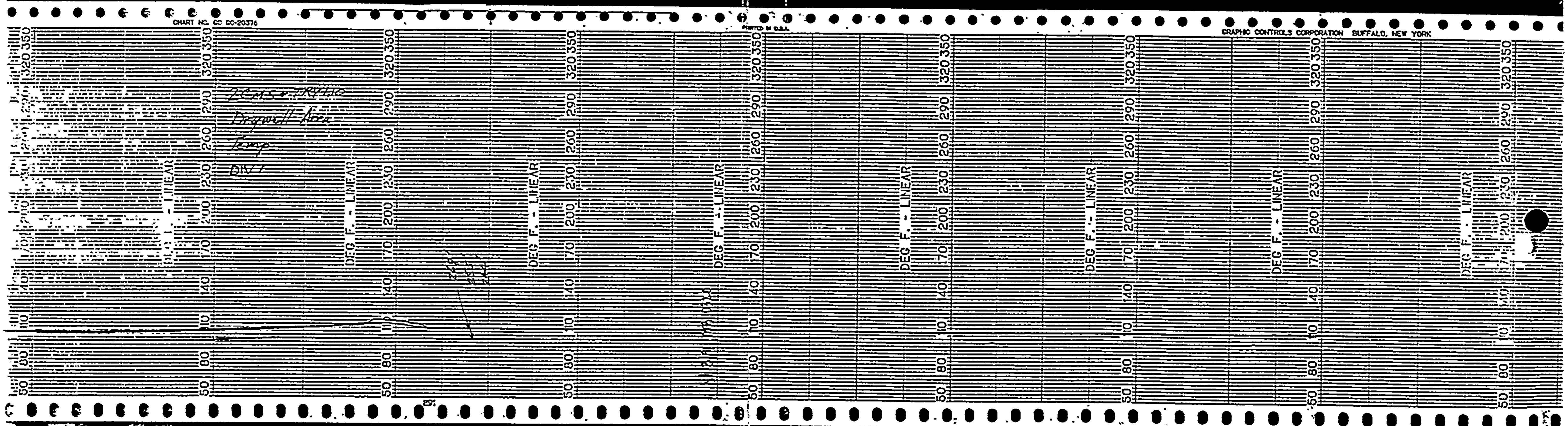
0321 D. Hanczyk "A.T.C"

0359 E. Davis "A.T.C"

0404 RHS B and C loops INOP for EPMs and repairs

0548 Lost Control Room Annunciators, process computer and BOP indication.


2CMS*TRX130
Drywell Area
Temp.
DIV 1
DEG F. - LINEAR
50 80 110 140 170 200 230 260 290 320 350
283'
289'
307'
DEG F. - LINEAR
DEG F. - LINEAR
8/13/91-MAS-0320



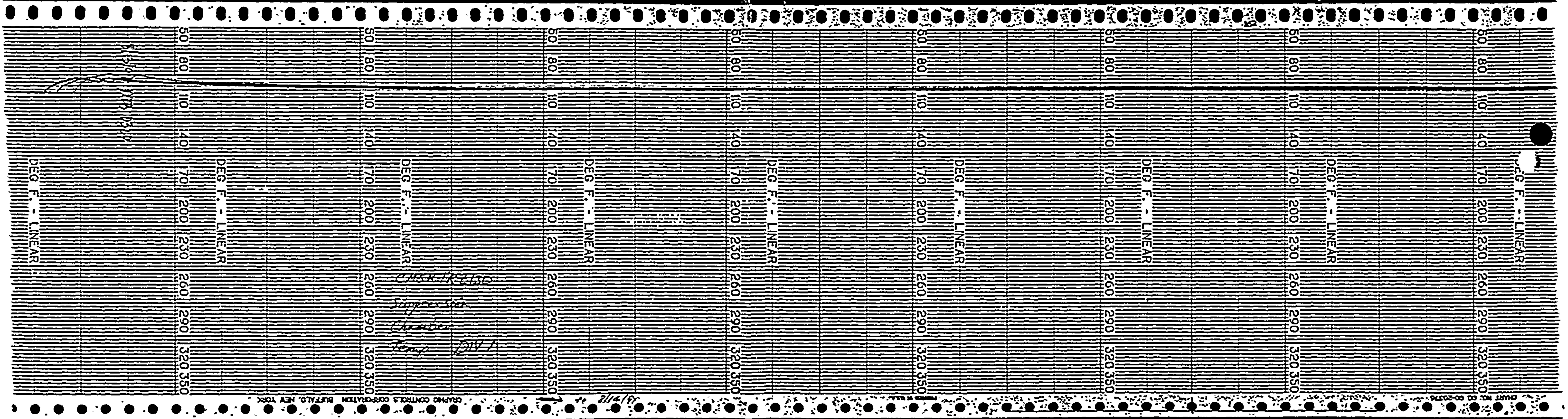
SI
APERTURE
CARD

Also Available On
Aperture Card

9305050237-01

SI
APERTURE
CARD

Also Available On
Aperture Card



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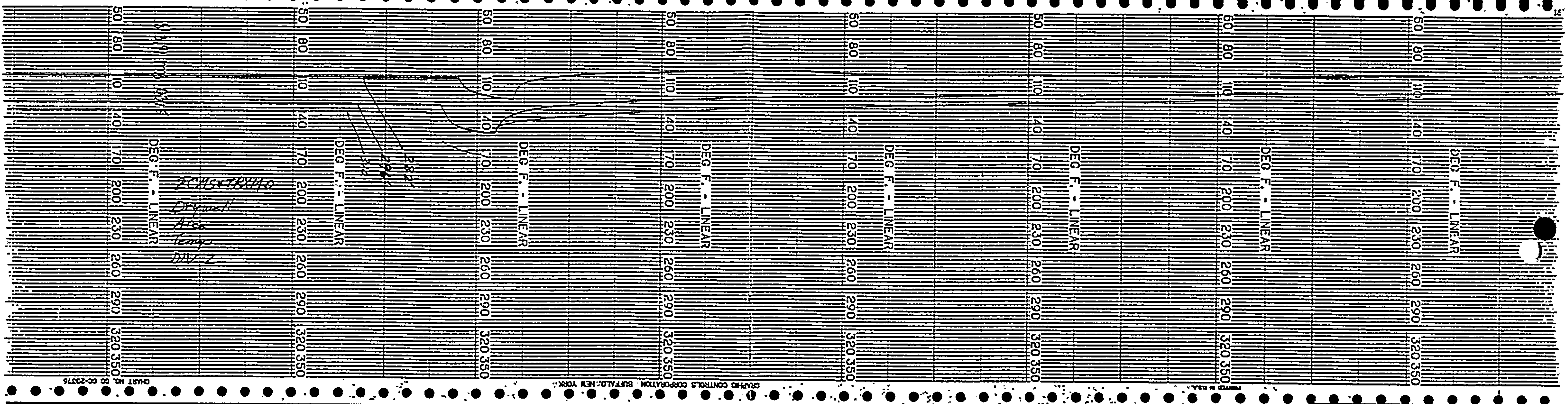

SI
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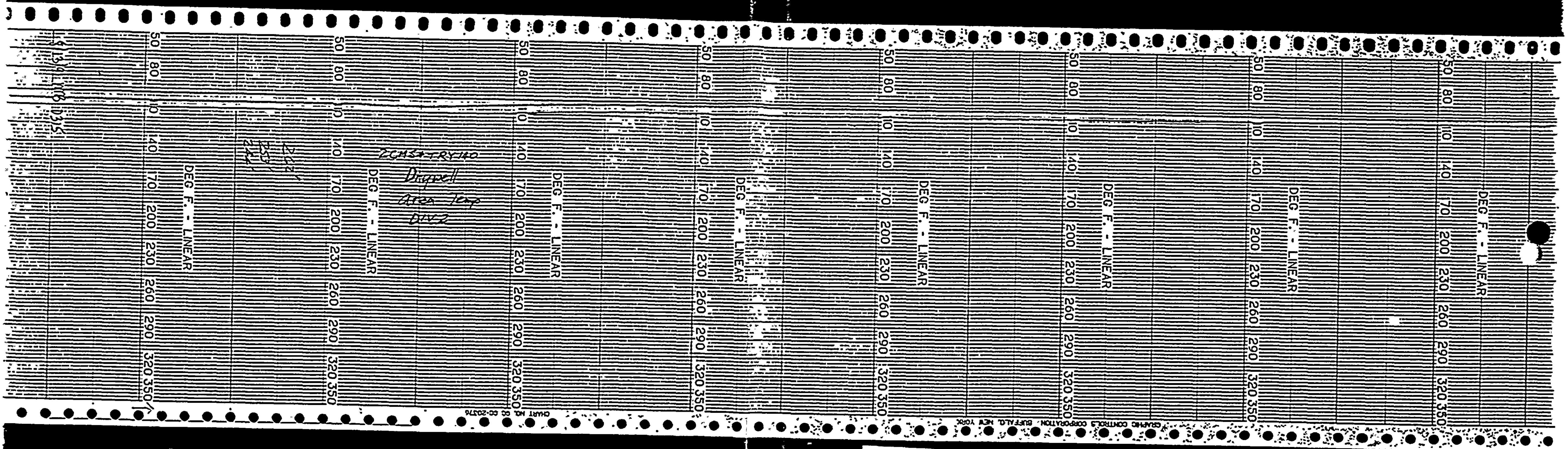
Also Available On
Aperture Card

9305050237-03



SI
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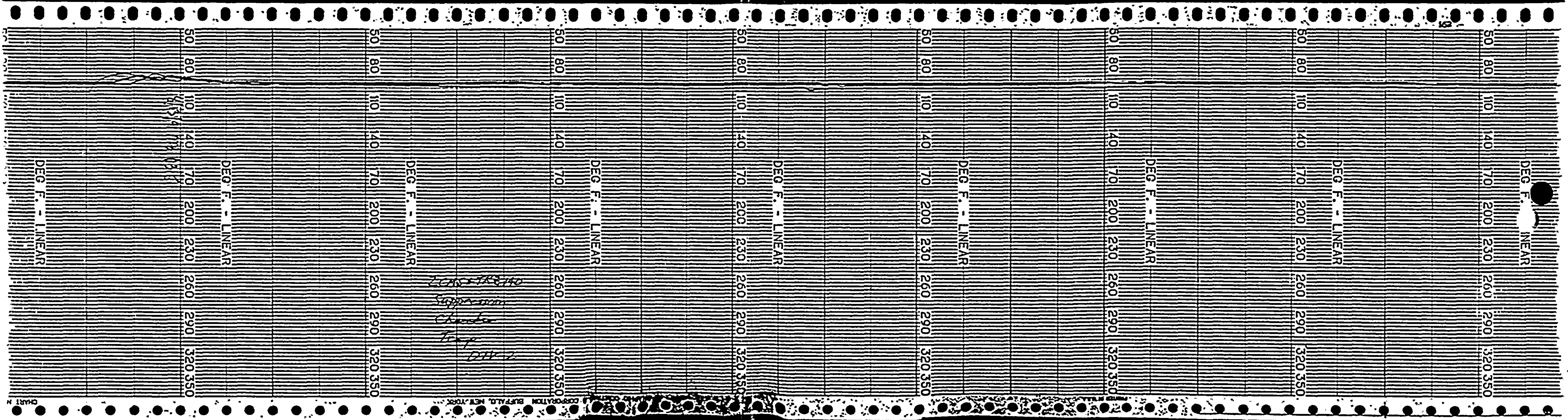
Also Available On
Aperture Card

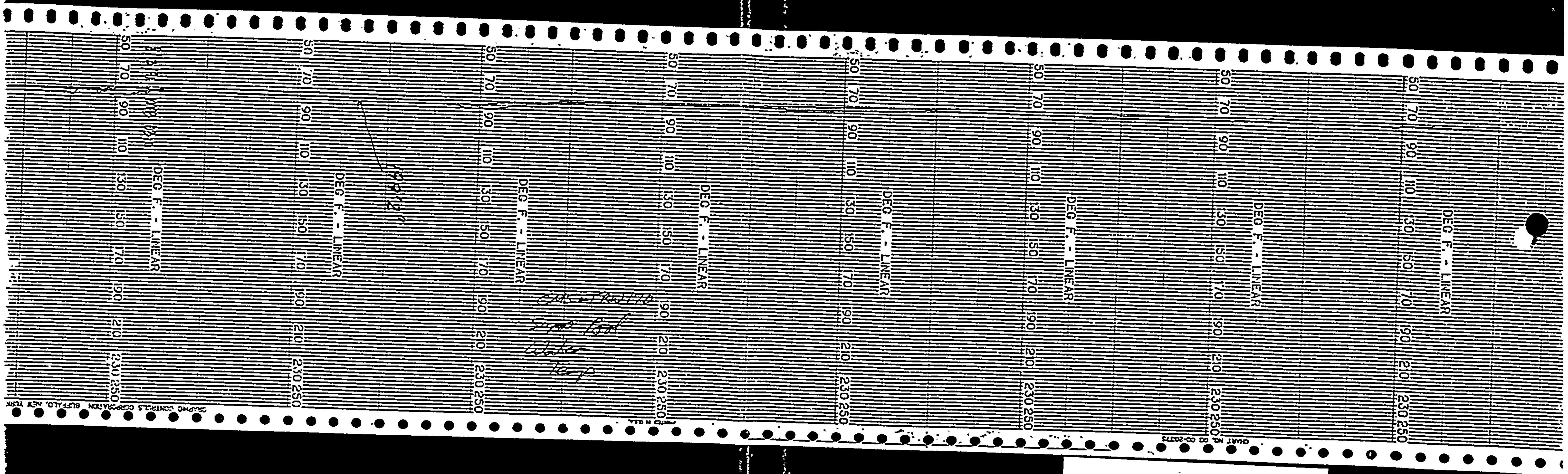
9305050237-04



SI
APERTURE
CARD

Also Available On
Aperture Card

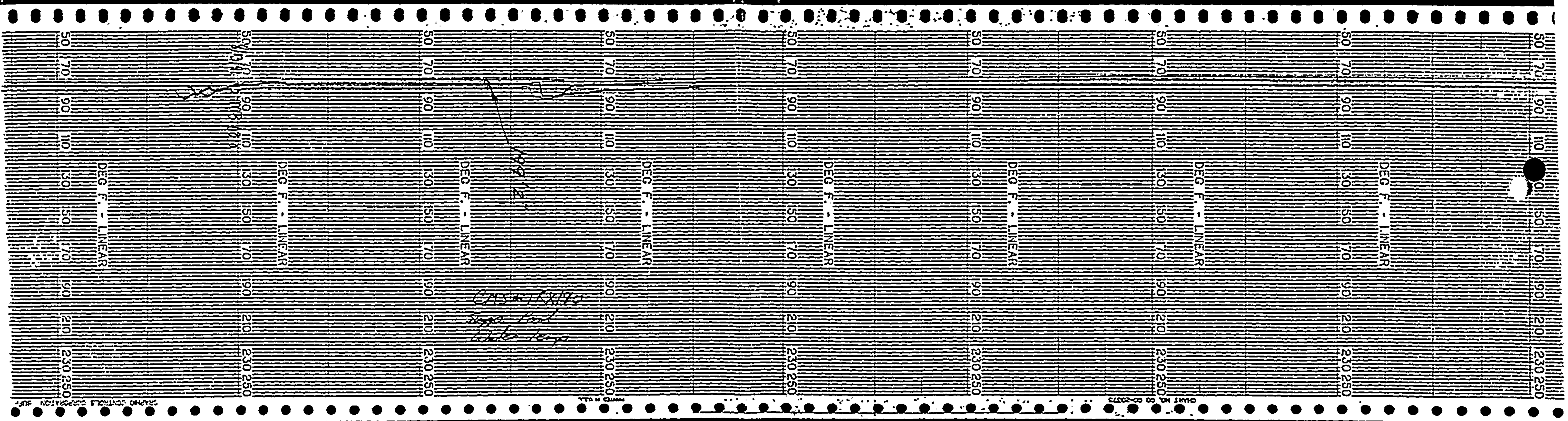
9305050237-05



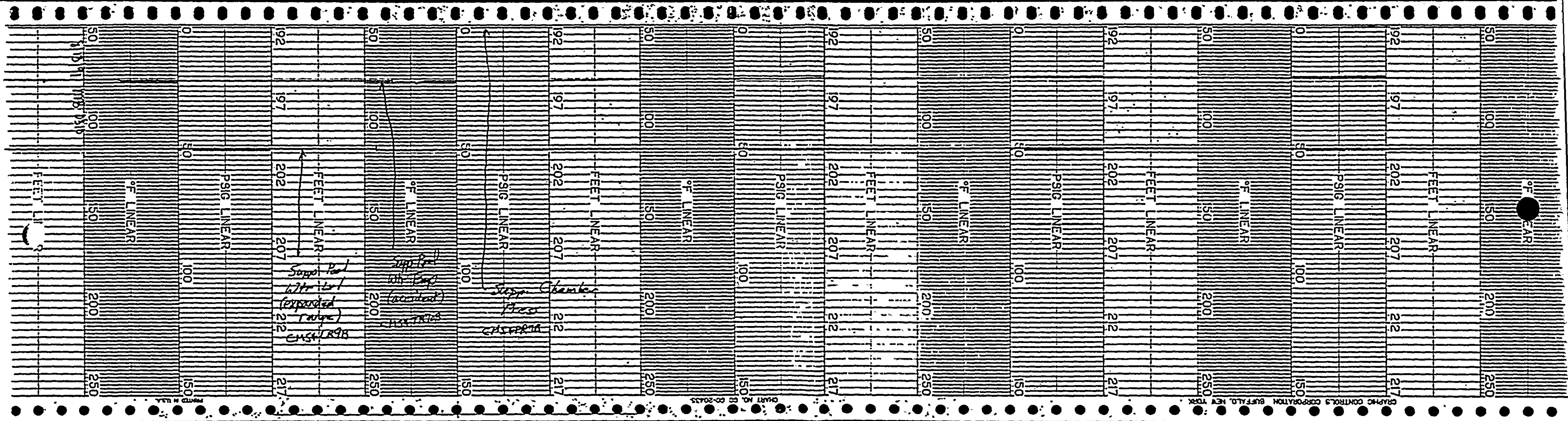
9305050237-06

SI
APERTURE
CARD

Also Available On
Aperture Card



9305050237-07



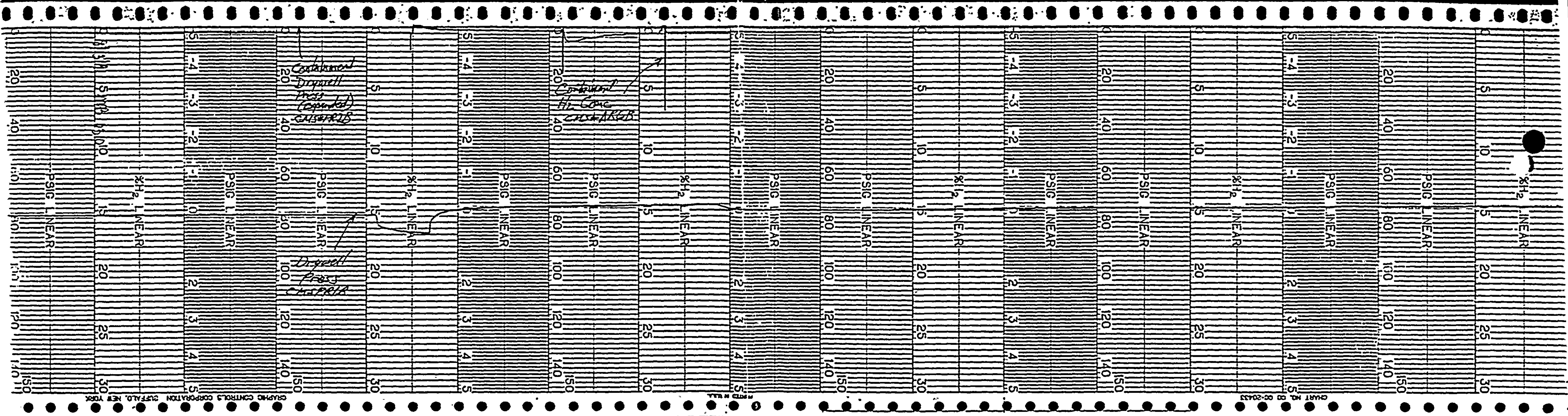
SI
APERTURE
CARD

Also Available On
Aperture Card

9305050237-08

SI
APERTURE
CARD

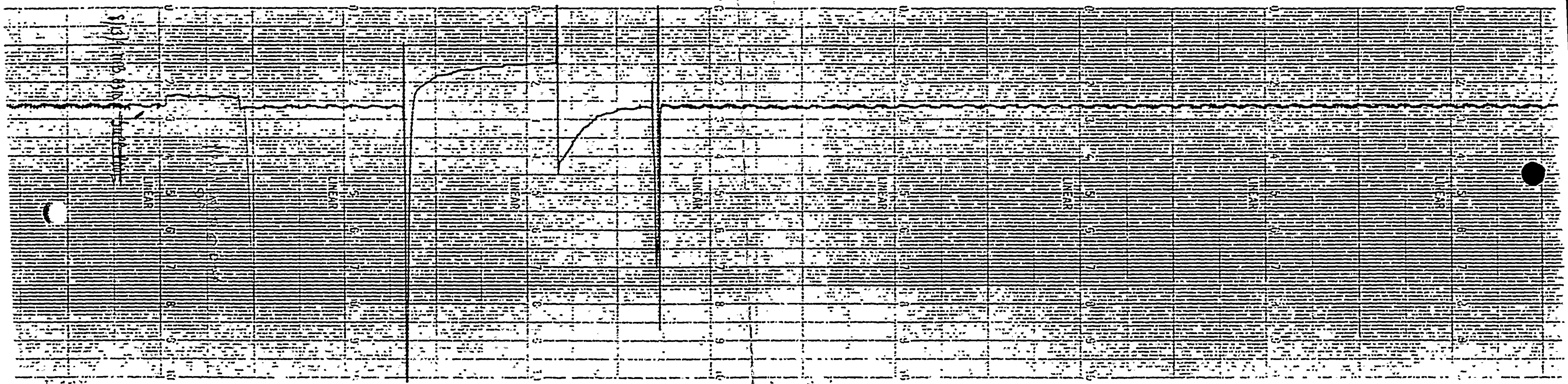
Also Available On
Aperture Card



9305050237-09

(DIV II)

2CMS*AR71B CONTAINMENT OXYGEN CONCENTRATION



05:48
TRANSIENT
PUMP TRIPS

≈07:30
PUMP
MANUALLY
RESTARTED
(2CMS*P2B)

≈8:30
OPERATOR
~~SUB~~ TURNED
OFF PUMP
AS DIRECTED
BY OP - RESTARTED
IMMEDIATELY
AFTER

9305050237-10

0000-0630 (cont.) SSS Log 8-13-91 Conway / Eron / Denny (STA) 277555

0109 (cont.) Repairs to the NSS tap changer completed — brake circuit relay replaced.

0247 N2-OSP-LOG-W@001 completed, SAT

0404 Note ESL 91-459 for RHS*P1B and RHS*P1C which are both inop to perform maintenance; both Div I and III ECCS have been verified operable; per T.S. 3.5.1 restore at least one Div II ECCS pump to operable within 72 Hours ~~Hours~~ or be in hot shutdown within next 12 hours. In addition, Div II suppression pool spray loop will be out of service for maintenance which is a 7 day LCO per T.S. 3.6.2.2. And Div II supp. pool cooling loop will be inop for work on the RHS 'B' Hx bypass valve which is also a 72 hour LCO.

0531 N2-OSP-LOG-S001 completed SAT for midshift.

0548 Lost control room annunciators ~~and~~ process computer and balance of plant indication.

0549 Placed mode switch in shutdown to manually scram the Rx.

0555 Initiated ICS for level control

0556 Rx level < 159.3. Entered EOP RPV control and C5 (no indication of control rod position on P603)

0600 Declared site area emergency

0607 Per N2-OSP-RES@001, commenced OP 101D shutdown procedure.

0608 State and local agencies notified of SAE

0612 NRC notified (completed at 0640)

~~0620~~ 0615 Shutdown condensate booster pumps

0620 Shutdown condensate pumps except for CNM-P1A

0622 Annunciator power returned when UPS 1A-D, G were placed

2200 - 0630 SSS LOG 8-13-91 CONWAY / CRON / DENNY 277556

CM MAINTENANCE POWER SUPPLY

[illegible] ALL RODS INDICATE FULL IN EXCEPT FOR 6 RODS WHICH HAVE NO INDICATION

0640 STARTED "A" CONDENSATE BOOSTER PUMP

0650 RPS JUMPERS INSTALLED PER EOP 6 ATT 14

0653 SCRAM RESET

0700 ALL RODS INDICATE FULL IN

0711 PROCESS COMPUTER RETURNED TO SERVICE

0729 STARTED ARC-P1A & B

0738 STARTED CNM-P1B

0738 M. MCCORMICK RELIEVED M. CONWAY AS SE.D.

0740 ICS SHUTDOWN TO STANDBY. CONTROLLING LEVEL WITH CONDENSATE SYSTEM USING CNM-FV137

[illegible] SPDS RETURNED TO SERVICE

0758 OFFGAS SECURED

0805 STACK CEMS INOP

0806 OPENED RCS FLOW CONTROL VALVE FULLY DUE TO SLOW SPEED RCS PUMP OPERATION

0821 ADS INHIBIT SWITCHES RETURNED TO NORMAL. RPS JUMPERS REMOVED

0847 STACK CEMS RETURNED TO OPERABLE

0850 PTP N2-ODP-LOG-@ ALL

0937 ICS INOP DUE TO 2ICS*AOV156 INDICATING FULL OPEN. PER T.S 3.6.3 ISOLATED THE PENETRATION BY DEENERGIZING 2ICS*MOV124 IN THE CLOSED POSITION. CSH IS OPERABLE. PER T.S. 3.7.4 WITH CSH OPERABLE, RESTORE WITHIN 14 DAYS OR BE IN HOT SHUTDOWN IN FOLLOWING 12 HOURS. NOTED ESL 91-460

2230 - 0630 SSS LOG 8-13-91 CONWAY / GREEN / TUTTLE 277557

1006 PTP N2-OSP - ISC - M@002

1030 NOTIFIED by CHEMISTRY THAT SERVICE WATER ACTIVITY FOR SWP DISCH HDR A & B SHOWED NO ACTIVITY

1031 RESET PRIM. CONT. ISOL SYSTEM GP 9 ON PANEL 602 CAUSED BY LOSS OF POWER TO GTJ [illegible]

"The above is a true record of events on the preceding shift ________ SSS.

"I have read and understand the events recorded in this log since I was last on shift ________ SSS.

0630 - 1430 SSS LOG 8-13-91 MOYER / BOONE / TUTTLE

RX MODE : 3 PRESSURE : 165 LEVEL : 183 POWER : 0

MW_{th} : 0 MW_e : 0

F SHIFT ON : RATHBUN, EMERY, LAWRENCE, DELONG, MCEWEN, BROCKWELL, HINCKLEY, BOTTRAFF, GREER

SURVEILLANCE SHIFT ON : SPOONER, MOORE, BERGENSTOCK, SMITH M, LEMAY, PELLIGRINO

TRAINING SHIFT ON : BRENNAN, HOLT, LANGLEY, RICHARDSON, HANFORD, HEIM, DARLING

PLANT COOLDOWN IN PROGRESS

1056 WCS ISOLATED ON HIGH ΔFLOW WHILE ATTEMPTING TO PLACE WCS IN OPERATION FOLLOWING THE SCRAM. 4 HOUR NOTIFICATION REQUIRED DUE TO ESF ACTUATION.

1118 NRC NOTIFIED OF WCS ESF ACTUATION, DER WRITTEN

1136 PTP N2-ISP-NMS-W@009 (SAT 8-13-91) IRM CHANNEL CHECK)

1149 CLEARED EX 91-459, RHR B AND RHR C OPERABLE. EXITED T.S. 3.5.1, 3.6.2.2, 3.6.2.3 ACTION STATEMENT.

ICS * AOV 156 DETERMINED TO BE CLOSED BY VISUAL INDICATION OF A TSC DAMAGE CONTROL TEAM

0630 - 1430 SSS LOG 8-13-91 MOHER / BOSNIC / TUTTLE 277558

LE 1137 PTP N2-ESP-BYS-W675 (DIV 1 BATTERY)

1157 PTP N2-OSP-RHS-CS001 AS PMT OF RHS*MOV 40A

LE 1150 RX PRESSURE 150 #. EXITED 14 DAY LCO OF TS 3.7.4 FOR ICS BEING INOP. ICS IS NOW A MODE RESTRAINT PER T.S 3.7.4

1219 N2-OSP-ISC-M@002 COMPLETED SAT

LE ~~1223~~ 1217 SHUTDOWN COOLING PRESSURE INTERLOCKS CLEARED. PER T.S 3.4.9 WITH < 2 LOOPS OF SHUTDOWN COOLING OPERABLE, WITHIN 1 HOUR DEMONSTRATE THE OPERABILITY OF AT LEAST ONE OTHER ALTERNATE METHOD OF DECAY HEAT REMOVAL.

1230 CLEARED HOLDOUT & ENERGIZED RHS*MOV 40A IN ORDER TO PROVE OPERABILITY UNDER ADMINISTRATIVE CONTROL REQUIRED BY T.S 3.6.3

1301 NOTED ESL 91-461 FOR A MODE RESTRAINT PER T.S. 3.5.1 DUE TO RHS*MOV 4B DEENERGIZED SHUT FOR SHUTDOWN COOLING OPERATION

1314 CLEARED ESL 91-278 DECLARED 2RHS*MOV 40A OPERABLE. EXITED T.S. 3.6.3 LCO. DIV 1 LOOP OF SHUTDOWN COOLING IS NOW OPERABLE, EXITED 1 HOUR REQUIREMENT OF T.S 3.4.9

N2-OSP-RHS CS001 (PMT OF RHS*MOV 40A) COMPLETED SAT

1320 N2-ISP-NMS-W@009 (ALL ATTACHMENTS) COMPLETED SAT

LE 1303 N2-ESP-BYS-W675 (DIV 1) COMPLETE PTP DIV 2 BATTERY

1355 PTP N2-ISP-NMS-~~W~~ M@008

1415 N2-ESP-BYS-W675 (DIV 2) COMPLETE PTP DIV 3 BATTERY

"I have read and understand the events recorded in this log since I was last on shift [signature] SSS.

"The above is a true record of events on the preceding shift [signature] SSS,

1430-2230 SSS Log 8/13/91 Pitts/Dragomer/Tuttle 277559

Rathbun (for Burr)

1430 Shift T/O Complete, "D" Shift on: ~~Burr~~ Bullock Smith C., Merihew, Teifke, Farnett, Kott A, Kott C., Van Allen. Also extra; Spooner, Burr, Conaway, Brockwell, Emery, Moore,

NMP2 is in an SAE due to loss of Annunciation and load reject. Currently placing RHS "B" in SDC. RWCU is isolated and RPV being fed via CNM-P1A, P1B, P2A.

1434 N2-OSP-LOG-W001 Completed-SAT

Ø1435 N2-OSP-LOG-S001 Completed-SAT

L.E. 1420 While performing N2-ISP-NMS-M@08, it was noted that SRM C reading uncharacteristically high. Declared SRM C inop, Enter T.S 3.3.7.6 (A already inop and B, D will become inop one at a time for Surveillance) action b. All rods verified inserted and the Mode switch is locked in S/D. Note ESL #91-462.

1445 AP N2-OSP-LOG-S@ALL

L.E. 1440 N2-ESP-BYS-W675 completed-SAT, all att's.

1455 P. Bright (Fire Chief) and "B" Shift Fire Dept. on.

1507 2RCS*P1B Shutdown

1510 2RHS*P1B S/U in SDC

1430-2230 SSS LOG 8-13-91 PITTS/DRAGOMER/TUTTLE 277560

1520 Rx @ 75psig, RCIC Isolation on Rx pressure as expected.

1521 Secured CNM-P2A and CNM-P1A to control vessel level by reducing FWS valve leakthrough.

1538 Main Turbine is now turning on the turning gear with normal, stable running current for the turning gear. Note that a turbine inspection should be done prior to turbine S/U.

1539 Informed that engineering walkdown of RHS piping which experienced "water hammer" during RHS heatup for shutdown cooling (reject to radwaste) has been completed with no abnormalities found.

43 APRM "D" upscale trip (½ scram on RPS "B"). Noted APRM "D" drifting upscale slowly. All other APRMs still downscale. Directed D APRM bypassed - declared it inoperable - and reset ½ scram. Problem appears to be two LPRM inputs failing upscale.

1609 PTP N2-PM-@07 to bypass LPRM's 16-25D and 16-41B for APRM "D".

1615 Notified by chemistry (Leon Albrecht) that we have entered an action level 2 per NDD-CHE based on high sulfates of 112 ppb (100 ppb limit) and conductivity of 1.01 umho/cm (1.0 umho/cm limit) Action required is to be in Cold shutdown within 24 hours.

13 Directed Holdout placed on 2RCS-V145 (open) for Continuous Conductivity monitoring (RWCU isolated).

1643 SRM C passed N2-ISP-NMS-M@008. Although still reading high, it is considered operable. Exit T.S. 3.3.7.6
1705 Held Shift brief. Covered NRC's Confirmatory Action Letter requirements. Specifically do not change plant configuration w/o verifying it it thouroughly documented.
1718 Note ESL's 91-463 on APRM D (Info only), 2 LPRM's bypassed and gains need adjusted.
Note ESL 91-464, WCS system transient requiring Engineering Eval. prior to restoring to service.
1720 Notified by TSC (John Conway) that the following conditions/requirements will be maintained until further notice:
1. Maintain both Line #5 and #6 operable and electrically seperated including the emerg. switchgear
2. Maintain all functions of RHS-A and -B loops operable.
The above requirements are from SORC for coming out of the SAE pending further investigation and understanding of the S/D event.
1744 PTP N2-CSP-78V and -7V for Containment Sampling for Purge/Vent
1745 PTP N2-OSP-MSS-CS001.
17 PTP N2-CSP-78V and CSP-7V To obtain containment samples for vent/purge in preparation for de-inerting

1754 PTP N2-OSP-LOG-D001

1802 Directed 2FWS-MOV21A/B closed to facilitate RPV level control via RDS and RHS.

1846 Rx is in Mode 4, RCS Suction temp. 199°F

1854 During performance of N2-OSP-MSS-CS001, MSIV 6D did not indicate fully closed (i.e. red/green light indication - red never extinguished)

1858 MSIV's are closed except as noted in 1854 entry.

1943 Terminated Site Area Emergency (SORC approved) with stipulations as addressed in 1720 entry.

2030 2RHS*MOV142 will not stroke with switch in Control Room.

2043 Operator at 2RHS*MOV142 can open manually, Valve can stroke Closed from Cont. Rm but not open. Elect investigating

2100 M. Heenan back problems, will not be at work (Doctors orders - 3 days).

2106 ESL #91-466 on 2RHS*MOV142 initiated (won't Close from Control Room.)

2120 ESL #91-462 cleared, SRM C operable (see 1643 entry)

2123 D. Crager off, E. Dragomer on as SEPC.

L.E. 0600 Using conservative power of 3323 MWth for the 0600 CTP, the Shift avg. CTP for Mids was 3322.75 MWth.

2137 ESL #91-464 on RWCU Cleared. WCS is available.

Note: due to Carbon misplaced logs continued on Pg. 277564 and 277563 is not used.

12 August 91 to
13 August 1991 (Tues.) CSO 2230 – 0630 E. Davis / M. Badah 277776

CSO LOG PLANT STATUS CHECKLIST

MODE SW POS.	RUN	SUPPPOOL LVL (FT)	200.17
Rx POWER %	100	SUPPPOOL AVG TEMP	77
Rx PRESS.	1004	Rx BLDG ΔP (H_2O)	-.65
Rx Temp °F.	530	CST LEVEL (FT)	39.3
Rx LVL (INCHES)	183.1	[illegible]	72.9
MW THERMAL	3323	CWS FLUME TEMP	87.5
MW ELECT.	1122	DER LEAK RATE GPM	2.10
Rx ROD LINE	101.162	[illegible] LEAK RATE GPM	.67

A Shift on

2349 CCP Feed and bleed stopped.

2353 P-T-P N2-OSP-LOG-W001

0010 P-T-P N2-OSP-LOG-W@001

0027 When the annunciator test was preformed at Div I Diesel Control Panel (local) computer point EGPUC11 – EDG1 OVERSPEED TRIP – alarmed and would not clear. No annunciators remained alarmed, and an inspection of the overspeed trip switches indicated no problems. Verified that there is no impact on Diesel operability, computer pt is bad.

0109 House loads have been shifted to the Normal Station Service Transformer

0144 N2-OSP-LOG-W@001 complete

0202 RHS*P1A started for Sup. Chamber spray

0244 RHS*P1A stopped

0321 D. Hanczyk "A.T.C"

0359 E. Davis "A.T.C"

0104 RHS B and C loops INOP for EPMs and repairs

0548 Lost Control Room Annunciators, process computer and BOP indication

13 August 1991 (Tues) CSO 2230-0630 E. Davis / M. Boduch 277777

0549	Mode switch placed in shutdown
0555	Manually initiated RCIC
0556	Rx Level < 159.3", entered EOP's RPV and CS (no indication of rod position
0600	Declared Site Area Emergency
0607	P-T-P N2-OSP-RCS-@001
0615	Shutdown Condensate Booster pumps
0620	Shutdown CNM-P1C, CNM-P1B.
0622	Annunciator power and other indicators restored when the UPS 1A-D.G were placed on maintenance power
0630	All rods indicate full in except 6 with no indication
0640	CNM-P2A started
0650	RPS jumpers installed per EOP 6 Att 14
0653	Scram Reset
0700	All rods full in
0711	process computer restored
0729	ARC-P1A + P1B started. RCS-V145 IS OPEN
0738	CNM-P1B started
0740	RCIC shutdown to standby, Level via CNM-FV137
0750	SPDS restored.
0758	OFG secured
0806	RCS flow control valves opened fully
0821	ADS inhibit switches returned to normal, RPS jumpers removed
0937	ICS INOP, *AOV156 did not shut on RCIC shutdown, ICS*MOV126 deenergize shut.
50	Attempting to restore UPS's to normal power. UPS 1C+D restored, problems with UPS 1A+B required leaving them on ~~main~~ maintenance.

"I have read and understand the events recorded in this log since I was last on shift" [signature] SSS/ASSS

The Above Is A True Record Of Events On The Preceding E.M. Davis CSO

CSO

8/13/91 0630 - 1830 Rathbun/Emery 277778

CSO LOG PLANT STATUS CHECKLIST

MODE SW POS:	S/D	SUPPPOOL LVL (FT)	200.16
Rx POWER %:	0	SUPPPOOL AVG TEMP	76.8
Rx PRESS:	235	Rx BLDG ΔP (H_2O)	-0.46
Rx Temp °F:	429	CST LEVEL (FT)	38.6
Rx LVL (INCHES)	183	SWP TEMP °F	72.5
MW THERMAL	—	CWS FLUME TEMP	74.8
MW ELECT	—	DER LEAK RATE GPM	1.02
Rx ROD LINE	—	DFR LEAK RATE GPM	0.32

1017 D. Rathbun relieved M. Davis as CSO, F-shift on.
1020 UPS1G placed on normal power supply
1031 Group Nine Isolation Reset
35 Accum 26-31 charged (T.W.# 7219 due 12/4/91)
1052 Regional Control closed R925 and R230
1055 Started 2WCS-P1B for full reject mode.
1056 2WCS-P1B tripped due to delta-flow timers, cleanup isolated.
1119 P.T.P. N2-OSP-ISC-M@002
1137 PTP N2-ISP-NMS-W@009
1140 PTP N2-ESP-BYS-W675 (Div I)
1159 PTP N2-OSP-RHS-CS001
1200 Secured 2RHS*P1A
1213 N2-OSP-ISC-M@002 complete
1217 Reset Shutdown Cooling and Cleanup Isolations
1303 N2-ESP-BYS-W675 (DIV I complete, starting Div II)
1315 N2-OSP-RHS-CS001 Complete
1319 N2-ISP-NMS-W@009 Complete

CSO

8/13/91 0630-1830 (con't) Rathbun/Emery 277779

1358 PTP N2-ISP-NMS-M@008

1414 N2-ESP-BYS-W675 (Div II complete, starting Div III)

1415 Shut 2CNM-AOV109 (CND Bypass)

1437 N2-ESP-BYS-W675 Complete

1458 Shutdown 2RCS-P1B (for SDC)

1508 Started 2RHS*P1B in Shutdown Cooling Mode

1519 Shutdown 2CNM-P2A

1520 Shutdown 2CNM-P1A

1708 Requested that Chemistry perform N2-CSP-78V in preparation for Primary Containment Purging (Contact: Kent Stoffle)

1807 Shut 2FWS*MOV21A & 21B

1850 PTP N2-OSP-MSS-C@001

"I have read and understand the events recorded in this log since I was last on shift [signature], SSS, CSO"

The Above Is A True Record Of Events On The Preceding Shift [signature] CSO"

1846 Rx in cold shutdown

1858 MSIV's closed per N2-OSP-MSS-CS001
except AO86D has duel indication

1914 Secured 2ARC P1A/B

1916 Opened condenser Vacuum breakers

1920 Secured sealing steam

1930 Shutdown Clean steam reboilers

[illegible]

Shift ______ CSO

"I have read and understand the events recorded in this log since I was last on shift E. M. Davis SSS, CSO"

ATTACHMENT 2 (Cont)

FIGURE 2.E

HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY (Unit 2)

Initiating Condition	Unusual Event	Alert	Site Area Emergency	General Emergency
Loss of Indicators, Annunciators, or Alarms in the Control Room and Loss of Emergency Assessment or Communication Capability	1)Loss of all Meteorological Data. OR 2)Loss of the following functions for a continuous period of 8 hours: a.SPDS out of service. OR b.Ability to update process computer. OR 3)Loss of the following communications systems: a.Emergency Notification System Line (Red phone) AND b.New York State Radiological Emergency Communication Line (RECS) AND c.Commercial Telephone Lines (New York Telephone).	Loss of all Control Room Alarms (Annunciators).	Loss of all Control Room alarms (annunciators) AND plant transient initiated or in progress.	Not Applicable

D Hawley

1.0 RPV WATER LEVEL/HIGH DRYWELL PRESSURE ASSOCIATED ESF ACTUATIONS

The intent of this attachment is to provide a tabular list of system initiations and isolations for use in verifying automatic responses to lowering RPV Water Level or rising Drywell Pressure. It is provided as a quick reference. A more detailed list is provided in N2-OP-83. (SER 90-145)

1.1 Level 3 Checks (159.3")

a. Panel 603

Reactor Scram.................................... (✓) 0700
FWS setpoint setdown............................. (✓)

b. Panel 602

Recirc pumps downshift............... *P1A (✓) *P1B (✓) TCN-4

c. Panel 601

PAM recorder to fast speed........................ (__)

RHR A System Valves Closed

RHS*MOV 112 (✓) 113 (✓) RHS*SOV 36A (__)
40A (✓) 67A (✓) 35A (✓)

RHR B System Valves Closed

RHS*MOV 104 (✓) 149 (✓) RHS*SOV 36B (✓)
40B (✓) 142 (✓) 35B (✓)
67B (✓)

1.2 Level 2 Checks (108.8")

a. Panel 852

HPCS DG START...................................... (__)

b. Panel 851

Verify Closed

IAS*SOV 166 (__) 168 (__) 185 (__)
167 (__) 184 (__) 180 (__)

1.2 (Cont)

c. Panel 603

TIP N2 SOV 166 Closed.............................. (__)

RRCS ARI Initiated................ DIV I (__) DIV II (__)

d. Panel 602

Rx Wtr Sample SOV Closed 104 (__) 105 (__)

Recirc Hydraulic Supply Valves Closed

RCS*SOV	67A (__)	81A (__)	67B (__)	81B (__)
	65A (__)	79A (__)	65B (__)	79B (__)
	66A (__)	80A (__)	66B (__)	80B (__)
	68A (__)	82A (__)	68B (__)	82B (__)

Recirc pumps tripped................. *P1A (__) *P1B (__)

CCP Recirc Pump Cooling Valves Closed

CCP*MOV	94A (__)	17A (__)	94B (__)	17B (__)
	16A (__)	15A (__)	16B (__)	15B (__)

RWCU Isolation Valves Closed.. 2WCS*MOV 112 (__) 102 (__)

e. Panel 601

RCIC Initiated...................................... (__)

ADS N2 Valves Closed........... IAS*SOV 164 (__) 165 (__)

SLS Initiated (if above 4% pwr after 98 sec)......... (__)

HPCS Initiated...................................... (__)

f. Panel 607

TIP Ball Valves Closed

CH A (__) CH C (__) CH E (__)
CH B (__) CH D (__)

1.2 (Cont)

g. Panel 873

DW Equip/Floor Drain Valves Closed

DER*MOV	131 (__)	130 (__)	DFR*MOV	139 (__)	140 (__)
	120 (__)	119 (__)		120 (__)	121 (__)

CCP DW Cooling Valves Closed

CCP*MOV	265 (__)	122 (__)
	273 (__)	124 (__)

Leakage Monitoring System Valves Closed

LMS*SOV 153 (__) 157 (__)

Containment Atmos Monitoring Valves Closed

CMS*SOV	62B (__)	24A (__)	32A (__)
	60A (__)	24C (__)	33A (__)
	62A (__)	26A (__)	35A (__)
	60B (__)	26C (__)	34A (__)

H2 Recombiner Valves Closed

HCS*MOV	6A (__)	4A (__)	5A (__)
	3A (__)	1A (__)	2A (__)

Containment Purge Valves Closed

CPS*AOV	104 (__)	110 (__)	CPS*SOV	120 (__)
	105 (__)	111 (__)		119 (__)

h. Panel 870

STBY Gas Train A Started.............................. (__)

Rx Bldg Ventilation Dampers Closed

HVR*AOD	1A (__)	9A (__)
	10A (__)	34A (__)

HVR*UC413A Started.............................. (__) | TCN- 4

Control Bldg Ventilation HVC*MOV1A Closed............ (__)
HVC*FN2A Started............ (__)

1.2 (Cont)

i. Panel 875

Leakage Monitoring System Valves Closed

LMS*SOV 152 (__) 156 (__)

Containment Atmos Monitoring Valves Closed

CMS*SOV	61B (__)	24B (__)	32B (__)
	61A (__)	24D (__)	33B (__)
	63A (__)	26B (__)	35B (__)
	63B (__)	26D (__)	34B (__)

H2 Recombiner Valves Closed

HCS*MOV	6B (__)	4B (__)	5B (__)
	3B (__)	1B (__)	2B (__)

Containment Purge Valves Closed

CPS*AOV	107 (__)	109 (__)	CPS*SOV	122 (__)
	106 (__)	108 (__)		121 (__)

j. Panel 871

Stby Gas Train B Started............................ (__)

Rx Bldg Ventilation Dampers Closed

HVR*AOD	1B (__)	9B (__)
	10B (__)	34B (__)

HVR*UC413B Started.............................. (__)

Control Bldg Ventilation

HVC*MOV 1B Closed.............................. (__)

HVC*FN 2B Started.............................. (__)

1.3 Level 1 Checks (17.8")

a. Panel 852

DIV I DG Started (__) DIV II DG Started (__)

1.3 (Cont)

b. Panel 602

MSIV Closed

MSS*AOV 6D (__) 6B (__) 7D (__) 7B (__)
6C (__) 6A (__) 7C (__) 7A (__)

MSL Drains Closed

MSS*MOV 111 (__) 208 (__) 112 (__) | TCN-4

c. Panel 601

LPCS Initiated.................................... (__)

LPCI-A Initiated.................................. (__)

ADS 105 Sec Timer Started......... DIV I (__) DIV II (__)

ADS SRV's open (105 sec time delay)

MSS*PSV 121 (__) 130 (__) 134 (__)
127 (__) 129 (__)
126 (__) 137 (__)

LPCI-C Initiated.................................. (__)

LPCI-B Initiated.................................. (__)

1.4 Drywell Pressure High (1.68 psig)

a. Panel 852

Div I DG Started (__) Div II DG Started (__)
Div III DG Started (__)

b. Panel 851

Instrument Air Valves Closed

IAS*SOV 166 (__) 168 (__) 185 (__)
167 (__) 184 (__) 180 (__)

c. Panel 603

Tip N2 SOV166 Closed.............................. (__)
Reactor Scram..................................... (__)

1.4 (Cont)

d. Panel 602

Recirc Hydraulic Supply Valves Closed

RCS*SOV	67A (__)	81A (__)	67B (__)	81B (__)
	65A (__)	79A (__)	65B (__)	79B (__)
	66A (__)	80A (__)	66B (__)	80B (__)
	68A (__)	82A (__)	68B (__)	82B (__)

CCP Recirc Pump Cooling Valves Closed

CCP*MOV	94A (__)	17A (__)	94B (__)	17B (__)
	16A (__)	15A (__)	16B (__)	15B (__)

e. Panel 601

RCIC Vacuum Breakers Closed
(If coincident RPV press below 60 psig)
ICS*MOV 148 (__) 164 (__)
LPCS Initiated.. (__)
LPCI-A Initiated...................................... (__)
ADS N2 valves Closed
IAS*SOV 164 (__) 165 (__)
RHR A System Valves Closed
RHS*SOV 36A (__) 35A (__)
LPCI-C Initiated...................................... (__)
LPCI-B Initiated...................................... (__)
RHR B System Valves Closed
RHS*MOV 149 (__) 142 (__)
RHS*SOV 36B (__) 35B (__)
HPCS Initiated.. (__)

f. Panel 607

Tip Ball valves Closed

Ch. A (__)	Ch. C (__)	CH. E (__)
CH. B (__)	Ch. D (__)	

g. Panel 873

DW Equip/Floor Drain Valves Closed

DER*MOV	131 (__)	130 (__)	DFR*MOV	139 (__)	140 (__)
	120 (__)	119 (__)		120 (__)	121 (__)

CCP DW Cooling Valves Closed CCP*MOV 265 (__) 122 (__)
273 (__) 124 (__)

1.4.g (Cont)

Leakage Monitoring System Valves closed

LMS*SOV 153 (__) 157 (__)

Containment ATMOS Monitoring Valves closed

CMS*SOV	62B (__)	24A (__)	32A (__)
	60A (__)	24C (__)	33A (__)
	62A (__)	26A (__)	35A (__)
	60B (__)	26C (__)	34A (__)

H2 Recombiner Valves closed

HCS*MOV	6A (__)	4A (__)	5A (__)
	3A (__)	1A (__)	2A (__)

Containment Purge Valves closed

CPS*AOV	104 (__)	110 (__)	CPS*SOV	120 (__)
	105 (__)	111 (__)		119 (__)

h. Panel 870

STBY Gas Train A started............................ (__)

Rx BLDG Ventilation Dampers closed

HVR*AOD	1A (__)	9A (__)
	10A (__)	34A (__)

HVR*UC413A started............................ (__)

Control Bldg Ventilation

HVC*MOV1A closed.............................. (__)
HVC*FN2A started.............................. (__)

i. Panel 875

Leakage Monitoring System Valves closed

LMS*SOV 152 (__) 156 (__)

Containment ATMOS Monitoring Valves closed

CMS*SOV	61B (__)	24B (__)	32B (__)
	61A (__)	24D (__)	33B (__)
	63A (__)	26B (__)	35B (__)
	63B (__)	26D (__)	34B (__)

1.4.i (Cont)

H_2 Recombiner Valves closed

HCS*MOV	6B	(__)	4B	(__)	5B	(__)
	3B	(__)	1B	(__)	2B	(__)

Containment Purge Valves closed

CPS*AOV	107 (__)	109 (__)	CPS*SOV	122 (__)
	106 (__)	108 (__)		121 (__)

j. Panel 871

STBY Gas Train B started.............................. (__)

Rx Bldg Ventilation Dampers closed

HVR*AOD	1B (__)	9B (__)
	10B (__)	34B (__)

HVR*UC413B started.............................. (__) TCN-4

Control Bldg Ventilation HVC*MOV 1B closed........... (__)
HVC*FN 2B started........... (__)

Attachment Done by D. Rathbun

14.0 ALTERNATE CONTROL ROD INSERTIONS

This procedure is performed only as required by N2-EOP-RPV, Section RQ. The intent is to provide alternate methods to insert control rods during ATWS conditions.

Sections can be performed independently as required. ALTERNATE CONTROL ROD INSERTION FLOWCHART, Figure 14.4, included as a guide.

14.1 Reset ARI

Defeat ARI interlocks as follows:

(T) **NOTE:** The following step will require L54G keys and fuse pullers. TCN-1

a. At C22-P001-2 (lower door, North side) pull the following fuses to fail the ARI valves closed.

1. C22A-F5A (20A)................................... (__)
2. C22A-F6A (20A)................................... (__)

b. At C22-P002-2 (lower door, North side) pull the following fuses to fail the ARI valves closed.

1. C22A-F5B (20A)................................... (__)
2. C22A-F6B (20A)................................... (__)

14.2 De-energize the Scram Solenoids using one or both of the following methods:

a. At P610, slowly rotate the "Power Source Select" switch first to "ALT A" then to "ALT B" then back to "NORM".. (__)

b. Starting with a rod at or near the center, using Figure 14.1 as a guide, de-energize individual rod scram solenoids as follows:

1. Obtain an OD-7 printout, if available........... (__)
2. De-energize individual scram solenoids by placing both test switches on the HCU from "NORM" to "TEST".
   - Work spirally outward, de-energizing scram solenoids for every other rod until a checkerboard pattern is achieved... (__)

14.2.b (Cont)

NOTES:

1. Figure 14.3 of this attachment is provided as an aid for locating HCUs for individual rods.

2. If a rod in the sequence of Figure 14.1 or 14.2 is already fully inserted, move to the next rod and continue the sequence.

3. Figures 14.1 and 14.2 of this attachment are not intended to depict the only allowable insertion sequence. Core life and neutron flux profile considerations may dictate a different sequence as determined by the Reactor Engineer and directed by the SSS.

3. Continue de-energizing individual rod scram solenoids starting with a rod at or near the center, using Figure 14.2 as a guide. Work spirally outward until all remaining scram solenoids have been de-energized.......... (__)

14.3 Vent the Scram Header using one or both of the following methods:

T NOTE: The following step requires an L54G key and (2) PA235 keys (CSO's desk). TCN-1

a. Place both ARI keylock test switches for Division I or Division II [located in Relay Room Panels C22-P001-2 (DIV I) and C22-P002-2 (DIV II)] in the "TEST" position.. (__)

b. Manually vent the scram air header.

1. Close 2RDS-V595 (R.B. 261 Inboard of ARI Valve Rack).. (__)

2. Open 2RDS-V43 (R.B. 261 Outboard of Inst. Rack 2CEC*RAK026 West of South HCUs)................ (__)

14.3 (Cont)

c. When no longer required; as applicable:

1. Reset ARI by returning keylock test switches in C22-P001-2 and C22-P002-2 to normal by rotating CCW from "TEST" position........................ (__)

2. Restore from manually venting the scram air header.

a) Shut 2RDS-V43.............................. (__)

b) Open 2RDS-V595.............................. (__)

14.4 Manually Initiate Additional Scrams by performing the following as required:

NOTE: If scram valves are open and control rods not fully inserted, perform the following to do a series of scrams and resets.

a. Reset ARI per Step 14.1 of this attachment........... (__)

b. Reset the following EPAs (if required) in the order listed.

1. 2RPM*ACB1A (C.B. 237 West)...................... (__)

2. 2RPM*ACB2A (C.B. 237 West)...................... (__)

3. 2RPM*ACB1B (C.B. 237 East)...................... (__)

4. 2RPM*ACB2B (C.B. 237 East)...................... (__)

c. Reset the scram.

1. If required, defeat RPS interlocks by installing jumpers at the following points:

T

NOTE: The following step will require an L54G key.

a) From fuse C72A-F14A to relay C72A-K12E Cont. B (P609 BAY A, Left Side) (Jumper #21)............................... (✓) | TCN-4

b) From fuse C72A-F14C to relay C72-K12G Cont. B (P609 BAY D, Left Side) (Jumper #16)............................... (✓) | TCN-4

14.4.c.1 (Cont)

c) From Fuse C72A-F14B to relay C72A-K12F Cont. B (P611 BAY A, Left Side) (Jumper #14)............................ (✓)

d) From Fuse C72A-F14D to relay C72A-K12H Cont. B (P611 BAY D, Left Side) (Jumper #10)............................ (✓)

2. Reset the scram on P603 by taking Reactor Scram Reset switches for Channels A, B, C and D to the RESET position.................................. (✓)

d. Reopen 2RDS-V28 if previously closed in Section 14.5. |TCN-4

e. Verify the SDV drained using any of the following indications.

1. SDV Hi Level indicating switches

a) C12-N601C (P609) indication................ (__)

b) C12-N601A (P609) indication................ (__)

c) C12-N601B (P611) indication................ (__)

d) C12-N601D (P611) indication................ (__)

2. Annunciator 603109, RPS A DISCH VOLUME HIGH LEVEL TRIP, cleared............................ (__)

3. Annunciator 603409, RPS B DISCH VOLUME HIGH LEVEL TRIP, cleared............................ (__)

4. Annunciator 603130, SDV LEVEL HIGH, cleared..... (__)

f. Initiate a manual scram.............................. (__)

g. If control rods moved inward, repeat steps 14.4.b through 14.4.e as required until all rods are full in.. (__)

<u>NOTE</u>: If full scram results in little inward rod movement, individual rod scrams may be more effective. This method will supply greater drive force to the single selected rod than will a full scram.

h. <u>Perform individual rod scrams.</u>

1. Perform Steps 14.4.a through 14.4.d............. (__)

2. Perform Steps 14.2.b.1 through 14.2.b.3......... (__)

14.4 (Cont)

i. When RPS interlocks are no longer required to be defeated, remove the jumpers installed in Step 14.4.c.1 .... (✓) *

j. When ARI interlocks are no longer required to be defeated, reinstall the fuses pulled in Steps 14.1.a.1 and 14.1.a.2 .... (__)

14.5 Drive Control Rods

a. Start the second CRD pump .... (__)

b. Open 2RDS-FV6A/B (P603). Do not exceed 40 amps on running pumps .... (__)

c. Maximize drive water DP, by closing 2RDS-PV101 (P603) .... (__)

d. If required, close the charging header isolation valve (2RDS-V28), located at R.B. 261. This valve may have to be reopened to charge the accumulators if performing Section 14.4 of this attachment .... (__)

e. Defeat the RWM if required by taking the BYPASS/OPERATE/TEST switch to the Bypass position, at P603 .... (__)

f. Defeat RSCS if required by installing the following jumpers:

1. (P613) Trip Unit C12-N654A Terminal 7 to 8 (Jumper #5) .... (__) |TCN-4

2. (P613) Trip Unit C12-N654B Terminal 7 to 8 (Jumper #6) .... (__) |TCN-4

g. Starting with a rod at or near the center, using Figure 14.1 as a guide, select a control rod to be driven in .... (__)

h. Rapidly insert the control rod by depressing and holding the continuous insert pushbutton of RMC until rod motion stops .... (__)

* RPS Jumpers (4) Removed:

Removed By: [signature]

Verified By: [signature]

14.5 (Cont)

NOTES:

1. Figures 14.1 and 14.2 of this attachment are not intended to depict the only allowable insertion sequence. Core life and neutron flux profile considerations may dictate a different sequence as determined by the Reactor Engineer and directed by the SSS.

2. If a rod in the sequence of Figure 14.1 or 14.2 is already fully inserted, move to the next rod and continue the sequence.

i. Repeat Steps 14.5.g and 14.5.h working spirally outward until a checkerboard pattern is achieved..... (__)

j. Repeat Steps 14.5.g and 14.5.h using Figure 14.2 of this attachment as the guide. Work spirally outward until all control rods have been inserted........... (__)

k. When no longer required, restore bypassed equipment.

1. Remove Jumpers #5 and 6 installed in Step 14.5.f.................................. (__) TCN-4

2. Place RWM in OPERATE, if bypassed in Step 14.5.e.. (__) TCN-4

14.6 Vent Control Rod Overpiston Volumes

To insert control rods, vent the above piston area as follows:

a. Obtain an OD-7 printout if available.

T

NOTES:

1. The following step will require use of tools staged in the EOP box located in R.B. 261, west of the south HCUs.

2. Figure 14.3 of this attachment is provided as an aid for locating HCUs for individual rods.

3. An S6 key will be required for EOP box entry.

b. Establish communication between the Control Room and the HCU area in R.B. 261........................... (__)

14.6 (Cont)

c. Starting with a Rod at or near the center, using Figure 14.1 as a guide, select a control rod to be inserted.. (__) TCN- 4

NOTE: Withdraw and insert lines are located above the HCUs. The withdraw line is the above piston area line and is the smaller of the two.

d. Locate and connect a drain rig to 2RDS-V1 of the HCU to be vented by removing the cap, hooking up the hose and routing the hose to a Reactor Building drain..... (__)

* *

CAUTION

Hose end directed to Reactor Building drain should be secured at the drain to prevent flow-induced "Hose Whip".

* *

1. Remove the cap from 2RDS-V1 operator............ (__)
2. Slowly open 2RDS-V1.......................... (__)
3. Shut 2RDS-V1 when rod motion stops.............. (__)
4. Remove the drain rig and re-install the cap.... (__)

NOTES:

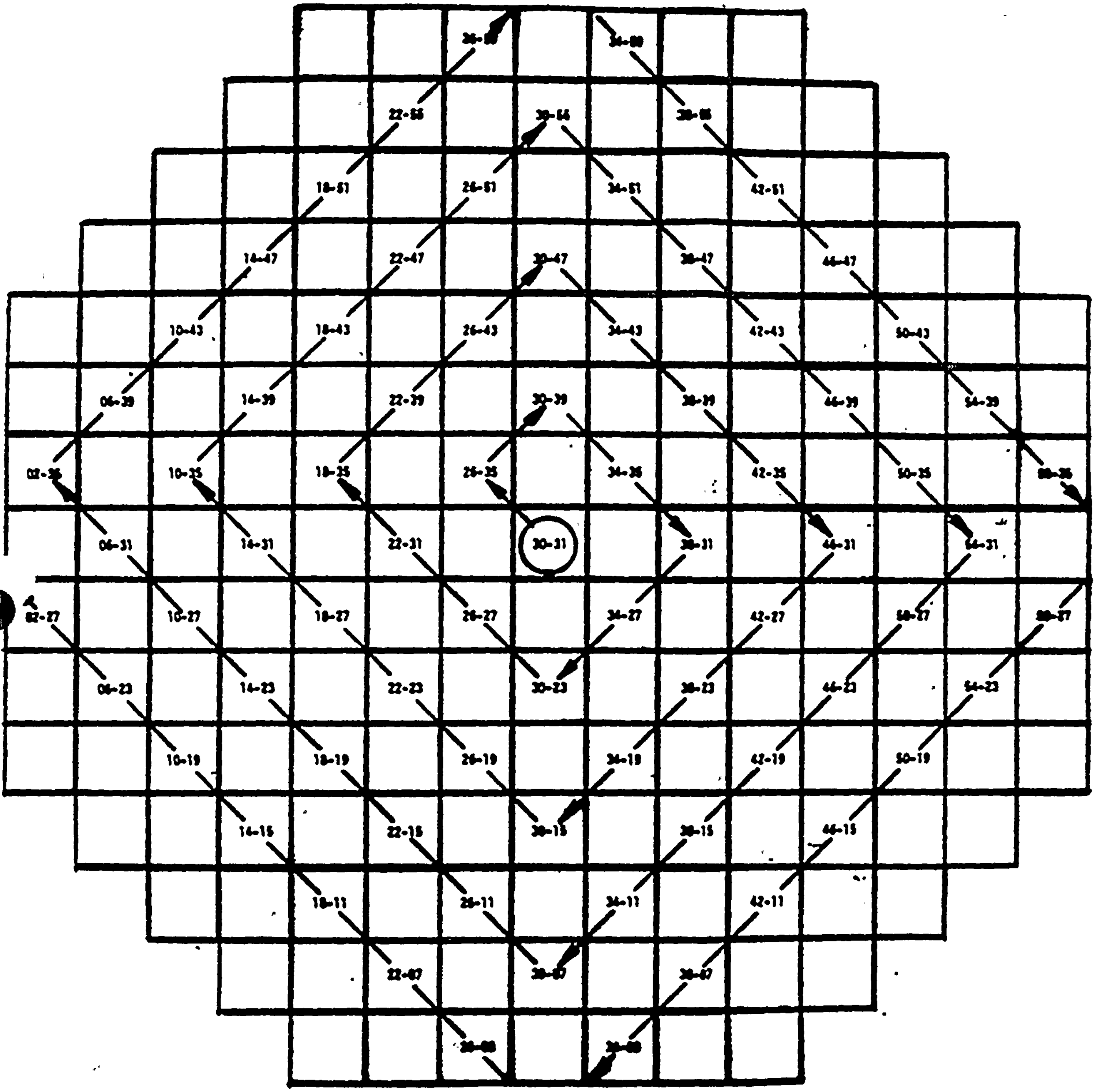
1. Figures 14.1 and 14.2 of this attachment are not intended to depict the only allowable insertion sequence. Core life and neutron flux profile considerations may dictate a different sequence as determined by the Reactor Engineer and directed by the SSS.

2. If a rod in the sequence of Figure 14.1 or 14.2 is already fully inserted, move to the next rod and continue the sequence.

e. Repeat Steps 14.6.c and 14.6.d working spirally outward until a checkerboard pattern is achieved..... (__)

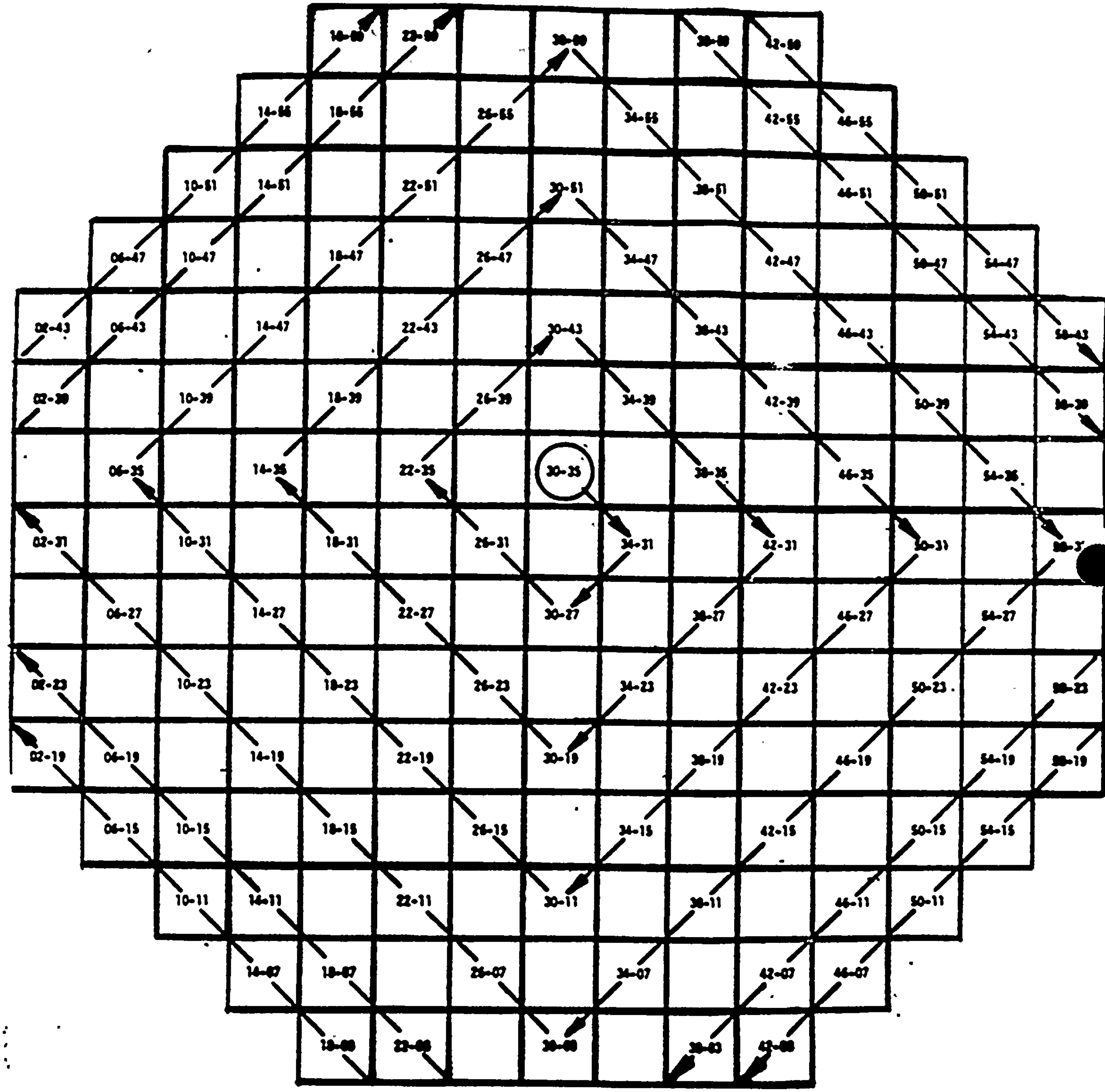
f. Repeat Steps 14.6.c and 14.6.d using Figure 14.2 of this attachment as the guide. Work spirally outward until all control rods have been inserted........... (__)

FIGURE 14.1



ROD INSERTION (FIRST SEQUENCE)

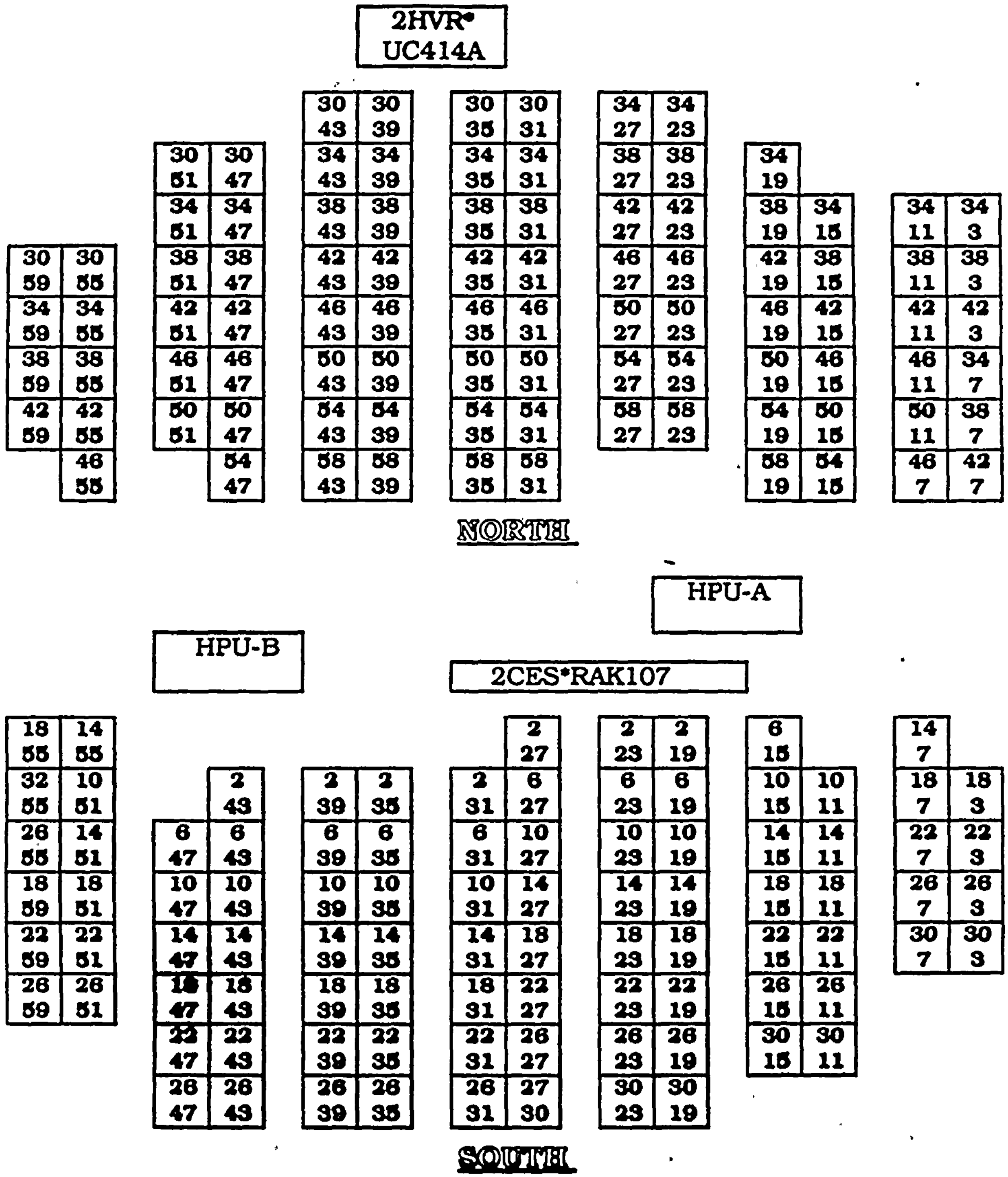
FIGURE 14.2



ROD INSERTION (SECOND SEQUENCE)

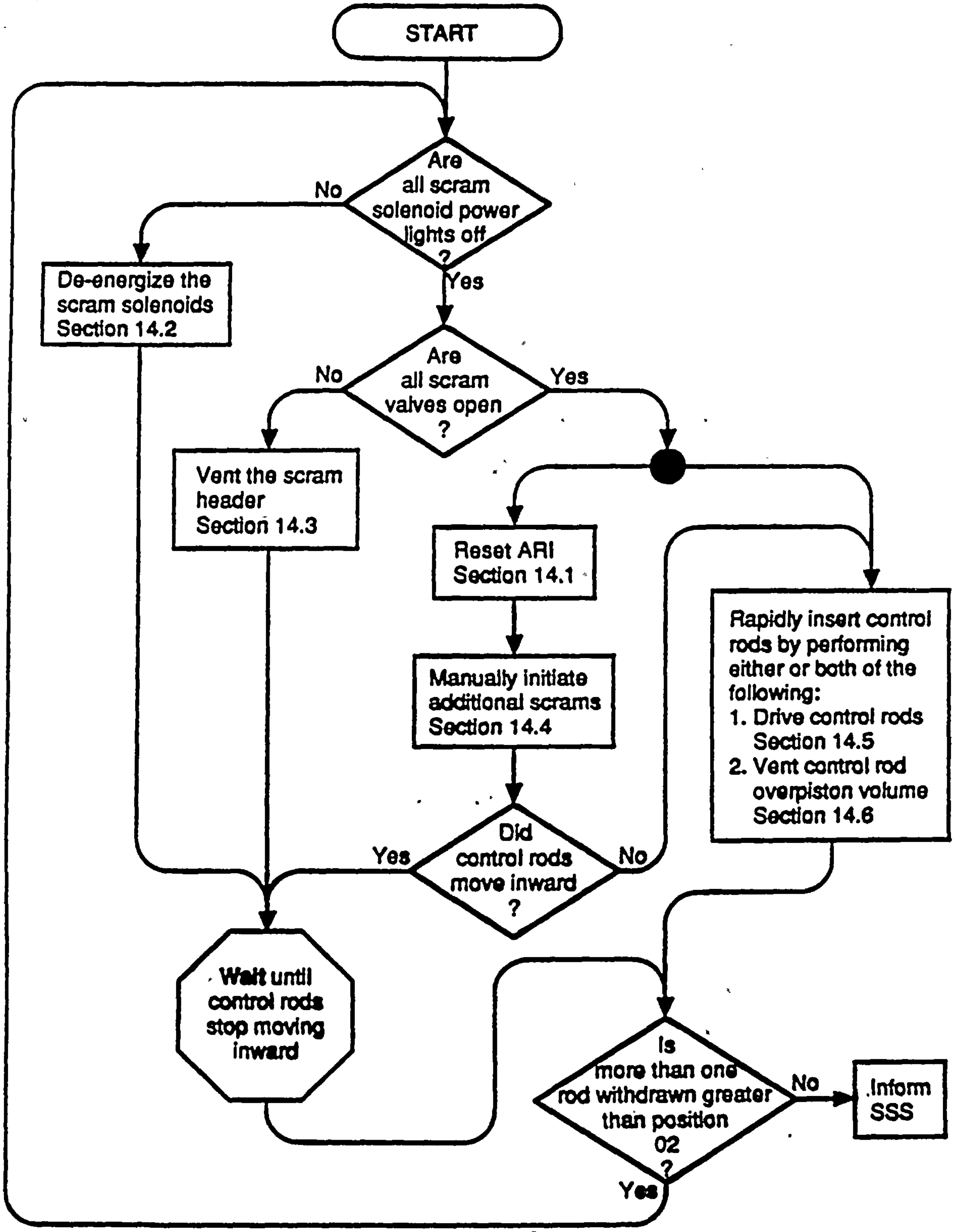
TCN-1

FIGURE 14.3



CRD HCU LOCATIONS

FIGURE 14.4



TCN-1

TCN-1

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8-8-91

EOP-6 CIRCUIT MODIFICATION TRACKING SHEET

REASON FOR MODIFICATION	ATTACHMENT NO.	METHOD OF MODIFICATION	MODIFIED	RETURNED TO NORMAL
DEFEAT LOW RPV PRESS RCIC ISOLATION	2,18	REMOVE RELAYS E51-K79, K86, K78 AND K66 P618, P621		
MAKE 2CSH*MOV107 THROTTLEABLE	3	LIFT LEADS AT 2EHS*MCC201, CUBICLE 2C		
MAKE 2CSL*MOV104 THROTTLEABLE	3	LIFT LEADS AT 2EHS*MCC102C, CUBICLE 15B		
MAKE 2RHS*MOV24A THROTTLEABLE	3	LIFT LEADS AT 2EHS*MCC103C, CUBICLE 17C		
MAKE 2RHS*MOV24B THROTTLEABLE	3	LIFT LEADS AT 2EHS*MCC303D, CUBICLE 14C		
MAKE 2RHS*MOV24C THROTTLEABLE	3	LIFT LEADS AT 2EHS*MCC303D, CUBICLE 19A		
DEFEAT 2RHS*MOV40B ISOLATION	5,6	INSTALL JUMPER AND LIFT LEAD (P622)		
DEFEAT 2RHS*MOV104 ISOLATION	5,6	INSTALL JUMPER AND LIFT LEAD (P623)		
DEFEAT 2RHS*MOV40A ISOLATION	6	INSTALL JUMPER AND LIFT LEAD (P623)		
DEFEAT L1 GROUP 1 ISOLATION	10	INSTALL TWO JUMPERS EACH IN P609 AND P611		
DEFEAT 2MSS*MOV189 OPEN SIGNAL	10	LIFT LEAD AT P856 BAY D		
DEFEAT RWCU ISOLATION (RRCS)	11,19	DISCONNECT AMPHINOL JACK P737A AND P736B		
DEFEAT RWCU ISOLATIONS (ALL EXCEPT RRCS)	11,19	LIFT LEADS AND INSTALL JUMPERS IN P622 AND P623		
DEFEAT ALL GROUP 1 ISOLATIONS	12,18	INSTALL JUMPERS P609 BAYS B AND C, P611 BAYS A AND C		
DEFEAT ARI	14	PULL FUSES IN C22-P001-2 AND C22-P002-2		
DEFEAT SCRAM SIGNALS	14	INSTALL JUMPERS P609 BAYS A AND D, P611 BAYS A AND D	✓	✓ 0820
DEFEAT RSCS	14	INSTALL JUMPERS P613		
DEFEAT OFG HIGH RAD ISOLATION	16	LIFT LEADS 2OFG-IPNL122		
DEFEAT 2MSS*MOV208 ISOLATION	17	INSTALL JUMPER AND LIFT LEAD IN P623		
DEFEAT ALL RCIC ISOLATIONS	18	PULL RELAYS AND INSTALL JUMPERS P618, P621		
DEFEAT FWS HI RPV WATER LEVEL TRIP	20	INSTALL JUMPERS P612A AND P612C		
DEFEAT GTS HI RAD ISOLATION	21	PULL FUSES P856, BAY F		
DEFEAT CPS LOCA ISOLATIONS	21,25	INSTALL JUMPERS P859, BAY E, P861, BAY E		
DEFEAT 2GTS*MOV2A(B) AND 3A(B) CLOSE CIRCUIT	21,25	LIFT LEADS 2EHS*MCC102A(302B)		
DEFEAT HVR LOCA ISOLATIONS	26	LIFT LEADS P859 BAY E, P861, BAY E		
Defeat ADS			✓	✓ 0822

TCN-1

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N2-EOP-6
Rev

ATTACHMENT 7

HEATUP/COOLDOWN DATA SHEET

Section Performed (circle one) 8.1 8.2 8.3 8.4

Date 8/13/91 Page 1 of 1

Time	Interval (frac of an hr)	RPV Press	Press Instr Used	*Reactor Coolant Temperature: Sat Temp (Att 8)	Recirc Loop Temp: Loop A	Recirc Loop Temp: Loop B	RHR Loop Temp: Loop A	RHR Loop Temp: Loop B	H/U or C/D Rate	H/U - C/D rate & Press/Temp Acceptable per Step 8.1.4, 8.2.4, 8.3.4 or 8.4.4: SAT	UNSAT	Initial	Date
0615		660	2ISC*PI 623B	499				[illegible] 8-13-91	~~140/CD~~	✓		[illegible]	8/13
0618		619	2ISC*PI 623B	492					140/CD	✓	*NOTE 1	[illegible]	8/13
0620		600	2ISC*PI 623B	489					60/CD	✓		[illegible]	8/13
0623		570	2ISC*PI 623B	483					120/CD	✓	*NOTE 1	[illegible]	8/13
0628		579	2ISC*PI 623B	485					24/HU	✓		[illegible]	8/13
0630		580	2ISC*PI 623B	485					0/CD	✓		[illegible]	8/13
0635		600	2ISC*PI 623B	489					48/HU	✓		[illegible]	8/13
0640		618	2ISC*PI 623B	492	490	490			36/HU	✓		[illegible]	8/13
0645		625	2ISC*PI 623B	493	493	495			36/HU	✓		[illegible]	8/13
0650		545	2ISC*PI 623B	479	482	482			132/CD	✓	*NOTE 1	[illegible]	8/13
① 0700		532	2ISC*PI 623B	476	477	478			30/CD	✓		[illegible]	8/13
0710		568	FWSPI101	483	480	480			18/HU	✓		[illegible]	8/13
0720		561	FWSPI101	482	478	478			12/CD	✓		[illegible]	8/13
0730		544	FWSPI101	479	475	475			18/CD	✓		[illegible]	8/13
0740		527	FWSPI101	476	472	472			18/CD	✓		[illegible]	8/13
0750		491	FWSPI101	468	465	465			42/CD	✓		[illegible]	8/13

*Temperature corresponding to Downcomer temperature in accordance with Step 4.6.

① DATA TAKEN FOR RPV PRESSURE WAS FROM THE PAM RECORDER UP TO 0700

ATTACHMENT 7

HEATUP/COOLDOWN DATA SHEET

Section Performed (circle one) 8.1 8.2 8.3 8.4 Date 8/13/91 Page 1 of 1

Time	Interval (frac of an hr)	RPV Press	Press Instr Used	*Reactor Coolant Temperature: Sat Temp (Att 8)	Recirc Loop Temp: Loop A	Recirc Loop Temp: Loop B	RHR Loop Temp: Loop A	RHR Loop Temp: Loop B	H/U or C/D Rate	H/U - C/D rate & Press/Temp Acceptable per Step 8.1.4, 8.2.4, 8.3.4 or 8.4.4: SAT	UNSAT	Initial	Date
0800		485	FWS PA101	467	465	463			0/CD	✓		Reo	8/13
0810		477	FWS PA101	468	463				12/CD	✓		Reo	8/13
0820		462	FWS PA101	462	460				18/CD	✓		Reo	8/13
0830		448	FWS PA101	460	455				30/CD	✓		Reo	8/13
0840		435	FWS PA101	456	453				12/CD	✓		Reo	8/13
0850		421	FWS PA101	453	450				18/CD	✓		Reo	8/13
0900		408	FWS PA101	450	448				12/CD	✓		Reo	8/13
0910		388	FWS PA101	446	442				36/CD	✓		Reo	8/13
0920		360	FWS PA101	438	435				42/CD	✓		Reo	8/13
0930		343	FWS PA101	433	430				30/CD	✓		Reo	8/13
0940		319	FWS PA101	428	425				30/CD	✓		Reo	8/13
0950		297	FWS PA101	421	418				42/CD	✓		Reo	8/13
1000		276	FWS PA101	414	411				42/CD	✓		Reo	8/13
1010		258	FWS PA101	408	406				30/CD	✓		Reo	8/13
1020		241	FWS PA101	403	400				36/CD	✓		Reo	8/13
1030		223	FWS PA101	396	393				42/CD	✓		Reo	8/13

*Temperature corresponding to Downcomer temperature in accordance with Step 4.6.

ATTACHMENT 7
HEATUP/COOLDOWN DATA SHEET

Section Performed (circle one) 8.1 8.2 8.3 8.4 Date 8/13/91 Page 1 of 1

				*Reactor Coolant Temperature						H/U - C/D rate & Press/Temp Acceptable per Step 8.1.4, 8.2.4, 8.3.4 or 8.4.4			
					Recirc Loop Temp		RHR Loop Temp						
Time	Interval (frac of an hr)	RPV Press	Press Instr Used	Sat Temp (Att 8)	Loop A	Loop B	Loop A	Loop B	H/U or C/D Rate	SAT	UNSAT	Initial	Date
1040		201	FWSPAIOI	388	385				48/CD	✓		[illegible]	8/13
1050		187	FWSPAIOI	383	380				30/CD	✓		[illegible]	8/13
1100		175	FWSPAIOI	378	374				30/CD	✓		[illegible]	8/13
1110		167	FWSPAIOI	374	370				24/CD	✓		[illegible]	8/13
1120		162	FWSPAIOI	371	368				12/CD	✓		[illegible]	8/13
1130		156	FWSPAIOI	368	364				24/CD	✓		[illegible]	8/13
1140		151	FWSPAIOI	367	363				6/CD	✓		[illegible]	8/13
1150		147	FWSPAIOI	365	360				18/CD	✓		[illegible]	8/13
1200		138	FWSPAIOI	360	356				24/CD	✓		[illegible]	8/13
1210		127	FWSPAIOI	354	351				30/CD	✓		[illegible]	8/13
1220		121	FWSPAIOI	351	348				18/CD	✓		[illegible]	8/13
1230		116	FWSPAIOI	348	345				18/CD	✓		[illegible]	8/13
1240		111	FWSPAIOI	345	342				18/CD	✓		[illegible]	8/13
1250		109	FWSPAIOI	344	340				12/CD	✓		[illegible]	8/13
1300		110	FWSPAIOI	344	341				6/HU	✓		[illegible]	8/13
1310		107	FWSPAIOI	343	339				12/CD	✓		[illegible]	8/13

*Temperature corresponding to Downcomer temperature in accordance with Step 4.6.

ATTACHMENT 7

HEATUP/COOLDOWN DATA SHEET

Section Performed (circle one) 8.1 8.2 8.3 8.4 Date 8/13/11 Page 1 of 1

Time	Interval (frac of an hr)	RPV Press	Press Instr Used	*Reactor Coolant Temperature: Sat Temp (Att 8)	Recirc Loop Temp: Loop A	Recirc Loop Temp: Loop B	RHR Loop Temp: Loop A	RHR Loop Temp: Loop B	H/U or C/D Rate	H/U - C/D rate & Press/Temp Acceptable per Step 8.1.4, 8.2.4, 8.3.4 or 8.4.4: SAT	UNSAT	Initial	Date
1320		108	FWSPAIO1	343	339				0/CD	✓		RCO	8/13
1330		112	FWSPAIO1	345	343				29/HU	✓		RCO	8/13
1340		113	FWSPAIO1	346	343				0/CD	✓		RCO	8/13
1350		114	FWSPAIO1	347	343				0/CD	✓		RCO	8/13
1400		115	FWSPAIO1	346	343				0/CD	✓		RCO	8/13
1410		110	FWSPAIO1	344	341				12/CD	✓		RCO	8/13
1420		108	FWSPAIO1	343	339				12/CD	✓		RCO	8/13
1430		106	FWSPAIO1	341	338				6/CD	✓		RCO	8/13
1440		104	FWSPAIO1	340	337				6/CD	✓		RCO	8/13
1450		104	FWSPAIO1	340	336				6/CD	✓		RCO	8/13
1500	.91	106	FWSPAIO1	341	335				6/CD	✓		RCO	8/13
1510	1.1	110	FWSPAIO1	344	336				6/HU	✓		RCO	8/13
515 1520		86	FWSPAIO1	328	336				148/CD	✓	NOTE 1	RCO	8/13
520 1530		75	FWSPAIO1	320	328				96/CD	✓		RCO	8/13
525 1535		65	FWSPAIO1	312	322				96/CD	✓		RCO	8/13
530 1530		48	FWSPAIO1	295	316				204/CD	✓	NOTE 1	RCO	8/13

*Temperature corresponding to Downcomer temperature in accordance with Step 4.6.

ATTACHMENT 7
HEATUP/COOLDOWN DATA SHEET

Section Performed (circle one) 8.1 8.2 8.3 8.4 Date 8/13 Page 1 of 1

Time	Interval (frac of an hr)	RPV Press	Press Instr Used	*Reactor Coolant Temperature: Sat Temp (Att 8)	Recirc Loop Temp: Loop A	Recirc Loop Temp: Loop B	RHR Loop Temp: Loop A	RHR Loop Temp: Loop B	H/U or C/D Rate	H/U - C/D rate & Press/Temp Acceptable per Step 8.1.4, 8.2.4, 8.3.4 or 8.4.4: SAT	UNSAT	Initial	Date
1535		40	FWSPAICI	287	300				96/CD	✓		Rco	8/13
1540		38	FWSPAICI	285	265				24/CD	✓		Rco	8/13
1545		38	FWSPAICI	285	265				0/CD	✓		Rco	8/13
1550		37	FWSPAICI	284	263				24/CD	✓		Rco	8/13
1555		36	FWSPAICI	282	261				24/CD	✓		Rco	8/13
1600		35	FWSPAICI	281	257				24/CD	✓		Rco	8/13
1605		34	FWSPAICI	279	258				12/CD	✓		Rco	8/13
1610		34	FWSPAICI	279	258				0/CD	✓		Rco	8/13
1615		34	FWSPAICI	279	257				12/CD	✓		Rco	8/13
1620		34	FWSPAICI	279	257				6/CD	✓		Rco	8/13
1625		32	FWSPAICI	277	255				24/CD	✓		Rco	8/13
1630		31	FWSPAICI	276	254				12/CD	✓		Rco	8/13
1635		31	FWSPAICI	276	254				0/CD	✓		Rco	8/13
1640		30	FWSPAICI	274	252				24/CD	✓		Rco	8/13
1645		29	FWSPAICI	273	251				12/CD	✓		Rco	8/13
1650		28	FWSPAICI	271	250				12/CD	✓		Rco	8/13

*Temperature corresponding to Downcomer temperature in accordance with Step 4.6.

ATTACHMENT 7
HEATUP/COOLDOWN DATA SHEET

Section Performed (circle one) 8.1 8.2 8.3 8.4 Date 8/13/91 Page 1 of 1

Time	Interval (frac of an hr)	RPV Press	Press Instr Used	Sat Temp (Att 8)	*Reactor Coolant Temperature: Recirc Loop Temp Loop A	Recirc Loop Temp Loop B	RHR Loop Temp Loop A	RHR Loop Temp Loop B	H/U or C/D Rate	H/U - C/D rate & Press/Temp Acceptable per Step 8.1.4, 8.2.4, 8.3.4 or 8.4.4: SAT	UNSAT	Initial	Date
1700	1/4	24	FWSPA101	265	244				29/CD	✓		[illegible]	8/13
1715	1/4	20	FWSPA101	259	235				34/CD	✓		[illegible]	8/13
1730	1/4	16	FWSPA101	251	223				48/CD	✓		[illegible]	8/13
1745	1/4	12	FWSPA101	244	216				28/CD	✓		[illegible]	8/13
1800	1/4	10	FWSPA101	240	212				14/CD	✓		[illegible]	8/13
1815	1/4	8	FWSPA101	235	209				12/CD	✓		[illegible]	8/13
1830	1/4	6.75	FWSPA101	231	202				28°/HRCD	✓		[illegible]	8/13/91
1845	1/4	5.62	FWSPA101	228	199				12°/HRCD	✓		[illegible]	8/13/91
1900	1/4	4.12	FWSPA101	225	194				20°/HRCD	✓		[illegible]	8/13/91
1915	1/4	3.00	FWSPA101	222	189				20°/HRCD	✓		[illegible]	8/13/91
1930	1/4	2.62	FWSPA101	219	192				12°/HRHU	✓		[illegible]	8/13/91
1945	1/4	3.00	FWSPA101	222	184				32°/HRCD	✓		[illegible]	8/13/91
2000	1/4	3.37	FWSPA101	222	179				20°/HRCD	✓		[illegible]	8/13/91
2015	1/4	3.75	FWSPA101	224	172				28°/HRCD	✓		[illegible]	8/13/91
2030	1/4	3.75	FWSPA101	224	166				24°/HRCD	✓		[illegible]	8/13/91
** 2100	1/2	3.75	FWSPA101	224	157			18°	26°/HRCD	✓		[illegible]	8/13/91

*Temperature corresponding to Downcomer temperature in accordance with Step 4.6.

** WENT FROM EVERY 15 minutes to every 30 minutes for readings per SSS. [illegible] 8/13/91

ATTACHMENT 7
HEATUP/COOLDOWN DATA SHEET

Section Performed (circle one) 8.1 8.2 8.3 8.4

Date 8/13/91

Time	Interval (frac of an hr)	RPV Press	Press Instr Used	*Reactor Coolant Temperature					H/U or C/D Rate	H/U - C/D rate & Press/Temp Acceptable per Step 8.1.4, 8.2.4, 8.3.4 or 8.4.4		Initial	Date
				Sat Temp (Att 8)	Recirc Loop Temp		RHR Loop Temp						
					Loop A	Loop B	Loop A	Loop B		SAT	UNSAT		
2130	1/2	3.75	FWSPA101	224	152			13	~~20°/HR CD~~	✓		MWS	8/13/91
2200	1/2	3.75	FWSPA101	224	146			11°	~~14°/HR CD~~	✓		MWS	8/13/91
2230	1/2	3.75	FWSPA101	224	141			10°	~~20°/HR CD~~	✓		RWB	8/13/91
2300	1/2	3.75	FWSPA101	224	137				8°/HR CD	✓		MB	8/13/91
2330	1/2	3.75	FWSPA101	224	136				2°/HR CD	✓		MB	8/13/91
0000	1/2	3.75	FWSPA101	224	135				2°/HR CD	✓		MB	8/14/91
0030	1/2	3.75	FWSPA101	224	134				2°/HR CD	✓		MB	8/14/91
0100	1/2	3.75	FWSPA101	224	132				4°/HR CD	✓		MB	8/14/91
0130	1/2	3.75	FWSPA101	224	132				0	✓		eo	8-14-91
0200	1/2	4.12	FWSPA101	225	132				0	✓		DCA	8-14-91
0230	1/2	3.75	FWSPA101	224	129				6°/HR CD	✓		DCA	8-14-91
0300	1/2	3.75	FWSPA101	224	128				2°/HR CD	✓		DCA	8-14-91
0330	1/2	3.75	FWSPA101	224	127				2°/HR CD	✓		DCA	8-14-91
0400	1/2	3.75	FWSPA101	224	125				4°/HR CD	✓		DCA	8-14-91
0430	1/2	3.75	FWSPA101	224	125				0°F/HR	✓		DCA	8-14-91
0500	1/2	3.75	FWSPA101	224	125				0°F/HR	✓		DCA	8-14-91

*Temperature corresponding to Downcomer temperature in accordance with Step 4.6.

ATTACHMENT 7
HEATUP/COOLDOWN DATA SHEET

Section Performed (circle one) 8.1 8.2 8.3 8.4   Date 8-14-91   Page 1 of 1

Time	Interval (frac of an hr)	RPV Press	Press Instr Used	*Reactor Coolant Temperature: Sat Temp (Att 8)	Recirc Loop Temp: Loop A	Recirc Loop Temp: Loop B	RHR Loop Temp: Loop A	RHR Loop Temp: Loop B	H/U or C/D Rate	H/U - C/D rate & Press/Temp Acceptable per Step 8.1.4, 8.2.4, 8.3.4 or 8.4.4: SAT	UNSAT	Initial	Date
0530	1/2	3.15	FWSPA101	224	124				2°F/hr CD	✓		[illegible]	8-14-91
0600	1/2	3.15	FWSPA101	224	122				4°F/hr CD	✓		[illegible]	8/14/91
0630	0.5	3.75	FWSPA101	N/A	121				2°F/hr C/D	✓		[illegible]	8/14/91
0700	0.5	3.75	FWSPA101	N/A	120				2°F/hr C/D	✓		[illegible]	8/14/91
0730	0.5	3.75	FWSPA101	N/A	120				0°F/hr C/D	✓		[illegible]	8/14/91
0800	0.5	3.75	FWSPA101	N/A	119				2°F/hr C/D	✓		[illegible]	8/14/91
0830	0.5	3.75	FWSPA101	N/A	119				0°F/hr C/D	✓		[illegible]	8/14/91
0900	0.5	3.75	FWSPA101	N/A	120				2°F/hr H/U	✓		[illegible]	8/14/91

*Temperature corresponding to Downcomer temperature in accordance with Step 4.6.

AUG 1 3 1991

FORM I (Cont)

SCRAM REPORT

III. TRANSIENT EVALUATION

1. Expected scram signal did did not initiate scram.

2. MSIV isolation occurred. Yes No

If yes, explain.____________________

3. Reactor

a. Lowest Reactor Level Attained 133 ____________ Instrument No.

b. Highest Reactor Level Attained 68 ____________ Instrument No.

4. Safety Relief Valves opened. Yes ~~No~~

If yes, which? ____________

Explain.____________________

5. Any ECCS auto manual initiation? Yes No

If yes, which?____________

Explain.____________________

IV COPIES OF LOGS ATTACHED

a. Alarm Typer

b. NSSS Post Trip Log NONE AVAILABLE

c. Sequence of Event Log

d. BOP Post Trip Log

Reviewed by [signature] for Date 8/20/91
Operations Superintendent

Reviewed by [signature] * Date 8/21/91
Station Superintendent

* the levels referenced are based on initial indications. (No instruments are listed). RAPG has further details.

TCN-41
N2-OP-101C
Rev. 06

AUG 1 3 1991

FORM I

SCRAM REPORT

To: 1. Operation's Superintendent

2. Station Superintendent

From: Mike Conway S.S.S

Scram No. 91-01

Scram Time/Date 0558/8/13/91

Operator M. Davis

Operator M. Bopoh

I. CAUSE OF SCRAM

Description Transformer Fault on Mn. Output Transformer 1B Resulting in Generator Trip & Rx Scram

II. PLANT CONDITIONS PRIOR TO SCRAM

1. Plant Evolution

a. Starting Up
b. Shutting Down
c. Steady State Operations
d. Power Change
e. System Test

2. Mode Switch

a. Run
b. Startup/Hot Standby
c. Refuel
d. Shutdown

3. Power Level

a. Reactor Critical Yes No

b. Thermal Power 3323 %

c. Generator Output 1122 MWe

			Instrument No.
4. Reactor Pressure	1004	psig	FWS-PA101
5. Reactor Level	183	inches	FWSLA101
6. Core Flow	106.3	$x 10^6$ lb/hr	COMPUTER
7. Steam Flow	14.2	$x 10^6$ lb/hr	COMPUTER
8. Feed Flow	14.1	$x 10^6$ lb/hr	COMPUTER

INTERNAL CORRESPONDENCE

NIAGARA MOHAWK

(25)

FROM	G.P. Whitaker *GPW*	DISTRICT	NMP2
		DATE	August 15, 1991 FILE CODE NMP79779
TO	N2-RAP-6 File	SUBJECT	8/13/91 RX SCRAM SRV ACTUATION ANALYSIS

On Tuesday, August 13, 1991, at approximately 0548 hours, a reactor scram with a turbine trip resulted in the actuation of two (2) Reactor Vessel Safety Relief Valves (SRVs). Non-ADS SRVs 2MSS*PSV128 and 2MSS*PSV133 (serial numbers 160959 and 160972 respectively) actuated under the overpressure relief mode of operation (automatic open via pneumatic actuator). The purpose of this correspondence is to document the following:

- evidence of this actuation event
- results of the SRV operation performance analysis
- review for any additional inspections, maintenance, or surveillances required as a result of this actuation event.

As part of the post-scram analysis per N2-RAP-6, Post Reactor Scram Analysis and Evaluation, review of Reactor Pressure Recorder 2ISC*PR1623A (B22-R623A) and the ADS/SRV Discharge Temperature Recorder 2MSS-TRSH1614 (B22-R614) data indicates that SRVs 2MSS*PSV128 and 133 actuated upon demand immediately after the reactor scram/turbine trip event. Due to the unavailability of computer log data, which was lost just prior to the reactor scram, the exact time and sequence of the SRV actuation event is indeterminate.

Review of the reactor pressure data recorded during this event indicates that SRVs 2MSS*PSV128 and 133 opened at a reactor steam dome pressure of approximately 1070 psig. The overpressure relief mode setpoint for these two (2) SRVs is 1076 psig. SRVs 2MSS*PSV128 and 133 have the lowest pressure relief setpoint of the eighteen installed ADS/SRV valves. This lift pressure is within approximately .6% of the overpressure relief mode setpoint for these two (2) valves, on the low (or conservative) side.

Based upon the reactor pressure data review, SRVs 2MSS*PSV128 and 133 appeared to close at a reactor steam dome pressure of approximately 1005 psig, at an estimated 30 seconds after SRV actuation. SRV actuation time was estimated from the reactor pressure plot and chart recorder speed during this event. In the overpressure relief mode of operation, SRVs 2MSS*PSV128 and 133 receive the open/close signal from Reactor Vessel Pressure Trip Unit 2ISC*PIS1668A and 2ISC*PIS1668E (B22-N668A, E) respectively.

The trip unit reset setpoint and range for SRV 2MSS*PSV128 and 133 closure (reseat) is 1015.6 (998.0 to 1033.2) psig. Valve 2MSS*PSV128 and 133 reseat at approximately 1005 psig is within the corresponding trip unit range for the SRV "close" signal in the overpressure relief mode.

Review of ADS/SRV Discharge Temperature Recorder data for approximately 12 hours after SRV 2MSS*PSV128 and 133 actuation revealed a steady discharge temperature cool down rate. With regards to steady reactor depressurization in this time frame, the discharge temperatures for SRVs 2MSS*PSV128 and 133 reached the group range discharge temperature of the remaining SRVs. Based upon this data trend, it is postulated that SRVs 2MSS*PSV128 and 133 achieved a positive reseat condition. Close monitoring of SRV discharge temperatures at reactor restart will provide the final assessment of SRV 2MSS*PSV128 and 133 reseat/seat leaking integrity.

On Wednesday, August 14, 1991, the General Electric ADS/SRV Lead System Engineer, Mr. John Boseman, was contacted with regards to the SRV actuation event. Upon sharing the results of our SRV operational performance assessment with Mr. Boseman, he agreed that SRV 2MSS*PSV128 and 133 operational performance appeared to be acceptable. When asked if any additional SRV inspections, maintenance, or surveillances should be performed as a result of the SRV actuation event, Mr. Boseman responded that no such additional actions are necessary or required.

As a result of the 8/13/91 SRV 2MSS*PSV128 and 133 operational event performance assessment, considering the data available and the accuracy of this data, it can be concluded that SRVs 2MSS*PSV128 and 133 operated acceptably in the overpressure relief mode, under the subjected conditions.

GW/sab

<u>References</u>:

1. Preliminary N2-RAP-6 results for 8/13/91 Reactor Scram
2. USAR Section 5.2.2, Reactor Coolant Pressure Boundary Overpressure Protection
3. N2-OP-34, Nuclear Boiler, Automatic Depressurization and Safety Relief Valves
4. LCRs, IL2ISC-028,029 Reactor Vessel Pressure 2ISC*PT5A,D respectively
5. N2-ICP-ADS-R101, Calibration of SRV Relief Valve Circuit

xc:
M. McCormick
M. Colomb
K. Coates
J. Conway
E. Tomlinson
R. Dean
A. Hwu
R. Crandall
S. Champine

1 of 2

26

RPS JUMPERS INFO

FROM J. HERKER'S DRAFT "ASSESMENT OF OPERATOR RESPONSE & TRAINING EFFECTIVENESS"

~~(LV137) was available.~~ Following restoration of UPS power the operators were able reset the rod drive control system and determine that the majority of control rods were fully inserted.

RPS JUMPERS

Several control rod positions were still unable to be determined. At this point the SSS was still utilizing N2-EOP-C5 for RPV water level control and had directed that alternate control rod insertion methods be attempted utilizing N2-EOP-6, Attachment 14. Utilizing N2-EOP-6, Attachment 14 the operators defeated RPS interlocks in able to permit resetting the scram signal in order to effect multiple scrams. Upon resetting the scram the operators were able to determine that all control rods were fully inserted thus further N2-EOP-6, Attachment 14 actions were not required. The SSS then properly exited N2-EOP-C5 and returned to N2-EOP-RPV section RL for RPV water level control. Restoration of defeated ADS and RPS interlocks were then accomplished later in the scenario following the clearing of all scram signals. Defeating of RPS interlocks is authorized by the EOPs for this particular scenario in order to provide the ability to reset the scram and perform multiple scrams. The premise is that the failure of all control rods to fully insert could be caused by a hydraulic problem, thus resetting the scram enables the scram discharge volume (SDV) to drain. In this scenario the operators using N2-EOP-6, Attachment 14 recognized that there was no pneumatic system problem and that the SDV was full and thus performed appropriate actions.

(cont)

RPS JUMPERS INFO (cont)

- T.S. 3.3.1 action b.

This T.S. action requirement specifies placing at least one RPS trip system in a tripped condition within one hour. Using N2-EOP-6, Attachment 14 operators had defeated all RPS interlocks (except for manual) as directed by the EOPs for a period of approximately one and one half hours. This was required in order to permit resetting the scram signal to allow the SDV to drain down and subsequently perform additional scrams to effect control rod insertion. This action is directed by NMP2 EOPs consistent with the BWROG-EPG (Rev. 4) and is recognized in the Safety Evaluation for NMP2 EOPs (Rev. 4) (SER 90-145, Attachment 4, Event 15.8). Additionally EPG Appendix B specifically states the following "...This is not to imply that operation beyond the Technical Specification is recommended in any emergency. Rather, such operation is required and is now permitted under certain degraded conditions in order to safely mitigate the consequences of those degraded conditions...."

RPS JUMPERS

Since defeating RPS interlocks was believed to have been required (the operators were unable to determine multiple control rod positions) in order to insert control rods, and the basis for the procedures and safety evaluation recognize the potential for this condition the action taken by the operators and direction by the procedures was appropriate.

RPS JUMPERS

HIT....................... 1
Work No................... W190966
Issued.................... 910824
Depart.................... 300
Status.................... C
Lead or Supprt............ L
Deficiency Tag Number..... 035696
WCC Status................ 100
Unit...................... 2
Component No.............. 2CMS*P2B
System No................. CMS
BIP No.................... 082
Safety Class.............. SR
ASME Component............ N
Title..................... SAMPLE PUMP
Work Item Description..... DURING PLANT TRANSIENT ON 910813 DIV II PUMP TRIPPED 2CMS-P2B FOR NO OBVIOUS REASON DIV I CMS AND ALL OTHER DIV II CMS SOV'S WERE FOUND IN THEIR NORMAL POSITIONS. DETERMINE CAUSE OF PUMP TRIP AND CORRECT IF REQUIRED. J DOCKUM HAS MORE INFORMATION
Location.................. ABS,240,00,000.00
Originator................ TUTTLE T
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Approved by............... KINNEY D
Approval date............. 910824
Received By............... GANOUNG S
Rcvd By Dt................ 910825
Account Code.............. 706.30--9521-321258--200-0110
QC Review................. BOOTH J
QA Review Date............ 910825
Inspection Req'd.......... Y
Left Planning............. 910825
IP Code................... 3
Merit Score............... 000
Work Cond. Code........... A
Remarks................... TO FLD 910826
Work Type Code............ CM
Power Block Flag.......... Y
Staged By................. NOSKO G
Staged By Date............ 910825
Proj Crew................. 1
Proj Dur.................. 20
Sched. Start Date......... 910826
SSS Notify................ 910825
Corrective Action......... NONE
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Cause of failure.......... NONE FOUND POSSIBLY SPURIOUS

ZCMS* P2B

2 of F

W-190966 (continued)

QCIR Nos................	NA
NCR's...................	NA
Completed by............	DORHAM J
Completion date.........	910826
Deficiency Tag Removed..	Y
Supervisor Review.......	SITNIK T
Supervisor Review Date..	910827
QC Work Accepted by.....	BOOTH J
QC Work Accept date.....	910828
PMT Review By...........	SITNIK T
PMT Rev Date............	910827
Accepted by.............	NEWMAN D
Acceptance date.........	910828
Plan LO.................	910829
Fld Compl Log Dte.......	910828
Lead/Supprt Dpt.........	300
OMG Availability Code...	11
Completion Entry Date...	910828

NIAGARA MOHAWK NINE MILE POINT **WORK REQUEST** 1. DATE 8/29/91 W.R. NO. 196053

3. DEPARTMENT TO DO WORK
- [x] ELECTRICAL MAINTENANCE
- [ ] MECHANICAL MAINTENANCE
- [ ] INSTRUMENTATION & CONTROL
- [ ] COMPUTER
- [ ] ISI
- [ ] SECURITY I & C
- [ ] FIRE
- [ ] METER & TEST
- [ ] OTHER

4. PRIORITY OF WORK 3/0/F
- 1 EMERGENCY
- 2 URGENT (<1 DAY)
- 3 NECESSARY (<7 DAYS)
- 4 AS TIME PERMITS (>7 DAYS)
- 5 NEXT UNIT OUTAGE
- 6 NEXT REFUELING OUTAGE

5. UNIT: ☐1 ☒2 ☐SITE EHS
6. SYSTEM CODE
7. COMPONENT NUMBER
8. BIP NUMBER 82
18. SAFETY CLASS ☒SR ☐Q ☐NSR
19. EQ ☐YES ☒NO
20. ASME COMPONENT ☐YES ☒NO
21. CLEANNESS CLASS N/A

9. EQUIPMENT TITLE: [illegible] breakers — 2EHS*MCC [illegible] 4A

10. FAILURE DESCRIPTION AND LOCATION 11. NPRDS. SYMPTOM CODE DESCRIPTION

During Hard transient on 910813 Div II Pump tripped [illegible] for no obvious reason Div I ems and all other Div II [illegible] were found in Normal Positions. [illegible]

12. ORIGINATOR [illegible] Burling X2201 DATE 8/29/91
13. APPROVED RW Gayne DATE 8/29/91
14. W.R. RECEIVED [illegible] DATE 8/29/91
15. PROCEDURE NOS. / N2-EPM-GEN-V582 / / / / ☐ NOT REQUIRED
16. ☐ QA NOTIFIED BY SUPV. DATE / / TIME QA NAME

17. ACCOUNT

ACCOUNT	SUB LEDGER	ACTIVITY ORDER	COST CENTER	SUB CAT	COST COMP	LOCATION	SUB ACCT	PROJ COST ACCT NO
706.30		9541	321257		200	0110		

22. QA REVIEW QA [illegible] DATE 8/29/91 23. INSPECTION REQUIRED ☐YES ☐NO
ISI Review By: S. Champine 8/29/91

STAGED BY DATE / / ☐PARTS ☐PROCEDURE ☐DWG ☐MARKUP ☐RWP ☐NA INIT.

ASSIGNED TO DATE / /

26. NOTIFICATIONS: QC DATE / / TIME ☐NA [illegible] DATE / / TIME

27. CORRECTIVE ACTION 28. NPRDS CORRECTIVE ACTION CODE DESCRIPTION

29. CAUSE OF FAILURE 30. NPRDS FAILURE CODE DESCRIPTION

31. ATTACHMENTS [illegible] CHECKOUTS [illegible]

32. MARK UP NO. [illegible]

33. CORRECTIVE ACTION [illegible]

34. SUPERVISOR REVIEW [illegible]

35. [illegible]

NUMBER 58-32-063 [illegible]

RCIC Flow Oscillations

28

```
HIT......................  1
Work No..................  W184909
Issued...................  910814
Depart...................  300
Status...................  O
Lead or Supprt...........  L
WCC Status...............  05
Unit.....................  2
Component No.............  2ICS*FC101
System No................  ICS
BIP No...................  035
Div......................  I
Safety Class.............  SR
ASME Component...........  N
Title....................  ELECTRONIC FLOW CONTROLLER ( 2ICS*P1 DISCH
Work Item Description....  AFTER SEVERAL MINUTES OF OPERATION DURING
                           QUARTERLY SURVEILLANCE THE RCIC FLOW CONTR
                           AUTO BEGAN TO HUNT AT APPROXIMATELY PLUS O
                           GRAM ABOUT ITS SETPOINT 600 GPM. NEED CONT
                           SETTING VERIFICATION PER ATTACHED AND TROU
                           NECESSARY
Location.................  CCR,306,AE,012.00
Option?  (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Originator...............  FLOOD D
Approved by..............  MCANDREW J
Approval date............  910815
Received By..............  GANOUNG S
Rcvd By Dt...............  910815
Account Code.............  706.30--9521-321258--200-0110
QC Review................  QUEEN S
QA Review Date...........  910815
Inspection Req'd.........  Y
Left Planning............  910815
IP Code..................  3
Merit Score..............  000
Work Cond. Code..........  B
Remarks..................  SENT TO CONTROL ROOM 910819
Work Type Code...........  CM
Power Block Flag.........  Y
Staged By................  PUTMAN, M.
Staged By Date...........  910817
Proj Crew................  2
Proj Dur.................  8
Sched. Start Date........  910821
SSS Notify...............  910821
Option?  (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Lead/Supprt Dpt..........  300
OMG Availability Code....  ##, 11, HO
```

RCIC FLOW OSCILLATIONS

(28)

201 F

```
HIT......................  1
Work No..................  W189944
Issued...................  910627
Depart...................  300
Status...................  O
Lead or Supprt...........  L
Deficiency Tag Number....  026274
WCC Status...............  05
Unit.....................  2
Component No.............  2ICS*T1
System No................  ICS
BIP No...................  035
Safety Class.............  SR
EQ.......................  Y
ASME Component...........  N
Cleanness Class..........  B
Title....................  TERRY TURBINE INCLUDES ALL ASSOCIATED VALVES , PUMPS
                           , PIPING AND EQUIPMENT SHIPPED ON THE SKID
Work Item Description....  RCIC TURBINE SPEED EXHIBITS HUNTING DURING
                           SURVEILLANCE TEST; PERFORM APPLICABLE PROCEDURE STEPS
                           (N2-IMP-ICS-@010) TO TUNE UP THE RCIC CONTROL SYSTEM.
                           TAG HUNG 306 CONTROL ROOM. P601 RCIC CONTROLLER
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Location.................  SC,175,,000.00
NPRDS Failcode...........  B
Originator...............  HWU J
Approved by..............  MURRAY R
Approval date............  910628
Received By..............  FORTIN C
Rcvd By Dt...............  910702
Account Code.............  706.50--9541-321258--200-0110
QC Review................  SIEMERS W
QA Review Date...........  910705
Inspection Req'd.........  N
Left Planning............  910705
IP Code..................  3
Merit Score..............  000
Work Cond. Code..........  A
Remarks..................  SENT TO CONTROL ROOM 910820
Work Type Code...........  CM
Power Block Flag.........  Y
Staged By................  PUYTMAN, M.
Staged By Date...........  910820
Proj Crew................  2
Proj Dur.................  8
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Sched. Start Date........  910822
SSS Notify...............  910823
Lead/Supprt Dpt..........  300
OMG Availability Code....  11, HO
```

Dry Well. Temp - -

29

1 of F

Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
HIT..................... 1
Work No................. W189947
Issued.................. 910819
Depart.................. 300
Status.................. O sched.
Lead or Supprt.......... L
Deficiency Tag Number... 035679
WCC Status.............. 04
Unit.................... 2
Component No............ 2CMS*TRX130
System No............... CMS
BIP No.................. 082
Div..................... I
Safety Class............ SR
ASME Component.......... N
Title................... ELECTRONIC/ 3 PEN TEMPERATURE RECORDER, RECORDS DRYWELL TEMPERATURE.
Work Item Description... PEN SHOWING ELEVATION 307 TEMPERATURE ON DRYWELL TEMP RECORDER DID NOT MOVE DURING TEMP TRANSIENT IN DRYWELL. COPY OF RECORDER PAPER DURING TRANSIENT INCLUDED WITH THIS WR. TAG HUNG AT RECORDER ON PANEL 873
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Location................ CCR,306,AG,011.00
Originator.............. TUTTLE T
Approved by............. KINNEY D
Approval date........... 910820
Received By............. MEYER J
Rcvd By Dt.............. 910820
Account Code............ 706.50--0635-321258--200-0110
QC Review............... SIEMERS W
QA Review Date.......... 910820
Inspection Req'd........ Y
Left Planning........... 910821
IP Code................. 3
Merit Score............. 000
Work Cond. Code......... A
Remarks................. TO FLD 910826
Work Type Code.......... CM
Power Block Flag........ Y
Staged By............... WELLS Y
Staged By Date.......... 910824
Proj Crew............... 2
Proj Dur................ 6
Sched. Start Date....... 910826
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Lead/Supprt Dpt......... 300
OMG Availability Code... HO, ##

INTERNAL CORRESPONDENCE
FORM 112-2 R 02-80 55-01-013

NIAGARA MOHAWK

FROM A. R. Andersen ARA

TO Distribution

DISTRICT Nine Mile Point Nuclear Station

DATE 15 August 91

FILE CODE

(30)

SUBJECT Nine Mile Point
Fire Protection Program
Post Event Interviews

After interviews conducted today with Fire Chief Bernie Harvey, and Firemen Pat Brennan and Mark Locurcio, and concurrence with Terry Vermilyea, System Expert Fire Detection and John Pavlicko of Caution Equipment Inc., I have reached the following conclusions.

1. Of the 20 fire panels at Unit 2, 18 maintained a normal power supply.

2a. Two fire panels LFCP113 and 123 transferred to internal battery backup.

2b. These two panels while on battery will still function normally as long as the 120 VAC is available in the LFCP, which it was.

There was no interruption or decrease of fire protection/detection/suppression at the local fire panels.

Fire Panels 849 and 200/1 being fed from UPS did have a power interruption. This would have left the control switches operable at Panel 849, (as they are fed from LFCP), but Control Room with no fire annunciation. Any fire suppression/indication could also have been initiated locally.

ARA:dlc

Distribution

T. Tomlinson
A. Julka (FAX 7225 - SM)
D. Pringle

INTERNAL CORRESPONDENCE
FORM 112-2 R 02-80 55-01-013

NIAGARA MOHAWK

FROM A. R. Andersen ARA

DISTRICT Nine Mile Point Nuclear Station

TO File

DATE 15 August 91 FILE CODE

SUBJECT Nine Mile Point, Unit 2
Fire Protection Program
Post Event 8/13/91 Interviews

Fire Dept. Personnel Interviews, Post Event of August 13, 1991

Bernie Harvey - Chief - In early for coverage, interviewed for loss of power in Control Building. Lights blinked, loud noise (louder than ever heard in plant), was in Fire Dept. office, told shift to get out into plant.

Pat Wilson was in Rx Bldg, switched radios to Channel 10, standard Fire Dept. practice if suspect loss of repeator.

Pat Brennan was in the Foam Room and proceeded to the Chief's desk.

Chief Harvey heard fire panel alarming when he got to Control Building. Went past Fire Panel 114 in Turbine Building passageway, no audible alarms, seemed normal.

Mark Locurcio went to Panel 126 - 214 elev. while Chief Harvey went to Panel 127 - 244 elev.; these were sounding trouble alarm and DAX was clear. Went past Panels 120, 121, 128; they were normal - no audible.

Prior to Site Area Emergency (SAE) message and evacuation being announced - Pat Brennan reported Panels R.B. normal, called on Gaitronics - had to silence Panels 113 on T.B. 250 and then silenced all Panels in R.B., Panels 101, 103, 104, 105, 106, 107 and 108.

Chief Harvey was going to trip systems wet in R.B. and have man in R.B. Guards Lynn Root, accompanied by Larry Ochsner, called his supervisor, when they saw transformer blow.

Chief Harvey would have liked to get to transformer quicker for fire evaluation. He feels it was at least one hour before evaluation.

Chief Harvey feels Fire Dept. should have been part of initial investigation/inspection team with Operations.

Post Event Aug. 13, 1991 Interview (Cont'd)

Pat Brennan

Pat was in Foam Room approximately 0550, heard loud noise, went to Chief's office and asked what noise was. Lighting dimmed, one string of lights off (NOTE: these feed from Emergency - UPS should have gone off)

Then he went on rover - heard alarms - which were on water treatment system panel, then went to Panel 123. There were no displays on DAX panel, was blank no lights were on. Power lights were off. Trouble light blinking.

Went to T.B. 261 NW, signed sheet, stairtower dark (no problem, knew way around), Turbine Track Bay dimly lighted.

Went to T.B. 306 - OK, signed sheet
" " T.B. Swgr 277 - OK, signed sheet
" " T.B. 250 by Feedpumps - noted not running
" by Panel 113 - no lights on, no audible or trouble alarm
estimates time approximately 0605
Continued rover rounds to Panel 106 - South Stairtower
R.B. 289 was alarming
display said "on internal clock"
had two troubles displayed
Went to R.B. 215 - Fire panel 103 alarming - silenced
" " R.B. 198 - Fire panel 101 alarming - silenced
both panels were in trouble - unknown
" " R.B. 175 - Signed sheet
" " R.B. 261 - SBGTS - OK
Panel 105 - silenced troubles
" " CO2 Room, about this time, evacuation alarm sounded went to Unit 2 Control Room assembly point

Walked around with Pat Brennan on 8-15-91 to Panel 123 and Panel 113, power on light was burned out on Panel 123. "Power on" light was on, on Panel 113.

Post Event Aug. 13, 1991 Interview (Cont'd)

Mark Locurcio (Called at home)

Was located in the Fire Dept. Office when lights flickered and noise was heard. Radio communication was gone. Hear Here was out.

Chief Harvey directed personnel to cover vital areas. Pat Wilson was in RX Bldg. Pat Brennan was roving T.B. Bernie & Mark were to cover Control Bldg.

Trip to C.B. uneventful

Panels Passed in route:

Panel	114	Elect. Bay Elv. 261'	Normal
Panel	120	C.B. Elv. 261'	Normal
Panel	128	C.B. Elv. 261'	Normal
Panel	121	C.B. Elv. 261'	Normal
Panel	125	C.B. Elv. 261'	Normal
Panel	127	C.B. Elv. 244'	Trouble Horn sounding - Silenced
Panel	126	C.B. Elv. 214'	Trouble Horn sounding - Silenced, also an amber light was lit on panel

Checked valve room on C.B. elv. 214' light was on in room. No indication of system actuation.

Stairwells were dark, Elv. 261' C.B. was dark. S.A.E. announcement and reported to Control Room.

31

'NTERNAL CORRESPONDENCE

FROM Raymond Dean

TO File

DISTRICT Nuclear Generation

DATE August 29, 1991

SUBJECT Group 9 isolation experienced during Site Area Emergency.

Upon loss of power to 2VBB-UPS1A, circuits for isolation of group 9 valves due to manual isolation and high radiation were lost. This is due to the isolation from these two sources being energize to trip. Additionally when 2VBB-UPS1B was lost, power to 2GTS-RE105 was lost. This caused the radiation monitor trip output to fail to a closed state. This closed contact feeds a time delay on pick up relay in the NSR section of the group 9 isolation logic.

When power was restored to 2VBB-UPS1A the group 9 logic was restored. This caused the relay fed from the radiation monitor to time out. The result of this time out was energization of the group 9 trip logic and subsequent valve isolation. This explanation assumes that 2VBB-UPS1A was energized 15 seconds prior to 2VBB-UPS1B. A review of other possible scenarios did not indicate any explanation for the trip. It is therefore concluded that the trip most likely occurred due to the powering up of the failed UPS's in the order described.

T. Tomlinson

Here are some charts & drawings to show the indicated water level errors. The actual cold condition may be different from the info I had from startup due to adjustments in the calibration heads used.

If these numbers need to be verified, Engineering may need to produce some calculations for them.

I blew up the Conditions for Calibration from the drawing to make it easier to read.
If you need any more help - Just Call.

R. Norway

7	J.AMBROZ
CHANGED PER (N) KGT-5502RO	
CHK BY: J.GARCIA	

NOTES

1. SUPPL DOC. 1 SHALL BE USED WITH AND FORM A PART OF THIS P&ID DATA. IF THERE ARE ANY CONFLICTS BETWEEN THE P&ID AND THIS P&ID DATA, THE P&ID DATA SHALL GOVERN.
2. MPL NO.'S ARE PREFIXED BY B22 UNLESS OTHERWISE NOTED.
3. WATER LEVEL INSTRUMENTS FOR VARIOUS RANGES ARE CALIBRATED AS STATED BELOW. ALL WATER LEVEL SWITCH SETPOINTS ARE NOMINAL, I.E., THE ANALYSES ARE PERFORMED WITH THE SWITCH TRIP UNCERTAINTY INCLUDED. REACTOR BUILDING TEMPERATURE ASSUMED TO BE 75 °F.
   A. FUEL ZONE: THE INSTRUMENTS ARE CALIBRATED FOR SATURATED WATER STEAM CONDITIONS AT 0 PSIG IN THE VESSEL AND THE DRYWELL WITH NO JET PUMP FLOW.
   B. WIDE RANGE: THE INSTRUMENTS ARE CALIBRATED FOR 1000 PSIG IN THE VESSEL, 135 °F IN THE DRYWELL AND 20 BTU/LB SUB-COOLING BELOW THE MIDDLE WATER LEVEL NOZZLE AND SATURATED CONDITIONS ABOVE THE MIDDLE WATER LEVEL NOZZLE WITH NO JET PUMP FLOW.
   C. NARROW RANGE: (SAFEGUARDS AND FEEDWATER): THE INSTRUMENTS ARE CALIBRATED FOR SATURATED WATER STEAM CONDITIONS AT 1000 PSIG IN THE VESSEL AND 135 °F IN THE DRYWELL.
   D. UPSET RANGE: THE INSTRUMENT IS CALIBRATED FOR SATURATED WATER STEAM CONDITIONS AT 1000 PSIG IN THE VESSEL AND 135 °F IN THE DRYWELL.
   E. SHUTDOWN: THE INSTRUMENT IS CALIBRATED FOR 120 °F WATER AT 0 PSIG IN THE VESSEL AND 80 °F IN THE DRYWELL.
4. THE NUMBER OF SRV'S WHICH SHALL BE CONTROLLABLE (OPEN-CLOSED) FROM THE REMOTE SHUTDOWN SYSTEM SHALL BE ADEQUATE TO BRING THE REACTOR TO COLD SHUTDOWN TAKING THE FOLLOWING INTO ACCOUNT:
   - REACTOR DECAY HEAT
   - HEAT REMOVAL FOR REACTOR COOLDOWN (DEPRESSURIZATION) TO BELOW THE RHR SHUTDOWN COOLING PRESSURE PERMISSIVE (~100 PSIG).
   - SUPPRESSION POOL HEAT UP — ASSUME REACTOR ISOLATED IMMEDIATELY AFTER SCRAM WITH ALL HEAT DUMP GOING TO THE POOL. REACTOR DEPRESSURIZATION RATE MUST BE RAPID ENOUGH TO AVOID SRV DISCHARGE CONDENSATION OSCILLATION PROBLEMS IN THE POOL.

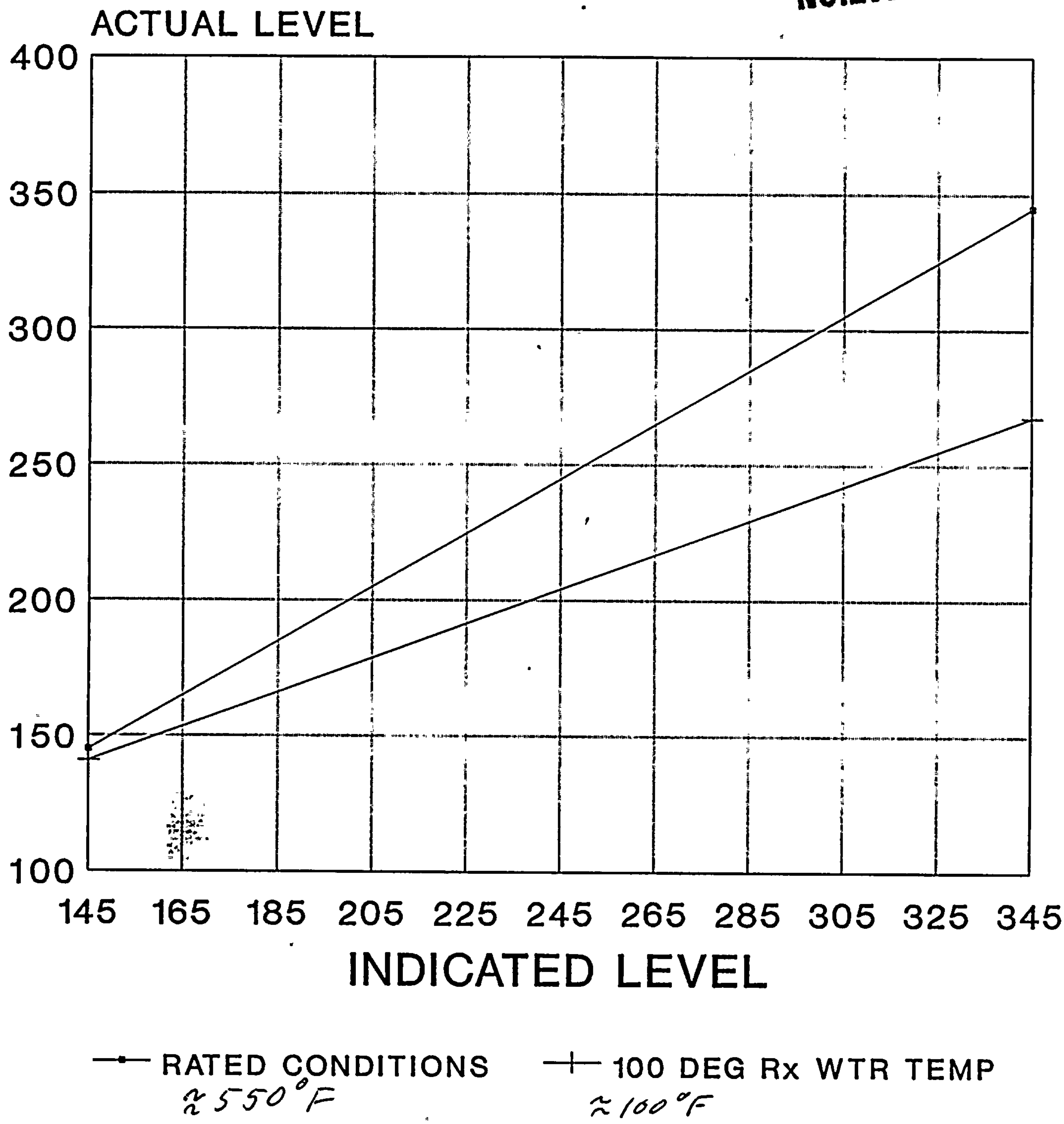
INFORMATION ONLY

P&ID DATA
761E445AF
16.020-001-004N
INFO ONLY

Rx WTR LVL ERROR
UPSET LEVEL

Indication error based upon Rx Vessel WTR Temp

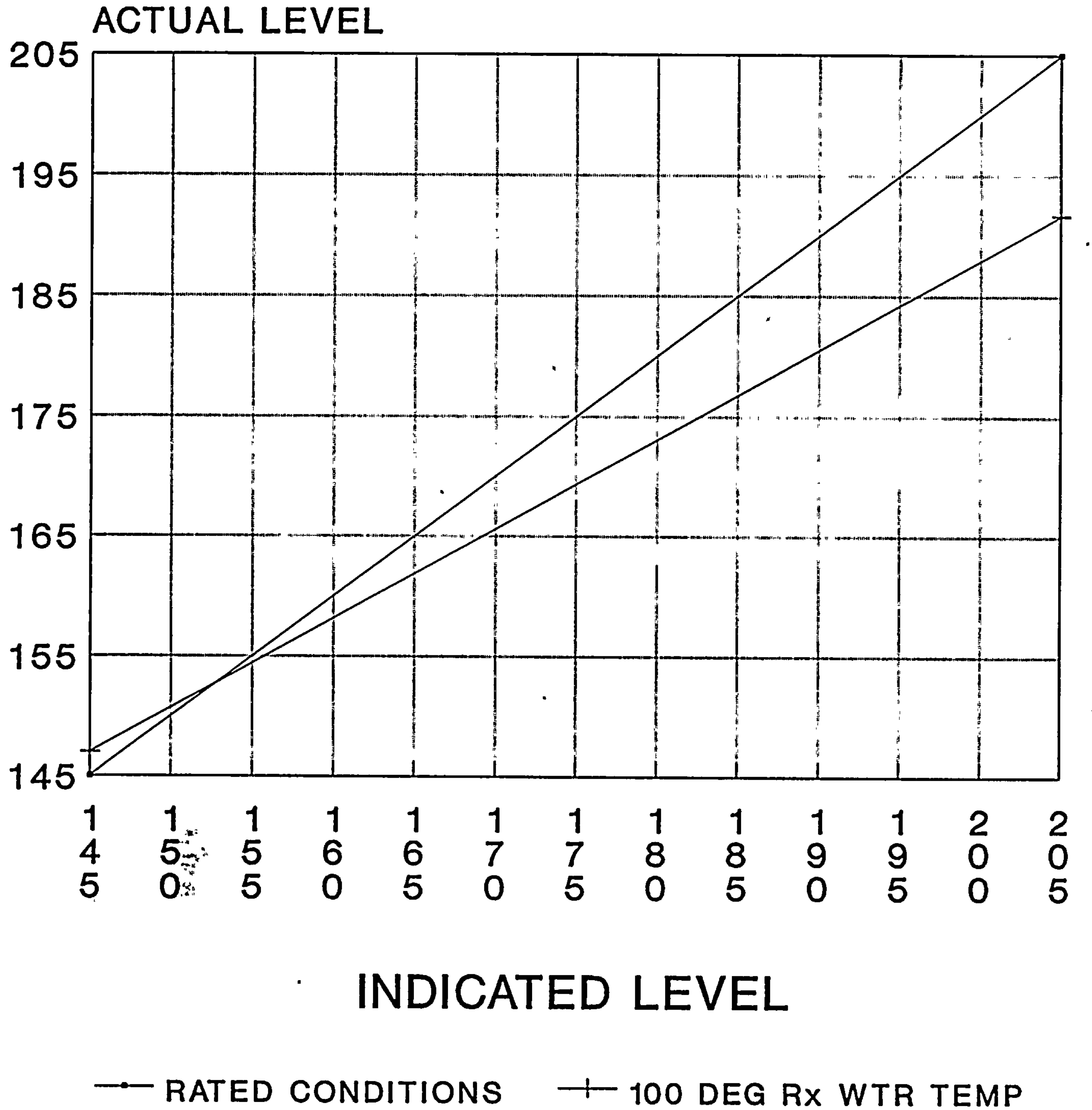
INFORMATION ONLY



INFO ONLY

Rx WATER LEVEL
NARROW RANGE

Indication error based upon Rx Vessel Water Temp



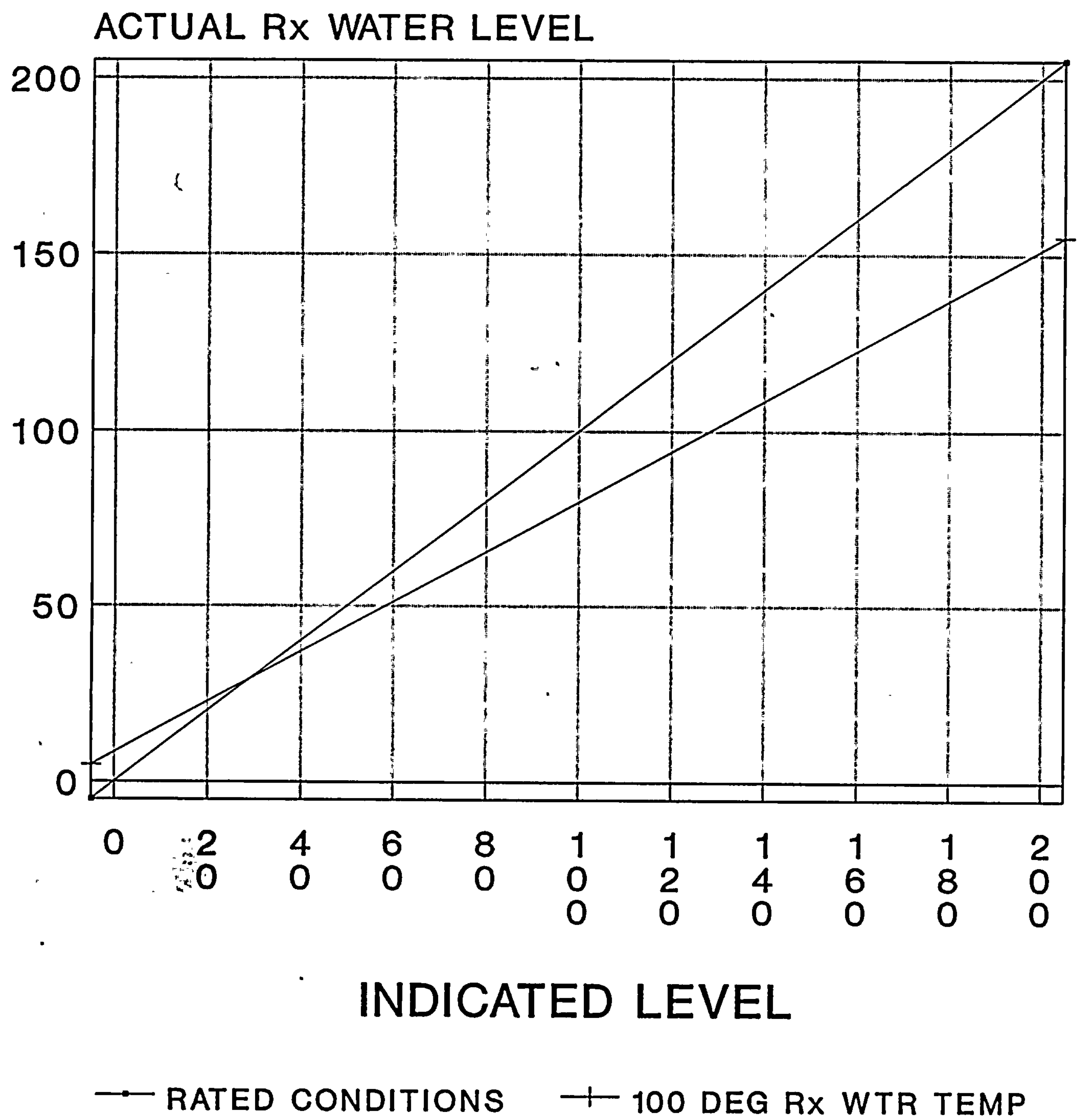
BASED ON STARTUP CALs

Info only

INFORMATION ONLY

Rx WATER LEVEL
WIDE RANGE

Indication error based upon Rx Vessel Water Temp



BASED ON STARTUP INFO

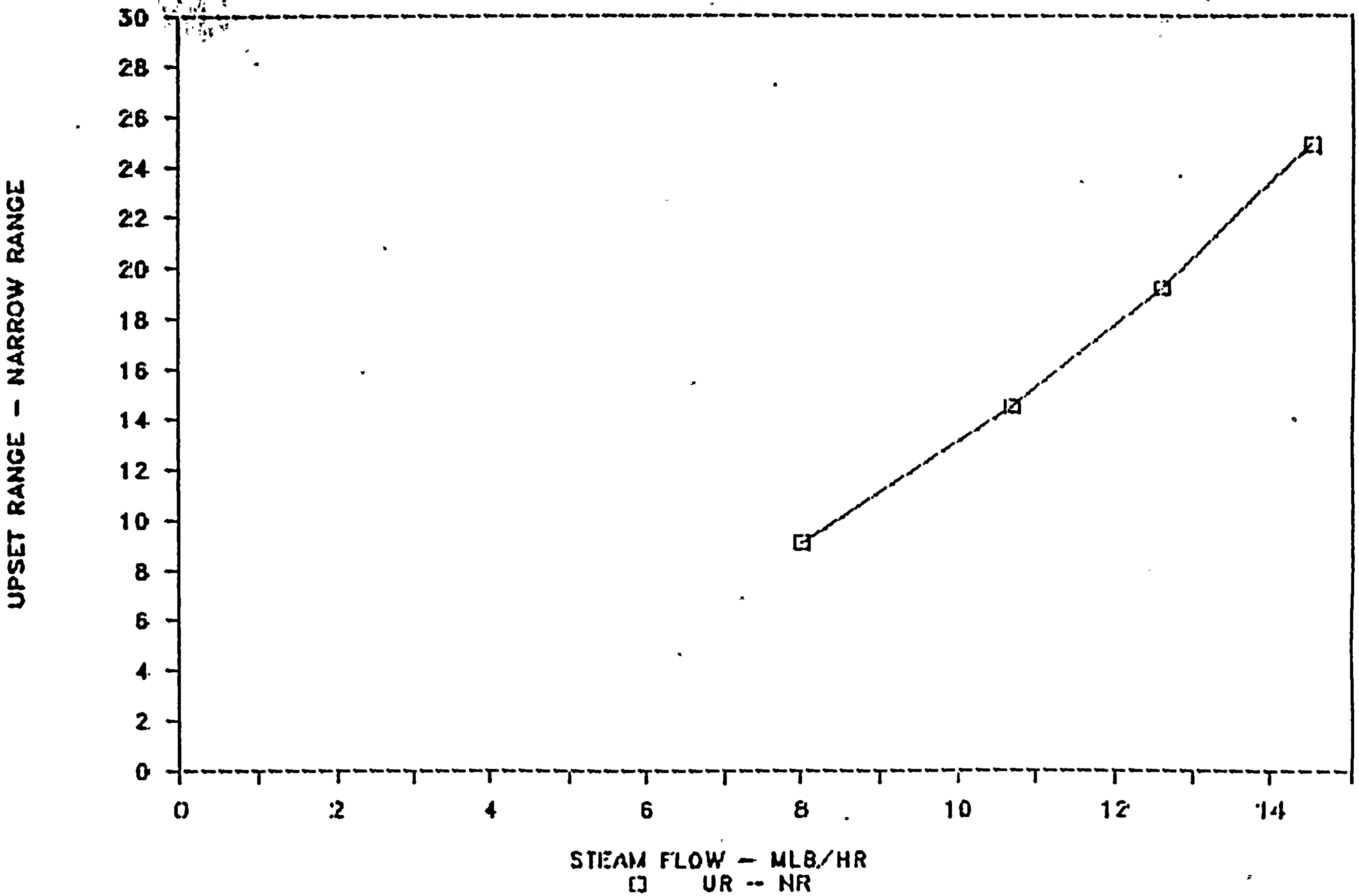
Info only

INFORMATION ONLY

From Unit 2 StarTup Report

FIGURE 3.12-4 STEAM FLOW VS DELTA LEVEL

100% LOAD LINE



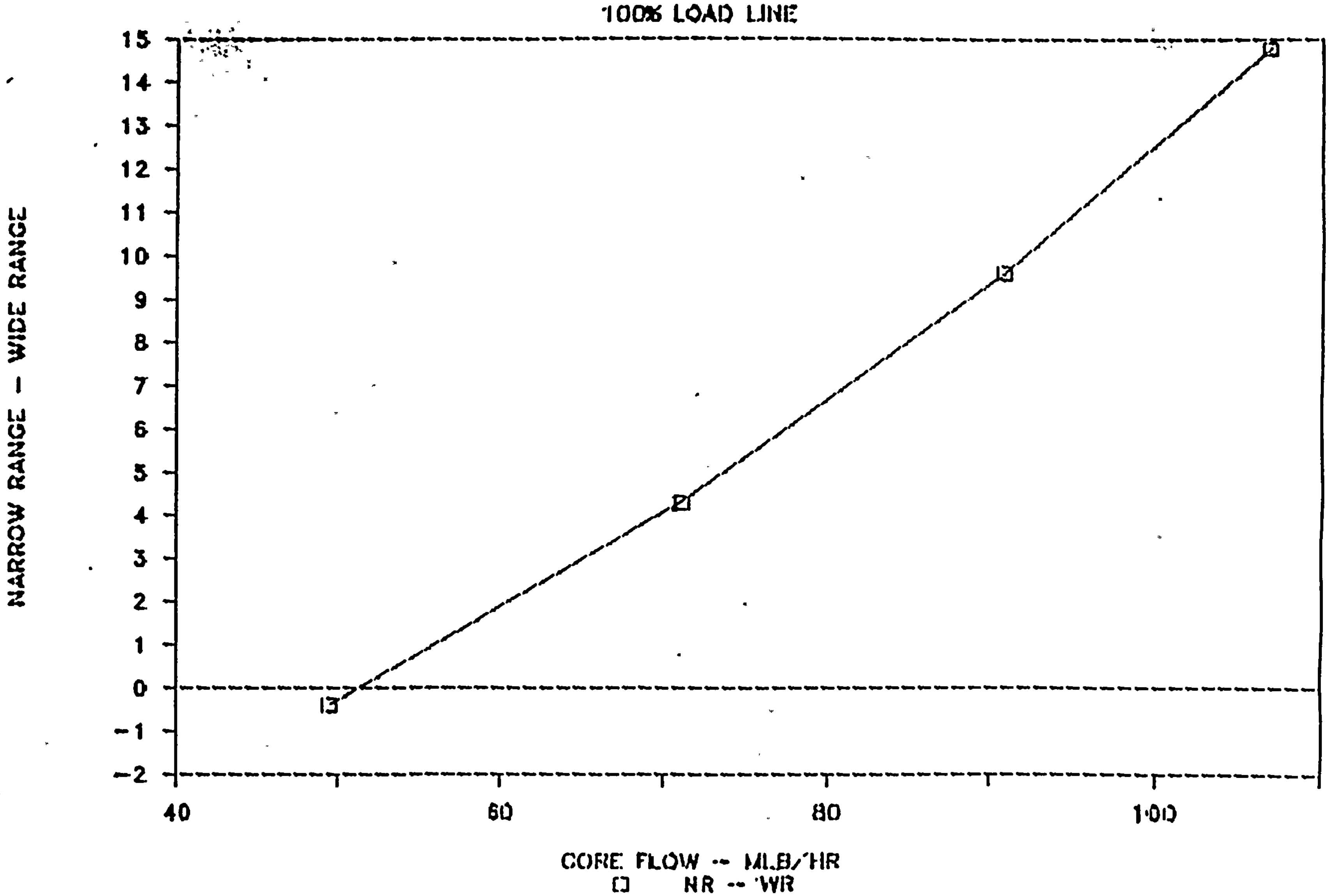
From Startup Report / Unit 2

INFORMATION ONLY

SELECTED PROCESS TEMPERATURES AND WATER LEVEL MEASUREMENTS

N2-SUT-16

FIGURE 3.12-3 CORE FLOW VS DELTA LEVEL



ATTENDANCE
OPERATOR BRIEF

8/14/91

NAME	TITLE
Rich Conte	AIT Leader
Carl Sisco	OPERATIONS ENGINEER
Gene Trager	NRC/AEOD : REACTOR SYSTEMS ENGI
Martin J. McCormick Jr.	Plant Manager Unit 2
JERRY B. HELKER	GEN SUPV. OPS
MICHAEL ERON	ASSS / STA
MICHAEL CONWAY	SSS
E. Mark Davis	CSO
Philip Nichols	Aux Operator "B"
AARON ARMSTRONG	Aux Operator C
Eric Hoffman	AUX. OPERATOR C
TODD KELLY	AUX OPERATOR B
W James Stevens	Aux Operator "C"
James Emery	Incoming Control Room RO
MIKE GARIBUS	R.O.
THOMAS RESTUCCIO	AUX. OPERATOR "B"
DAVID C Hanczyk	INPLANT RO,
MARK A BODOH	CONTROL RM R.O.
BOB CRANDALL	SYSTEM ENGINEER
AL SALEMI	Director Emerg. Prep.
John Conway	Tech. Support Mgr.
M.J. Colomb	Mgr. Operations
Tom Tomlinson	Supv Rx Eng
BRIAN WADE	REACTOR ENGINEER

2 micro cassette tapes were made of this debrief.

(over)

3.12 N2-SUT-16 SELECTED PROCESS TEMPERATURES AND WATER LEVEL MEASUREMENTS

A. OBJECTIVES

1. To ensure that the measured bottom head drain temperature corresponds to bottom head coolant temperature during normal operations.

2. To identify any reactor operating modes that cause temperature stratification.

3. To determine the proper setting of the low flow control limiter for the recirculation pumps to avoid coolant temperature stratification in the reactor pressure vessel bottom head region.

4. To familiarize plant personnel with temperature differential limitations of the reactor system.

5. To measure the reference and variable leg temperatures and recalibrate the instruments if the measured temperatures are different from the values assumed during the initial calibration.

B. ACCEPTANCE CRITERIA

Level 1

1. The reactor recirculation pumps shall not be started, flow increased, nor power increased unless the coolant temperatures between the steam dome and bottom head drain are within 145° F.

2. The recirculation pump in an idle loop must not be started, active loop flow must not be raised, and power must not be increased unless the idle loop suction temperature is within 50°F of the active loop suction temperature and the active loop flow rate is less than or equal to 50 percent of rated loop flow. If two pumps are idle, the loop suction temperature must be within 50°F of the steam dome temperature before pump startup.

Level 2

1. During two-pump operation at rated core flow, the bottom head coolant temperature as measured by the bottom drain line thermocouple is within 30°F of the recirculation loop temperature.

B. Level 2 (Cont'd)

2. The difference between the actual reference and variable leg temperature(s) and the value(s) assumed during initial calibration shall be less than that amount which will result in a scale end point error of 1 percent of the instrument span for each range.

C. DISCUSSION

This test was performed in Test Conditions Heatup, 2,3,5 and 6. During the heatup test phase, the bottom head drain temperature check was performed, stratification checks were performed (during one and two recirculation pump operation), and water level instrumentation endpoint calibrations were checked. In Test Condition 2, water level instrumentation endpoint calibrations were rechecked. In Test Condition 3, water level instrumentation variation was evaluated at 100% total core flow, and a stratification check was performed while in single loop operation. In Test Condition 5 stratification checks were performed during natural circulation testing and the recovery to two loop operation. In Test Condition 6 the difference between Narrow and Wide Range water level indications were recorded and evaluated as a function of total core flow (see Table 3.12-3). In addition, the difference in Narrow Range and Upset Range water level as a function of Steam Flow (100% rod line operation) was evaluated and is shown on Figure 3.12-4.The bottom head drain temperature check was also reperformed as well as performance of stratification checks during one recirculation pump operation. All Level 1 Criteria were successfully met. Test results for stratification checks are summarized on Table 3.12-1. Test results for water level instrumentation endpoint calibrations are summarized on Table 3.13-2. Test Exceptions and their resolutions are summarized on Table 3.12-5.

TABLE 3.12-1

SELECTED PROCESS TEMPERATURES AND WATER LEVEL MEASUREMENTS

N2-SUT-16

STRATIFICATION TEST RESULTS

		Maximum DT			
Parameter	Criteria	TC HU 1 Pump	TC 3 1 Pump	TC 5 2 Pumps	TC 6 1 Pump
Steam Dome to Bottom Head Drain Delta T	≤ 145°F	37.2°F	38.41°F	48.88°F	40.84
Active Loop to Idle Loop Delta T	≤ 50°F	7°F	2.27°F	3.0°F	-3.08°F
Steam Dome to Idle Loop Delta T (If two pumps idle)	≤ 50°F	N/A	N/A	33.9°F	N/A

TABLE 3.12-2

SELECTED PROCESS TEMPERATURES AND WATER LEVEL MEASUREMENTS

N2-SUT-16

WATER LEVEL ENDPOINT CALIBRATIONS*

	Assumed	TC HU	TC 2
Upper Drywell Temperature (Narrow and Wide Range Reference Leg)	135°F	154.4°F	132.2°F
Narrow Range Variable Leg Temperature	135°F	138.9°F	120.7°F
Wide Range Variable Leg Temperature	135°F	110.35°F	102.1°F
Upset Range Reference Leg Temperature	135°F	149.5°F	144.1°F
Upset Range Variable Leg Temperature	135°F	138.9°F	120.7°F
Avg. Reactor Building Temperature	75°F	88.1°F	90.7°F
Narrow Range High Endpoint Error	|<1%|	1) -1.30%	-0.928%
Narrow Range Low Endpoint Error	|<1%|	1) -1.30%	-0.928%
Wide Range High Endpoint Error	|<1%|	0.996%	-0.84%
Wide Range Low Endpoint Error	|<1%|	0.997%	-0.84%
Upset Range High Endpoint Error	|<1%|	-1.29%	-1.12%
Upset Range Low Endpoint Error	|<1%|	-1.29%	-1.12%

*See Startup Test N2-SUT-75 for a discussion of Drywell Temperature Monitoring

1) Actual value after recalculation in TC 2 (See TE 3)

TABLE 3.12-2 (Cont'd)

SELECTED PROCESS TEMPERATURES AND WATER LEVEL MEASUREMENTS

N2-SUT-16

WATER LEVEL ENDPOINT CALIBRATIONS*

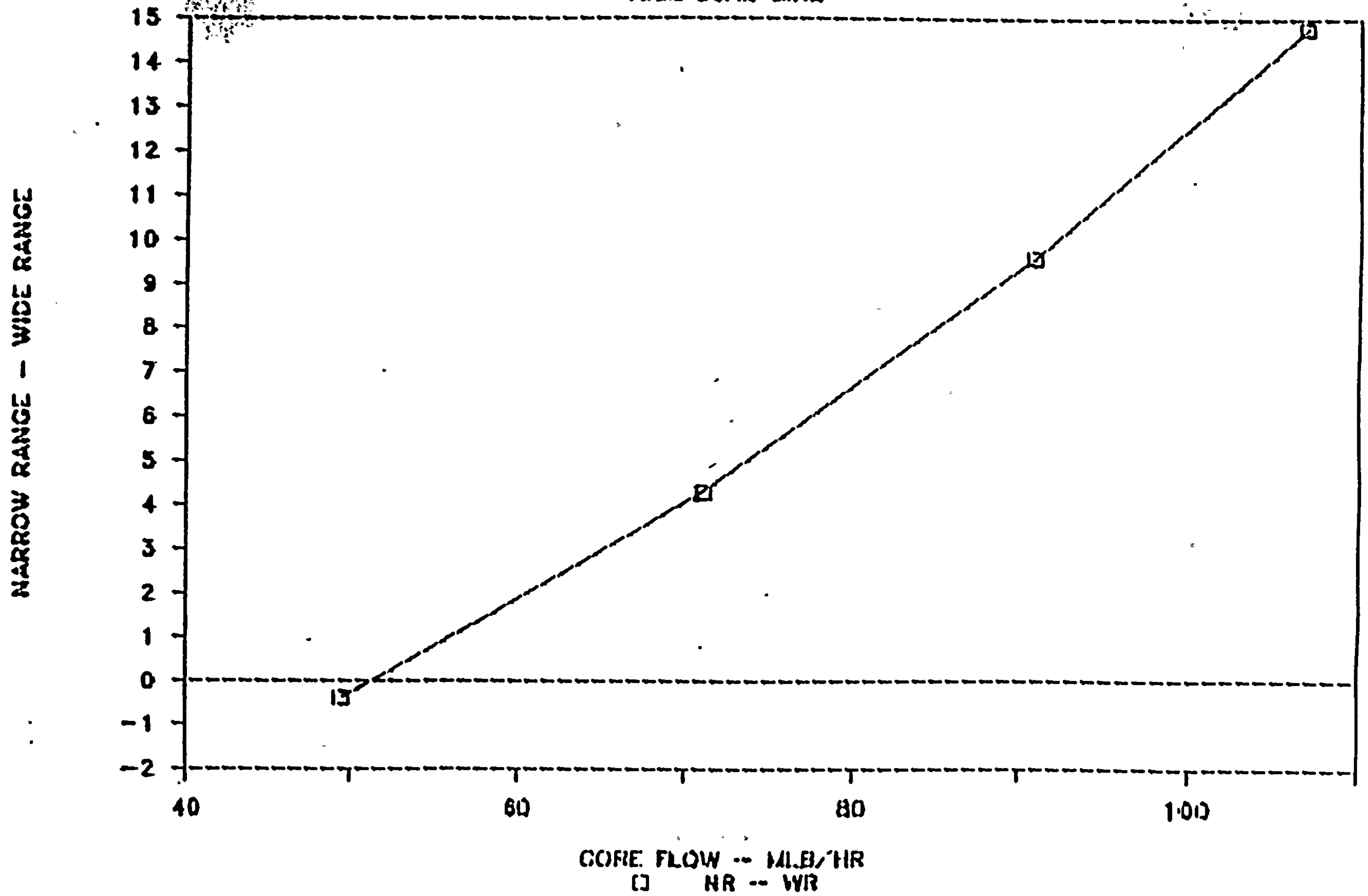
	Assumed	TC HU	TC 2
Shutdown Range Reference Leg Temperature	80°F	90.025°F	N/A
Shutdown Range Variable Leg Temperature	80°F	87.0°F	N/A
Average Reactor Building Temperature	75°F	78.95°F	N/A
Shutdown Range High Endpoint Error	|<1%|	-0.034%	N/A
Shutdown Range Low Endpoint Error	|<1%|	-0.157%	N/A

Water Level Indications

	HU	TC 3	TC 6	TC 6	TC 6	TC 6
Average Narrow Range Level	181.7	183.14	182.9	183.5	183.8	185.1
Average Wide Range Level	182.1	169.38	183.3	179.2	174.2	170.3
Average Upset Range Level	166	189	192	198	203	210
Total Core Flow (MLB/HR)	33	107	49.5	71	91	107
Total Steam Flow (MLB/HR)	2.6	9.5	8.0	10.7	12.6	14.5

FIGURE 3.12-3 CORE FLOW VS DELTA LEVEL

100% LOAD LINE



SELECTED PROCESS TEMPERATURES AND WATER LEVEL MEASUREMENTS

N2-SUT-16

FIGURE 3.12-4 STEAM FLOW VS DELTA LEVEL

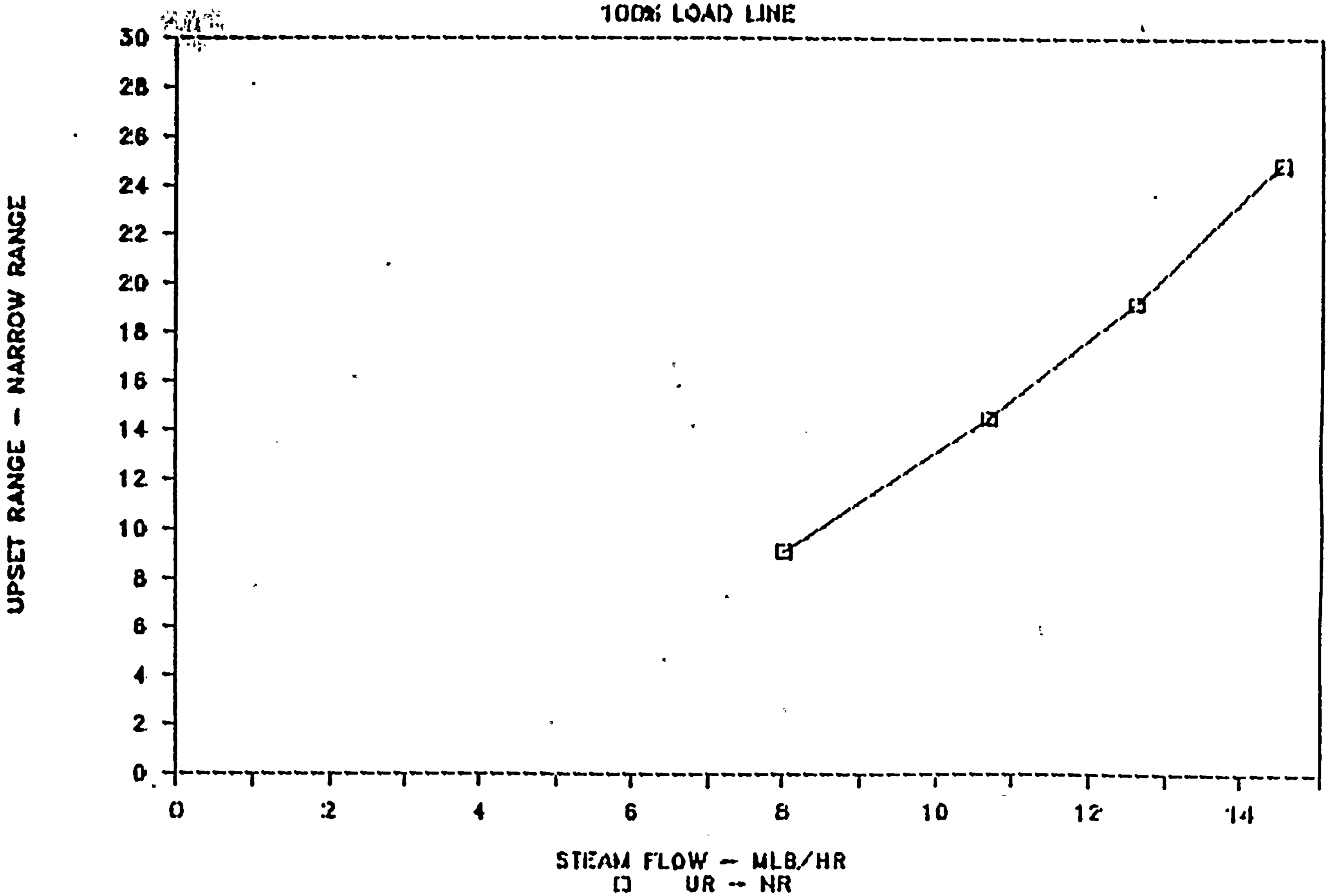


TABLE 3.12-5

SELECTED PROCESS TEMPERATURES AND WATER LEVEL MEASUREMENTS

N2-SUT-16

TEST EXCEPTION SUMMARY

Test Exception	Test Condition	Description
1	HU	Upset Range high and Low Endpoint errors above 1% limit. Exception accepted as is, pending retest after drywell cooling air rebalancing (TC 2).
2	2	Upset Range High and Low Endpoint errors above 1% limit. Exception accepted as is, endpoint errors are less than the minimum readable value.
3	2	A procedural error was found in the equations used to calculate the Narrow Range High and Low Endpoint errors. The procedural error also affected the calculations done in TC HU. Correct calculation showed that a Level 2 criterion violation had occurred in TC HU. Due to improvements in Drywell Cooling, the Level 2 criterion is now satisfied.

8/24/91
T. TUTTLE

LOSS OF DIV II H_2/O_2 SAMPLE PUMP (2CMS*P2B)

- P2B SAMPLE PUMP TRIPS OFF DURING OR IMMEDIATELY AFTER THE ORIGINAL TRANSIENT ($\approx$05:48) ← BASED ON CHART RECORDER - CAUSE OF TRIP NOT YET DETERMINED - POSSIBLE CAUSES:
  - SLUG OF WATER OR CONDENSED MOISTURE IN SAMPLE LINES
  - GROUND CURRENT CAUSES PROBLEM WITH PUMP POWER SUPPLY OR TRIP CIRCUITS

*WR 190966 WRITTEN TO INVESTIGATE PUMP TRIP

- DIV I H_2/O_2 SAMPLING REMAINS NORMAL AFTER THE TRANSIENT (PUMP P2A DID NOT TRIP)
- DIV II SOV'S REMAIN NORMAL AFTER TRANSIENT (LINED UP TO DRYWELL)
- @ $\approx$7:30 SAMPLE PUMP ~~WAS~~ P2B WAS FOUND TRIPPED OFF AT PANEL 875 BY DAVE WILSON DURING A PANEL WALKDOWN. HE NOTED ALL ~~OTHER~~ DIV II SAMPLE LINE SOV'S WERE IN THERE NORMAL POSITIONS, LINED UP TO ~~SAMPLING~~ THE DRYWELL. DAVE RATHBURN (OPERATOR) WAS NOTIFIED AND HE RESTARTED THE PUMP. DAVE WILSON ALSO LOOKED AT P873 ~~ALSO~~ AT THIS TIME AND FOUND THE DIV I PUMP & VALVES IN NORMAL CONDITIONS, SAMPLING THE DRYWELL.
- @ $\approx$8:30 PUMP WAS MANUALLY TURNED OFF AS PER OP 101C FOR COOLDOWN AFTER A SCRAM - IT WAS DECIDED TO ~~LEAVE IT ON LONGER~~ TURN IT BACK ON UNTIL COLD SHUTDOWN WAS REACHED ~~SO THE PUMP WAS TURNED BACK ON~~

WR 190966 35696

PAC BUSINESS FORMS, INC.
SYRACUSE, NEW YORK 13220

Crease Perforation - Pull and Tear in One Motion 2CMS* P2B TRIPPED OFF DURING PLANT TRANSIENT ON 5/13/91 FOR NO OBVIOUS REASON

DATE 8/24/91

DEFICIENCY

"C"

WORK REQUEST

1. DATE 8/24/91

2. W.R. NO. 190966

3. DEPARTMENT TO DO WORK

- L S ELECTRICAL MAINTENANCE
- L S MECHANICAL MAINTENANCE
- [X] L S INSTRUMENTATION & CONTROL
- L S COMPUTER
- L S ISI
- L S SECURITY I & C
- L S FIRE
- L S METER & TEST
- L S OTHER ______

4. PRIORITY OF WORK

- 1 EMERGENCY
- 2 URGENT (<1 DAY)
- 3 NECESSARY (<7 DAYS)
- 4 AS TIME PERMITS (>7 DAYS)
- 5 NEXT UNIT OUTAGE
- 6 NEXT REFUELING OUTAGE

5. UNIT: ~~1~~ [X] 2 ☐ SITE
6. SYSTEM CODE CMS
7. COMPONENT NUMBER 2CMS* P2B
8. BIP NUMBER 82.602
18. SAFETY CLASS [X] SR ☐ Q ☐ NSR
19. EQ ☐ YES [X] NO
20. ASME COMPONENT ☐ YES [X] NO
21. CLEANNESS CLASS ______

9. EQUIPMENT TITLE: DIV II H2/O2 SAMPLE PUMP

10. FAILURE DESCRIPTION AND LOCATION 11. NPRDS. SYMPTOM CODE ☐ DESCRIPTION ______

DURING PLANT TRANSIENT ON 8/13/91, DIV II PUMP TRIPPED (2CMS*P2B) FOR NO OBVIOUS REASON. DIV I CMS AND ALL OTHER DIV II CMS SOV'S WERE FOUND IN THEIR NORMAL POSITIONS. DETERMINE CAUSE OF PUMP TRIP AND CORRECT IF REQUIRED.

12. ORIGINATOR T. TUTTLE x7430 (J. DOCKUM HAS MORE INFO) DATE 8/24/91

13. APPROVED ______ DATE __/__/__

14. W.R. RECEIVED ______ DATE __/__/__

15. PROCEDURE NOS. /__/__/__/__/__/__/ ☐ NOT REQUIRED

16. ☐ QA NOTIFIED BY SUPV. ______ DATE __/__/__ TIME ______ QA NAME ______

17. ACCOUNT

ACCOUNT	SUB LEDGER	ACTIVITY/ORDER	COST CENTER	BUD CAT	COST COMP	LOCATION	SUB. ACCT.	PROJ. COST ACCT. NO.

22. QA REVIEW QA ______ DATE __/__/__ 23. INSPECTION REQUIRED ☐ YES ☐ NO INIT

24. STAGED BY ______ DATE __/__/__ ☐ PARTS ☐ PROCEDURE ☐ DRWG ☐ MARKUP ☐ RWP ☐ NA INIT

25. ASSIGNED TO ______ DATE __/__/__

26. NOTIFICATIONS: QC DATE __/__/__ TIME ______ ☐ NA QA INIT. ______ SSS DATE __/__/__ TIME ______

27. CORRECTIVE ACTION 28. NPRDS CORRECTIVE ACTION CODE ☐☐ DESCRIPTION ______

29. CAUSE OF FAILURE 30. NPRDS FAILURE CODE ☐☐ DESCRIPTION ______

31. ATTACHMENTS ☐ MATERIAL ISSUES ☐ PROCEDURE CHECKLISTS ☐ INSPECTION REPORTS ☐ LAS ☐ ______

32. MARK UP NO'S /__/__ RWP NO'S /__/__ QCIR NO'S ______ NCR NO'S ______

33. CORRECTIVE ACTION COMPLETED BY ______ DATE __/__/__

34. SUPERVISOR REVIEW BY ______ DATE __/__/__ INIT

35. WORK ACCEPTED BY QA ______ ☐ NA DATE __/__/__ INIT

36. PMT REVIEW BY ______ ☐ ASSS/SSS ☐ SUPV. DATE __/__/__

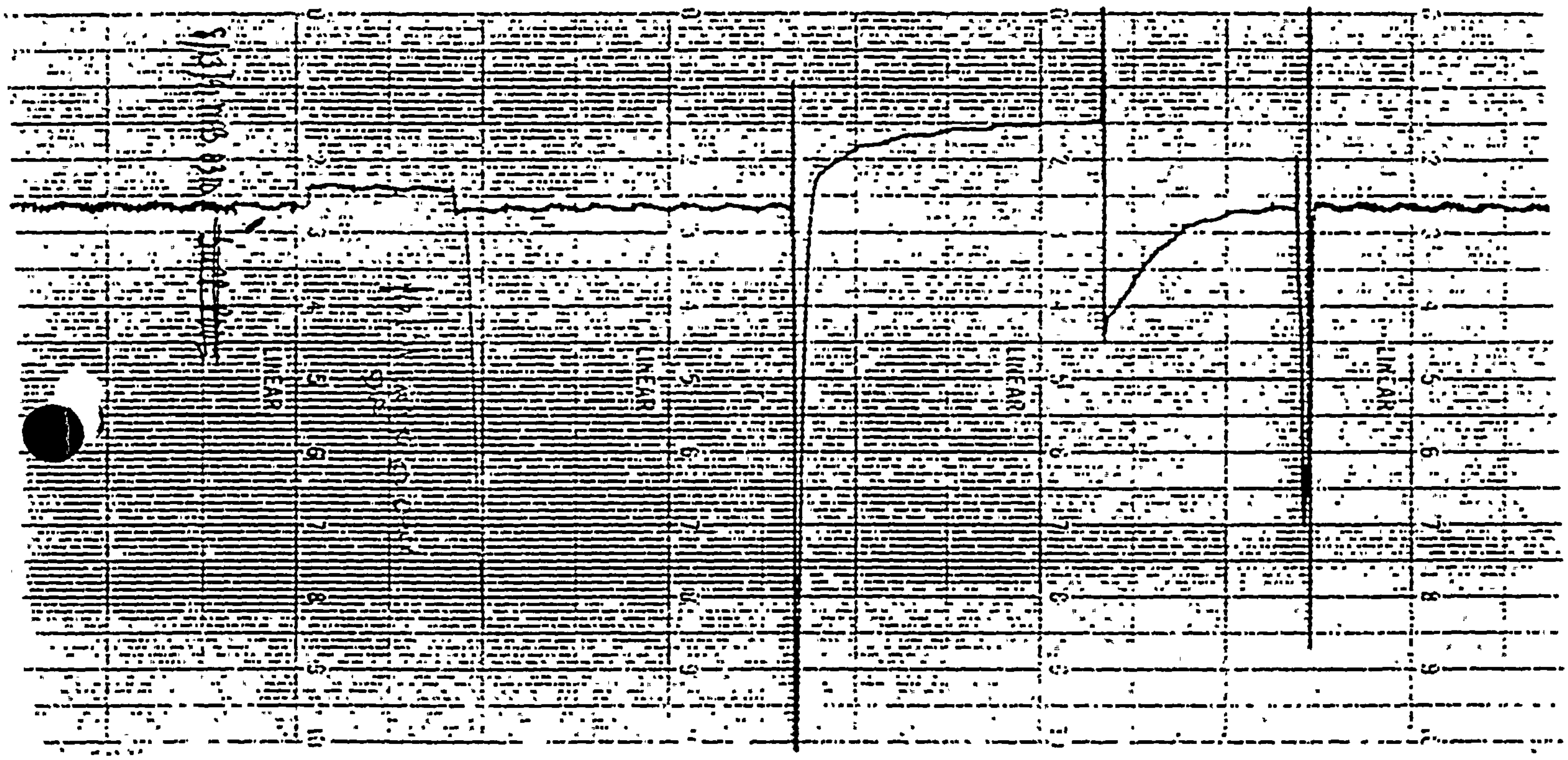
37. PMT PROCEDURE NO'S. __/__/__/__/__ ☐ PMT TEST REPORT ☐ NOT REQUIRED INIT

38. PMT COMPLETE VERIFIED BY ______ ☐ NA DATE __/__/__ INIT

39. ACCEPTED BY ______ ☐ SSS ☐ SUPV. DATE __/__/__

(DIV II)

2CMS*AR71B CONTAINMENT OXYGEN CONCENTRA



05:48
TRANSIENT
PUMP TRIPS

≈07:30
PUMP
MANUALLY
RESTARTED
(2CMS*P2B)

≈8:30
OPERATOR
~~and~~ TURNED
OFF PUMP
AS DIRECTED
BY OP - RESTARTED
IMMEDIATELY
AFTER

HOW POWER WAS INITIALLY RESTORED TO UPS'S

FROM J. HOLKER'S DRAFT "ASSESSMENT OF OPERATOR RESPONSE & TRAINING EFFECTIVENESS

UPS MAINT POWER RESTORATION

When it was recognized that the UPS-1 power supplies were lost, operators were dispatched to identify the problems and restore power. Power was restored manually at each UPS. It was identified that the existing procedure (N2-OP-71) for restoring UPS power did not fully address the restoration of the UPSs in their current configuration, thus the operator was required to utilize his knowledge of UPSs in order to access and manually close in the maintenance power supply breaker. This is considered appropriate response under these emergency conditions in order restore control room alarm and instrumentation system. This is specifically authorized by AP-2.0 (Rev. 23) section 3.4.4 which states "In emergency situations not addressed by procedures, personnel may take action to avoid or minimize personnel injury or damage to the station". Additionally this action of manually operating a breaker is considered within an operators Skills of the Trade. N2-ODI-5.16 (Rev. 0) Skills of the Trade will be revised to add manual operation of breakers (other than 13.8 and 4.16 KV which have a separate procedure for operation).

Cycle 2 Power History

NINE MILE PT2 CY02
MONTHLY CORE PERFORMANCE LOG
SEQUENCE NO 1 (FINAL)

COVERAGE BEGIN 19-JAN-1991 16:56
COVERAGE END 31-JAN-1991 23:59
PRINT TIME 1-FEB-1991 02:01

MONTHLY SUMMARY

DAYS IN CYCLE	12.3
ELECTRICAL ENERGY (MWD)	
MONTH	378.
CYCLE	378.
EFFICIENCY	
MONTH	0.098
CYCLE	0.098
EXPOSURE (MWD/ST)	
MONTH	25.
CYCLE	25.
CORE	8834.
CAPACITY FACTOR	
MONTH	0.095
CYCLE	0.095
AVAILABILITY	
MONTH	1.000
CYCLE	1.000

BATCH EXPOSURES (MWD/ST)

1. 12193 2. 11635 4. 32

CONTROL BURNUP (MAX B10 DEPLETION)
0.09

LPRM LIFE (MIN)
40.33 GWD/ST

DAILY SUMMARY

DATE	CAPACITY FACTOR THERM	CAPACITY FACTOR ELECT	ENERGY (MWD) THERM	ENERGY (MWD) ELECT	CORE MARGINS MFLCPR	CORE MARGINS MAPRAT	CORE MARGINS MFLPD
22	0.011	0.000	118.7	0.0	N/A	N/A	N/A
23	0.145	0.000	160.8	0.0	0.378	0.374	0.381
26	0.039	0.000	474.7	0.0	0.352	0.368	0.376
27	0.123	0.000	408.0	0.0	0.324	0.345	0.353
28	0.195	0.081	484.1	70.8	0.472	0.404	0.410
29	0.147	0.028	613.6	41.0	0.348	0.350	0.358
30	0.165	0.010	546.9	11.1	0.479	0.420	0.429
31	0.321	0.220	1065.8	255.5	0.629	0.527	0.533

9

NINE MILE PT2 CY02
MONTHLY CORE PERFORMANCE LOG
SEQUENCE NO 2 (FINAL)

COVERAGE BEGIN 1-FEB-1991 00:00
COVERAGE END 28-FEB-1991 23:59
PRINT TIME 1-MAR-1991 02:00

MONTHLY SUMMARY

DAYS IN CYCLE	40.3
ELECTRICAL ENERGY (MWD)	
MONTH	26079.
CYCLE	26458.
EFFICIENCY	
MONTH	0.333
CYCLE	0.322
EXPOSURE (MWD/ST)	
MONTH	508.
CYCLE	533.
CORE	9342.
CAPACITY FACTOR	
MONTH	0.841
CYCLE	0.614
AVAILABILITY	
MONTH	1.000
CYCLE	1.000

BATCH EXPOSURES (MWD/ST)
1. 12399 2. 12166 4. 703

CONTROL BURNUP (MAX B10 DEPLETION)
0.09

LPRM LIFE (MIN)
12.24 GWD/ST

DAILY SUMMARY

DATE	CAPACITY FACTOR THERM	CAPACITY FACTOR ELECT	ENERGY (MWD) THERM	ENERGY (MWD) ELECT	CORE MARGINS MFLCPR	CORE MARGINS MAPRAT	CORE MARGINS MFLPD
1	0.375	0.267	1245.9	310.2	0.612	0.442	0.446
2	0.371	0.263	1231.5	306.6	0.583	0.424	0.429
3	0.370	0.224	1231.1	260.5	0.590	0.440	0.446
4	0.561	0.480	1863.3	559.1	0.816	0.623	0.620
5	0.600	0.537	1995.4	624.5	0.827	0.616	0.613
6	0.609	0.549	2024.6	638.4	0.860	0.644	0.643
7	0.635	0.575	2108.9	669.3	0.843	0.649	0.657
8	0.647	0.590	2148.7	686.9	0.846	0.766	0.760
9	0.789	0.753	2621.4	876.0	0.845	0.856	0.857
10	0.952	0.931	3163.3	1083.0	0.883	0.904	0.901
11	0.997	0.976	3312.5	1135.4	0.905	0.982	0.976
12	0.999	0.978	3318.1	1138.0	0.900	0.964	0.959
13	0.999	0.977	3320.2	1137.6	0.899	0.951	0.946
14	0.998	0.974	3316.8	1134.1	0.895	0.938	0.933
15	0.957	0.936	3180.3	1089.0	0.894	0.939	0.933
16	0.987	0.966	3279.0	1123.8	0.904	0.940	0.941
17	0.998	0.977	3317.5	1137.2	0.898	0.943	0.938
18	0.998	0.977	3317.2	1136.6	0.905	0.936	0.931
19	0.999	0.973	3319.6	1132.5	0.909	0.938	0.933
20	1.000	0.975	3322.1	1134.8	0.910	0.927	0.929
21	0.821	0.805	2728.2	937.1	0.914	0.927	0.929
22	0.925	0.894	3073.2	1040.0	0.895	0.876	0.878
23	0.975	0.954	3240.7	1110.3	0.919	0.949	0.951
24	0.999	0.976	3320.3	1135.6	0.910	0.932	0.934
25	0.999	0.976	3320.1	1136.3	0.917	0.933	0.935
26	0.999	0.977	3320.9	1136.6	0.913	0.925	0.927
27	0.998	0.975	3315.9	1134.6	0.917	0.924	0.925
28	1.000	0.976	3322.2	1135.5	0.918	0.926	0.927

NINE MILE PT2 CY02
MONTHLY CORE PERFORMANCE LOG
SEQUENCE NO 3 (FINAL)

COVERAGE BEGIN 1-MAR-1991 00:00
COVERAGE END 30-MAR-1991 20:00
PRINT TIME 12-APR-1991 17:29

MONTHLY SUMMARY

DAYS IN CYCLE	70.1
ELECTRICAL ENERGY (MWD)	
MONTH	32868.
CYCLE	59325.
EFFICIENCY	
MONTH	0.341
CYCLE	0.332
EXPOSURE (MWD/ST)	
MONTH	625.
CYCLE	1158.
CORE	9967.
CAPACITY FACTOR	
MONTH	0.971
CYCLE	0.766
AVAILABILITY	
MONTH	1.000
CYCLE	1.000

BATCH EXPOSURES (MWD/ST)
1. 12640 2. 12818 4. 1544

CONTROL BURNUP (MAX B10 DEPLETION)
0.09

LPRM LIFE (MIN)
10.69 GWD/ST

DAILY SUMMARY

DATE	CAPACITY FACTOR THERM	CAPACITY FACTOR ELECT	ENERGY (MWD) THERM	ENERGY (MWD) ELECT	CORE MARGINS MFLCPR	CORE MARGINS MAPRAT	CORE MARGINS MFLPD
1	0.998	0.965	3315.4	1122.6	0.919	0.926	0.928
2	0.973	0.943	3232.9	1097.5	0.919	0.926	0.927
3	0.934	0.911	3103.0	1059.7	0.924	0.954	0.954
4	0.998	0.977	3317.7	1136.7	0.922	0.944	0.945
5	0.998	0.978	3317.1	1138.4	0.924	0.932	0.929
6	1.000	0.975	3322.4	1134.6	0.923	0.933	0.931
7	0.999	0.980	3320.0	1139.9	0.922	0.934	0.930
8	0.991	0.976	3293.4	1136.1	0.926	0.933	0.929
9	0.891	0.868	2962.0	1010.1	0.914	0.934	0.933
10	0.998	0.980	3318.0	1139.9	0.911	0.935	0.934
11	0.999	0.979	3318.6	1138.8	0.916	0.909	0.909
12	0.998	0.976	3317.3	1135.5	0.911	0.923	0.922
13	0.999	0.981	3320.8	1141.8	0.905	0.921	0.919
14	1.000	0.981	3321.9	1142.0	0.902	0.921	0.920
15	0.995	0.977	3307.8	1136.5	0.904	0.919	0.917
16	0.999	0.981	3321.1	1141.6	0.903	0.923	0.921
17	0.999	0.983	3319.9	1143.7	0.905	0.922	0.920
18	1.000	0.982	3322.2	1143.2	0.907	0.921	0.920
19	1.000	0.981	3321.3	1141.4	0.908	0.930	0.928
20	1.000	0.982	3321.9	1143.0	0.902	0.935	0.932
21	0.999	0.969	3320.8	1127.8	0.903	0.930	0.928
22	0.999	0.977	3321.0	1136.5	0.903	0.930	0.928
23	0.997	0.978	3313.7	1138.3	0.908	0.931	0.928
24	1.000	0.980	3322.4	1141.0	0.906	0.931	0.928
25	0.999	0.980	3320.2	1140.9	0.908	0.929	0.927
26	0.999	0.980	3320.2	1139.9	0.906	0.933	0.931
27	0.999	0.974	3319.4	1133.4	0.903	0.940	0.937
28	0.999	0.964	3320.7	1122.0	0.903	0.938	0.936
29	1.000	0.981	3321.3	1141.9	0.904	0.938	0.936
30	0.252	0.126	699.1	122.7	0.536	0.383	0.387

NINE MILE PT2 CY02

MONTHLY CORE PERFORMANCE LOG
SEQUENCE NO 4 (FINAL)

COVERAGE BEGIN 30-MAR-1991 20:00
COVERAGE END 30-APR-1991 23:59
PRINT TIME 1-MAY-1991 02:01

MONTHLY SUMMARY

DAYS IN CYCLE	101.3
ELECTRICAL ENERGY (MWD)	
MONTH	20087.
CYCLE	79413.
EFFICIENCY	
MONTH	0.343
CYCLE	0.335
EXPOSURE (MWD/ST)	
MONTH	380.
CYCLE	1539.
CORE	10347.
CAPACITY FACTOR	
MONTH	0.567
CYCLE	0.704
AVAILABILITY	
MONTH	1.000
CYCLE	1.000

BATCH EXPOSURES (MWD/ST)
1. 12784 2. 13214 4. 2059

CONTROL BURNUP (MAX B10 DEPLETION)
0.10

LPRM LIFE (MIN)
10.69 GWD/ST

DAILY SUMMARY

DATE	CAPACITY FACTOR THERM	CAPACITY FACTOR ELECT	ENERGY (MWD) THERM	ENERGY (MWD) ELECT	CORE MARGINS MFLCPR	CORE MARGINS MAPRAT	CORE MARGINS MFLPD
12	0.016	0.020	679.7	301.8	0.470	0.364	0.367
13	0.525	0.453	1743.2	527.4	0.875	0.674	0.673
14	0.939	0.915	3120.7	1064.4	0.945	0.985	0.983
15	0.993	0.974	3299.9	1133.2	0.916	0.969	0.969
16	0.999	0.978	3318.3	1138.6	0.927	0.927	0.925
17	1.000	0.984	3321.9	1144.8	0.919	0.924	0.922
18	0.999	0.972	3321.0	1131.5	0.919	0.926	0.923
19	1.000	0.982	3321.7	1142.6	0.922	0.927	0.924
20	0.996	0.980	3308.6	1140.8	0.922	0.928	0.925
21	0.999	0.983	3321.1	1144.5	0.921	0.925	0.922
22	0.999	0.985	3321.2	1146.2	0.921	0.924	0.921
23	1.000	0.982	3321.7	1143.1	0.921	0.923	0.921
24	0.994	0.961	3304.3	1118.3	0.921	0.922	0.919
25	1.000	0.982	3322.0	1142.3	0.921	0.922	0.920
26	1.000	0.978	3322.5	1138.7	0.920	0.923	0.921
27	0.988	0.968	3282.7	1126.7	0.922	0.925	0.923
28	1.000	0.978	3322.0	1138.0	0.921	0.925	0.923
29	1.000	0.974	3322.3	1133.3	0.919	0.927	0.925
30	1.000	0.972	3322.3	1131.2	0.918	0.927	0.924

NINE MILE PT2 CY02
MONTHLY CORE PERFORMANCE LOG
SEQUENCE NO 5 (FINAL)

COVERAGE BEGIN 1-MAY-1991 00:00
COVERAGE END 31-MAY-1991 23:59
PRINT TIME 1-JUN-1991 02:01

MONTHLY SUMMARY

DAYS IN CYCLE	132.3
ELECTRICAL ENERGY (MWD)	
MONTH	34840.
CYCLE	114253.
EFFICIENCY	
MONTH	0.340
CYCLE	0.337
EXPOSURE (MWD/ST)	
MONTH	665.
CYCLE	2204.
CORE	11012.
CAPACITY FACTOR	
MONTH	0.994
CYCLE	0.772
AVAILABILITY	
MONTH	1.000
CYCLE	1.000

BATCH EXPOSURES (MWD/ST)
1. 13037 2. 13900 4. 2973

CONTROL BURNUP (MAX B10 DEPLETION)
0.11

LPRM LIFE (MIN)
10.69 GWD/ST

DAILY SUMMARY

DATE	CAPACITY FACTOR THERM	CAPACITY FACTOR ELECT	ENERGY (MWD) THERM	ENERGY (MWD) ELECT	CORE MARGINS MFLCPR	CORE MARGINS MAPRAT	CORE MARGINS MFLPD
1	1.000	0.976	3322.2	1135.7	0.917	0.928	0.926
2	1.000	0.982	3322.1	1142.7	0.919	0.929	0.927
3	1.000	0.981	3321.5	1142.2	0.917	0.930	0.928
4	0.967	0.952	3214.1	1108.5	0.998	0.974	0.991
5	1.000	0.981	3322.5	1142.0	0.952	0.958	0.973
6	1.000	0.942	3322.3	1096.5	0.953	0.961	0.976
7	0.925	0.899	3075.0	1046.4	0.952	0.959	0.974
8	0.994	0.977	3302.7	1137.4	0.945	0.974	0.988
9	0.999	0.982	3320.2	1142.3	0.947	0.952	0.967
10	1.000	0.981	3322.4	1141.4	0.943	0.953	0.968
11	0.990	0.967	3288.8	1125.0	0.942	0.931	0.943
12	1.000	0.970	3323.1	1128.8	0.941	0.930	0.942
13	1.000	0.973	3322.6	1132.6	0.939	0.931	0.944
14	1.000	0.973	3321.5	1132.8	0.934	0.946	0.959
15	1.000	0.976	3321.8	1135.4	0.927	0.947	0.959
16	0.976	0.937	3243.6	1090.0	0.926	0.936	0.950
17	0.998	0.967	3314.8	1125.3	0.931	0.944	0.957
18	0.994	0.974	3302.9	1134.1	0.930	0.942	0.956
19	1.000	0.979	3321.9	1139.8	0.929	0.941	0.955
20	1.000	0.976	3322.7	1136.4	0.929	0.942	0.956
21	0.999	0.971	3321.3	1129.6	0.928	0.951	0.965
22	1.000	0.970	3321.6	1128.5	0.926	0.948	0.962
23	1.000	0.965	3322.2	1122.6	0.927	0.948	0.962
24	1.000	0.958	3322.6	1115.4	0.928	0.949	0.964
25	0.993	0.957	3299.3	1113.4	0.930	0.952	0.967
26	1.000	0.964	3322.8	1121.4	0.930	0.952	0.967
27	1.000	0.957	3321.6	1113.5	0.930	0.953	0.968
28	0.999	0.967	3321.2	1124.8	0.931	0.954	0.970
29	0.999	0.964	3321.0	1121.4	0.932	0.956	0.971
30	0.999	0.959	3320.9	1116.2	0.931	0.955	0.971
31	0.999	0.961	3320.7	1118.3	0.931	0.957	0.974

NINE MILE PT2 CY02

MONTHLY CORE PERFORMANCE LOG
SEQUENCE NO 6 (FINAL)

COVERAGE BEGIN 1-JUN-1991 00:00
COVERAGE END 30-JUN-1991 23:59
PRINT TIME 1-JUL-1991 02:01

MONTHLY SUMMARY

DAYS IN CYCLE	162.3
ELECTRICAL ENERGY (MWD)	
MONTH	33560.
CYCLE	147813.
EFFICIENCY	
MONTH	0.339
CYCLE	0.337
EXPOSURE (MWD/ST)	
MONTH	643.
CYCLE	2846.
CORE	11655.
CAPACITY FACTOR	
MONTH	0.993
CYCLE	0.813
AVAILABILITY	
MONTH	1.000
CYCLE	1.000

BATCH EXPOSURES (MWD/ST)

1. 13280 2. 14557 4. 3869

CONTROL BURNUP (MAX B10 DEPLETION)
0.12

LPRM LIFE (MIN)
10.69 GWD/ST

DAILY SUMMARY

DATE	CAPACITY FACTOR THERM	CAPACITY FACTOR ELECT	ENERGY (MWD) THERM	ENERGY (MWD) ELECT	CORE MARGINS MFLCPR	CORE MARGINS MAPRAT	CORE MARGINS MFLPD
1	0.993	0.965	3300.9	1123.2	0.933	0.963	0.980
2	1.000	0.971	3322.1	1130.2	0.931	0.964	0.980
3	0.999	0.972	3320.3	1131.6	0.931	0.962	0.979
4	0.996	0.971	3310.8	1130.1	0.932	0.967	0.984
5	0.999	0.975	3318.8	1134.6	0.933	0.969	0.986
6	0.999	0.975	3318.9	1134.5	0.920	0.960	0.956
7	1.000	0.974	3322.7	1133.2	0.918	0.960	0.957
8	0.961	0.933	3194.8	1085.6	0.924	0.960	0.959
9	0.999	0.973	3320.4	1131.9	0.923	0.960	0.957
10	1.000	0.964	3321.7	1121.9	0.918	0.963	0.960
11	1.000	0.966	3321.3	1124.1	0.917	0.966	0.963
12	1.000	0.971	3322.2	1129.7	0.918	0.970	0.966
13	1.000	0.979	3322.2	1138.9	0.919	0.966	0.963
14	1.000	0.974	3321.6	1133.7	0.919	0.969	0.965
15	0.991	0.954	3293.3	1110.1	0.919	0.969	0.965
16	1.000	0.962	3322.1	1120.0	0.918	0.971	0.967
17	1.000	0.969	3321.8	1128.0	0.918	0.972	0.968
18	1.000	0.966	3322.4	1124.7	0.919	0.973	0.970
19	1.000	0.965	3322.4	1123.1	0.919	0.975	0.971
20	1.000	0.965	3322.3	1123.2	0.920	0.978	0.974
21	0.999	0.965	3320.1	1122.5	0.922	0.980	0.976
22	0.990	0.964	3291.3	1121.6	0.922	0.982	0.978
23	0.899	0.870	2987.2	1012.6	0.897	0.964	0.978
24	0.984	0.956	3271.5	1112.3	0.902	0.931	0.944
25	0.999	0.967	3321.2	1125.8	0.889	0.916	0.928
26	0.999	0.956	3318.2	1112.4	0.888	0.916	0.927
27	0.999	0.958	3318.4	1115.1	0.886	0.927	0.937
28	0.999	0.928	3319.6	1080.5	0.884	0.924	0.931
29	1.000	0.965	3322.6	1122.7	0.881	0.922	0.930
30	0.994	0.964	3302.9	1122.1	0.881	0.923	0.930

NINE MILE PT2 CY02

MONTHLY CORE PERFORMANCE LOG
SEQUENCE NO 7 (FINAL)

COVERAGE BEGIN 1-JUL-1991 00:00
COVERAGE END 31-JUL-1991 23:59
PRINT TIME 1-AUG-1991 02:00

MONTHLY SUMMARY

DAYS IN CYCLE	193.3
ELECTRICAL ENERGY (MWD)	
MONTH	32835.
CYCLE	180648.
EFFICIENCY	
MONTH	0.336
CYCLE	0.337
EXPOSURE (MWD/ST)	
MONTH	635.
CYCLE	3481.
CORE	12290.
CAPACITY FACTOR	
MONTH	0.949
CYCLE	0.835
AVAILABILITY	
MONTH	1.000
CYCLE	1.000

BATCH EXPOSURES (MWD/ST)

1. 13518 2. 15202 4. 4767

CONTROL BURNUP (MAX B10 DEPLETION)
0.12

LPRM LIFE (MIN)
10.69 GWD/ST

DAILY SUMMARY

DATE	CAPACITY FACTOR THERM	CAPACITY FACTOR ELECT	ENERGY (MWD) THERM	ENERGY (MWD) ELECT	CORE MARGINS MFLCPR	CORE MARGINS MAPRAT	CORE MARGINS MFLPD
1	0.996	0.969	3308.7	1127.8	0.884	0.923	0.931
2	1.000	0.971	3322.8	1130.6	0.882	0.923	0.927
3	1.000	0.966	3321.4	1124.3	0.883	0.924	0.926
4	1.000	0.962	3322.2	1119.7	0.883	0.925	0.927
5	1.000	0.963	3321.6	1121.3	0.882	0.937	0.946
6	0.999	0.962	3321.2	1119.3	0.870	0.936	0.941
7	0.733	0.677	2436.6	788.3	0.867	0.840	0.842
8	0.692	0.630	2298.5	733.1	0.888	0.694	0.705
9	0.721	0.666	2394.5	775.6	0.901	0.924	0.933
10	0.804	0.763	2670.3	887.5	0.866	0.836	0.849
11	0.839	0.801	2786.6	932.3	0.848	0.852	0.866
12	0.869	0.832	2888.4	968.0	0.887	0.963	0.975
13	0.998	0.965	3315.4	1122.6	0.887	0.975	0.990
14	0.999	0.966	3320.5	1124.6	0.867	0.977	0.992
15	0.999	0.966	3320.8	1124.6	0.868	0.948	0.958
16	1.000	0.966	3321.7	1123.9	0.867	0.948	0.959
17	1.000	0.961	3322.3	1118.0	0.866	0.948	0.961
18	0.999	0.957	3320.6	1113.3	0.865	0.948	0.960
19	0.999	0.953	3321.2	1108.6	0.866	0.950	0.961
20	0.821	0.767	2729.6	892.6	0.891	0.943	0.957
21	0.992	0.949	3295.0	1104.0	0.899	0.961	0.988
22	0.999	0.957	3320.9	1114.0	0.898	0.946	0.977
23	1.000	0.953	3321.9	1108.8	0.892	0.946	0.977
24	1.000	0.965	3321.6	1123.3	0.892	0.942	0.974
25	1.000	0.958	3322.1	1115.1	0.892	0.943	0.975
26	0.999	0.956	3318.0	1112.8	0.894	0.944	0.983
27	0.993	0.962	3300.1	1119.1	0.896	0.946	0.986
28	0.999	0.970	3320.6	1128.4	0.896	0.946	0.986
29	0.999	0.965	3320.5	1123.2	0.896	0.945	0.986
30	0.992	0.958	3295.7	1114.5	0.908	0.981	0.998
31	0.994	0.959	3303.0	1115.7	0.881	0.965	0.979

GROCHO>

NINE MILE PT2 CY02 COVERAGE BEGIN 1-AUG-1991 00:0(

MONTHLY CORE PERFORMANCE LOG COVERAGE END 13-AUG-1991 04:00

SEQUENCE NO 8 (IN PROGRESS) PRINT TIME 17-AUG-1991 14:43

MONTHLY SUMMARY

DAYS IN CYCLE	205.4
ELECTRICAL ENERGY (MWD)	
MONTH	13609.
CYCLE	194257.
EFFICIENCY	
MONTH	0.337
CYCLE	0.337
EXPOSURE (MWD/ST)	
MONTH	262.
CYCLE	3743.
CORE	12552.
CAPACITY FACTOR	
MONTH	0.998
CYCLE	0.845
AVAILABILITY	
MONTH	1.000
CYCLE	1.000

BATCH EXPOSURES (MWD/ST)

1. 13616 2. 15466 4. 5142

CONTROL BURNUP (MAX B10 DEPLETION)

0.12

LPRM LIFE (MIN)

10.69 GWD/ST

DAILY SUMMARY

DATE	CAPACITY FACTOR THERM	CAPACITY FACTOR ELECT	ENERGY (MWD) THERM	ENERGY (MWD) ELECT	CORE MARGINS MFLCPR	CORE MARGINS MAPRAT	CORE MARGINS MFLPD
1	1.000	0.961	3321.3	1118.5	0.877	0.957	0.969
2	0.994	0.956	3303.6	1112.9	0.877	0.962	0.972
3	0.992	0.962	3297.1	1119.9	0.877	0.962	0.973
4	1.000	0.967	3322.2	1125.2	0.877	0.960	0.970
5	1.000	0.968	2768.8	938.6	0.876	0.962	0.970
6	0.999	0.950	3871.5	1289.8	0.877	0.963	0.973
7	1.000	0.967	3321.7	1125.5	0.886	0.962	0.970
8	1.000	0.956	3323.4	1113.1	0.884	0.942	0.962
9	1.000	0.966	3322.4	1124.0	0.882	0.939	0.957
10	0.991	0.955	3291.7	1111.4	0.882	0.946	0.964
11	1.000	0.964	3321.6	1121.5	0.880	0.941	0.960
12	1.000	0.964	3324.5	1121.5	0.880	0.943	0.962
13	1.000	0.966	553.8	187.5	0.880	0.943	0.962

End of Data -- Type Control Y to Return

INTERNAL CORRESPONDENCE

FORM 112-2 R 02-80 55-01-013

Kvern Later.

NIAGARA MOHAWK

①

FROM Y. SOONG

TO J. BLASIAK

DISTRICT NUCLEAR DIVISION

DATE AUGUST 28, 1991 FILE CODE *

SUBJECT EVALUATION OF REACTOR WATER CHEMISTRY TRANSIENTS AT NMP2

I. INTRODUCTION

Since the resin intrusion into the NMP2 reactor coolant occurred in November 1990, NMP2 has experienced two incidents of elevated sulfate excursion in reactor water during plant shutdown. These two incidents occurred on March 31, 1991 and on August 13, 1991 respectively.

In response to your request to Mr. A. Vierling for technical evaluation of reactor water chemistry transient data and their impact on the structural integrity of reactor vessel and vessel internals, I have already forwarded to you a report entitled "Evaluation of Water Chemistry Excursion at Nine Mile Point Unit 2, August 13, 1991", prepared by Structural Integrity Associates. The objective of this report is to highlight the contractor's views on the subject and to offer our own assessment on transients' effects and possible sulfate sources. Recommended actions are provided to alleviate the problem for elimination of future sulfate intrusion.

II. GENERAL DISCUSSION

1. During normal operation, the reactor water chemistry at NMP2 is well within the Mode 1 (see Attachment 1) NDD-CHE reactor water limits, and also within the achievable value, as defined in EPRI's Normal Water Chemistry Guideline. In the study of these two incidents, one thing that is certain is that the sulfate excursion appeared to always begin after the plant shutdown activities were initiated.

2. Based on my discussion with Dr. Dan Cubicciotti of EPRI, the spike in conductivity was very similar in the duration (a few hours) and height (about 1 micros/cm) to the shutdown spike in Hamaoka 1 (a Japanese BWR). The sulfate behavior was also similar and may be a type of "hideout return". Unfortunately, Hamaoka treated the case in a very proprietary way, without much information available.

3. According to technical specification, the temperature of reactor coolant below 200°F is defined as cold shutdown mode. Review of those plots of pertinent plant parameters reveals that the majority of the transient duration of sulfate (see Attachment 2) occurred while the plant was in cold shutdown (ie., over 90%). In EPRI's Water Chemistry Guideline, no action level is available for sulfate during cold shutdown; however, sulfate must be below 100 ppb before proceeding to startup.

4. Sulfate is probably the most detrimental impurity relative to IGSCC in the BWR. Sulfates at levels in the PPB range have been shown to significantly increase both the likelihood of crack initiation and crack growth rate for sensitized Type 304 or 316 stainless steel at BWR operation condition (see Attachment 3). Nickel alloys, used in BWR such as Inconel 600, and the related weld metals (Inconel 182), also exhibit a sensitivity to IGSCC in sulfate contaminated environments at BWR operating temperature.

III. POSSIBLE SULFATE SOURCE

1. One of the possible sources of sulfate is via condenser leakage when the cooling water contains large amounts (900 gallons sulfuric acid added per day) of sulfate. In Mr. Salvagno's report, dated August 22, 1991, condenser tube leakage has been carefully examined.

2. It is possible there are still very small amounts of residual resin fines or resin beads remaining in a variety of locations such as CRD tubes area or other crevice locations even though measures have been taken to remove the sulfate from the water after the incidence of resin intrusion in November 1990.

3. A plausible explanation for the source of sulfate is that during operation resin fines get into reactor water and decompose to form sodium sulfate (the sodium may come from demineralizer leakage or corrosion products). The solubility of hydrated sodium sulfate increases very rapidly with increasing temperature. When the temperature reaches around 80°F, the stable solid phase becomes $Na_2 So_4$, the interesting case is that the solubility of this phase turns to decrease with increasing temperature (see Attachment 4). The concentration of sulfate in the water during operation is small (10-20 ppb), but due to the heat flux and boiling on the fuel rods, the sodium sulfate may become concentrated on the fuel rods and stays on the fuel surface until shutdown operation, and is then released to the water, showing up as a spike in conductivity because the solubility increases as temperature decreases.

4. Another alternative explanation is that the "hideout return" of sodium sulfate may be caused by splashing and sulfate dry out on surfaces in the reactor (not necessarily the fuel rod surfaces) and subsequent washing into the reactor water during shutdown operation while the water level is raised to higher elevation than that during normal operation.

5. Sulfate (and other anions) may also be released from deposits or corrosion product films under thermal transients, as determined by solubility relationships for the specific ions. During plant shutdown condition, the reactor water clean-up system is totally isolated and does not function to minimize impurities concentration. Therefore, any ionic impurities (salts) which enter the water from different sources, such as discussed above, will be higher during shutdown than during normal operation.

IV. SULFATE EXCURSION IMPACTS AND CONCLUSION

1. The major concerns over the sulfate excursion will be focused on an environment where the reactor water chemistry is over EPRI's Guidelines. The major characteristics of abnormal condition include:

- Conductivity (us/cm) > 1
- Sulfate (ppb) > 100
- Chloride (ppb) > 100
- Temperature > 200°F

In review of the plots of plant parameters (see Attachment 2), it is shown that the time for RPV and internals exposed to the vulnerable environment during sulfate excursion was only 4-5 hours. In general, no corrective actions are required if the parameters can return to their normal range within 96 hours.

2. The IGSCC response of reactor vessel and internals to water chemistry transients is not readily quantified. Nonetheless, an increase in the sulfate and/or conductivity can affect the probability of IGSCC. However, the severity of the degradation is a function of the alloy, its microstructure (sensitized, irradiated) and, to a greater extent, the temperature. Since the reactor vessel and internals were exposed to the high sulfate condition for only a very short time at temperatures in excess of 200°F, the probability of crack initiation on uncracked components was probably small. Sulfate induced IGSCC is NOT anticipated at temperatures less than 200°F. Further, since times were short, crack growth of stainless steels was also likely to be minimal.

V. RECOMMENDATIONS

1. Plant startup should be modified, as GE recommended measures as a general guideline, so that the reactor water cleanup system may be used at maximum flow rate to remove all impurity concentrations, including sulfate, further from the water at the lowest practical temperature. Such an approach may require additional time during startup to ensure that hot spots or hideouts of sulfate anions have been purged to the maximum extent practical.

2. The source of contamination is not very apparent based upon the data provided. Partially decomposed resins remaining from the November 1990 resin intrusion would certainly appear to be a likely source. Recommendations for additional monitoring of fluid streams and a slow, carefully monitored startup are strongly recommended to avoid incurring any possible damage as the reactor is brought to power.

3. Generally, the effect of impurities in water chemistry on IGSCC crack propagation rate is a slow increase rather than sudden cracking. Due to this long time lapse between initiation and failure, the possibility of in-plant observation would be very low. Therefore, any augmented inspection plan for internals does not appear to be required at this time due to the very short duration and low temperature associated with the water chemistry transient unless similar incidents occur again in the future with increase of frequency and extent.

4. Additional water chemistry monitoring should be carefully established to identify impurities sources, especially water chemistry for some specific components. For example, the forward-pumped high pressure heater drain can contribute a large percentage of corrosion products in the final feedwater system, and these corrosion products will certainly aggravate the sulfate excursion or higher conductivity. During plant shutdowns, the normal-power-operation water chemistry level should be maintained as long as possible.

5. Sulfuric acid has been injected into cooling water to aid in controlling the formation of scale. Improvement of operating practice by use of appropriate amount of sulfuric acid may be needed. Overuse of sulfuric acid would have adverse effects, especially if condenser tube leaks exist. To prevent or minimize the ingress of contaminants due to possible condenser tube leaks, appropriate techniques should be used to locate condenser leakage. Prompt response to the problems of condenser tube leaks is essential to the quality of feedwater.

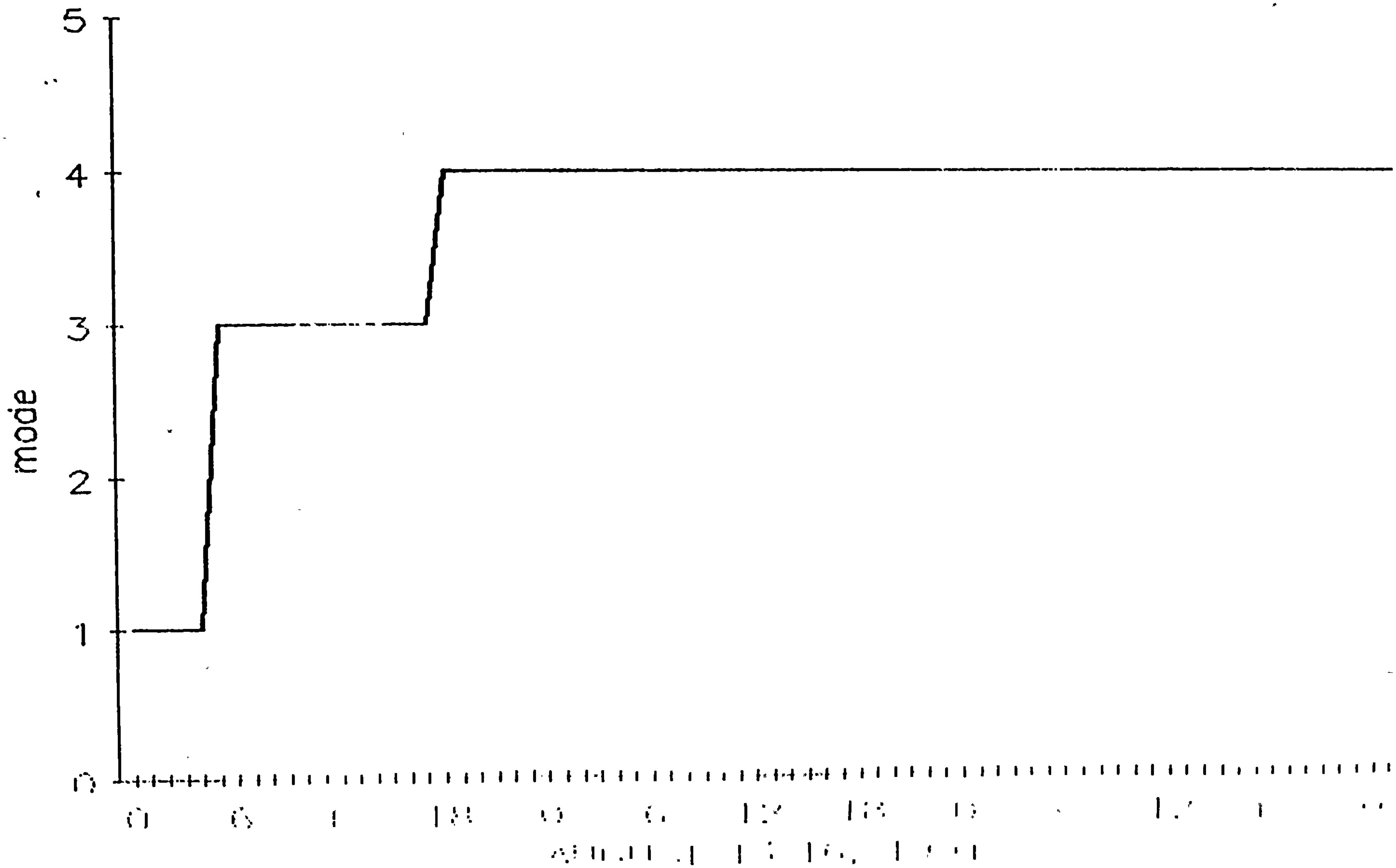
Yung P. Soong

Y. Soong
Sr. Engineer, Pgm. Development

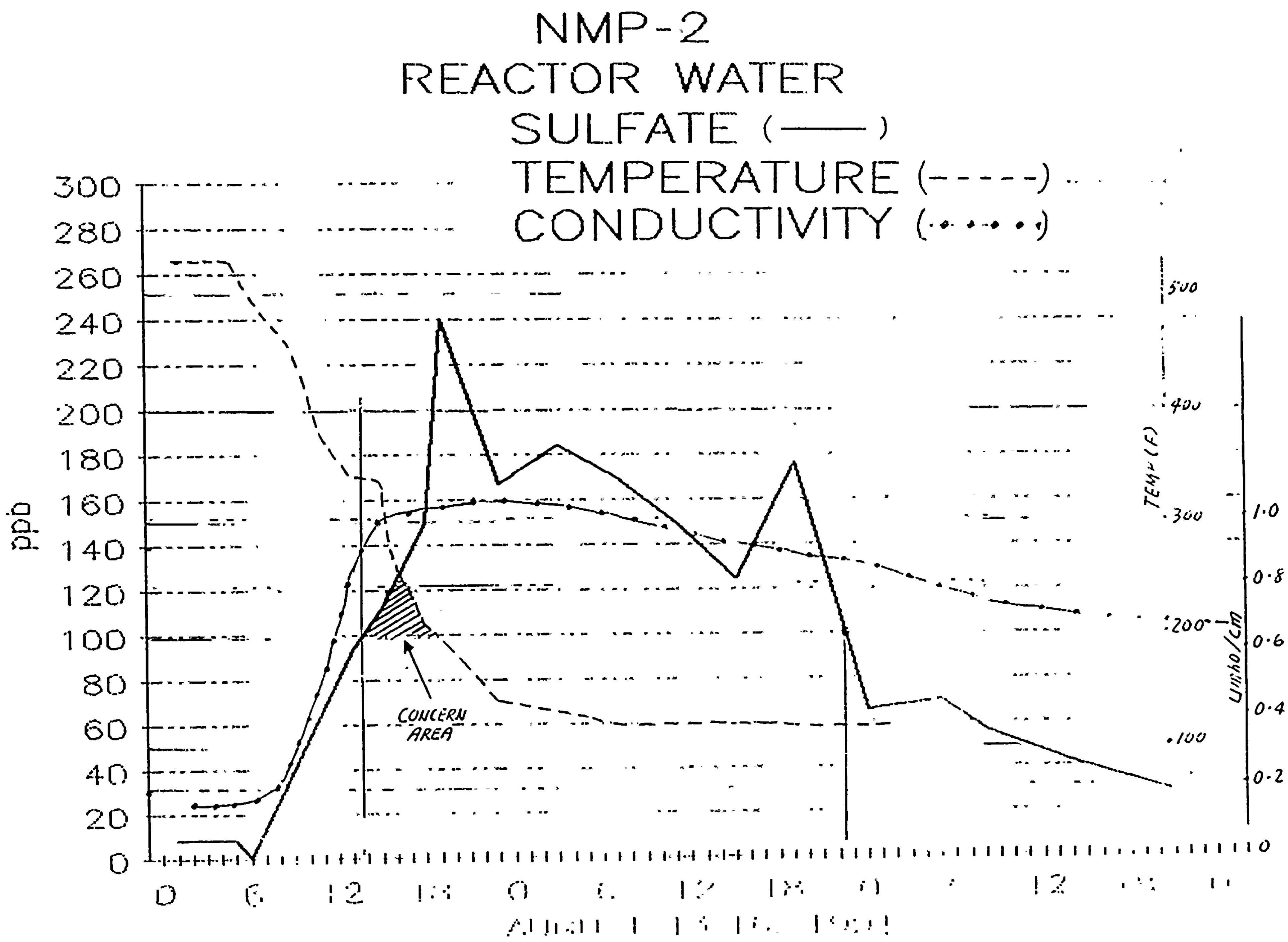
YS/jsj
Attachment
000779YY

xc: R. Abbott
A. Vierling
B. Cassolli
M. Colomb
J. Conway
T. Kurtz
R. Hammelmann
M. McCormick
G. Gresock
E. Tomlinson
K. Ward
* Records Management (File Code #SM-ISI91-0175)

NMP-2
REACTOR
MODE



ATTACHMENT 1



ATTACHMENT 2

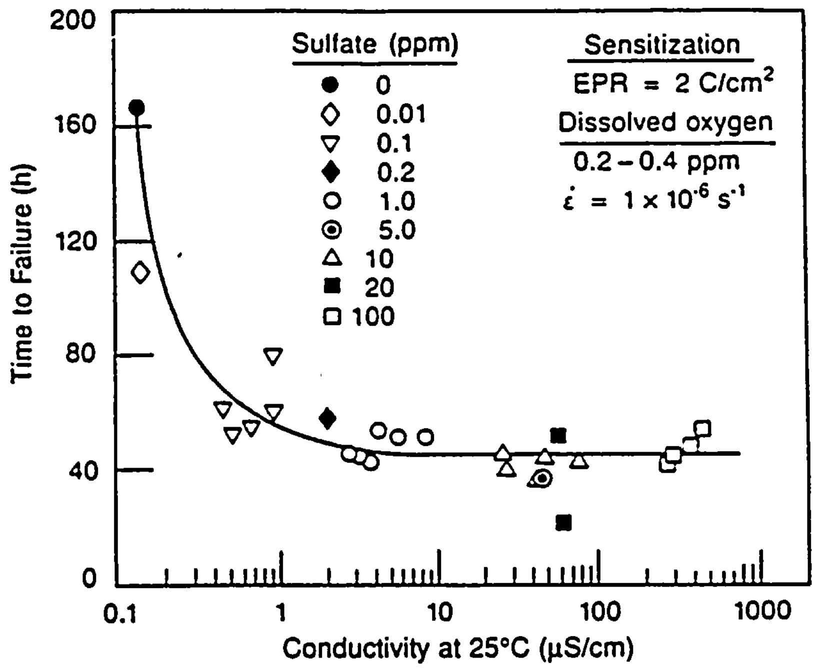
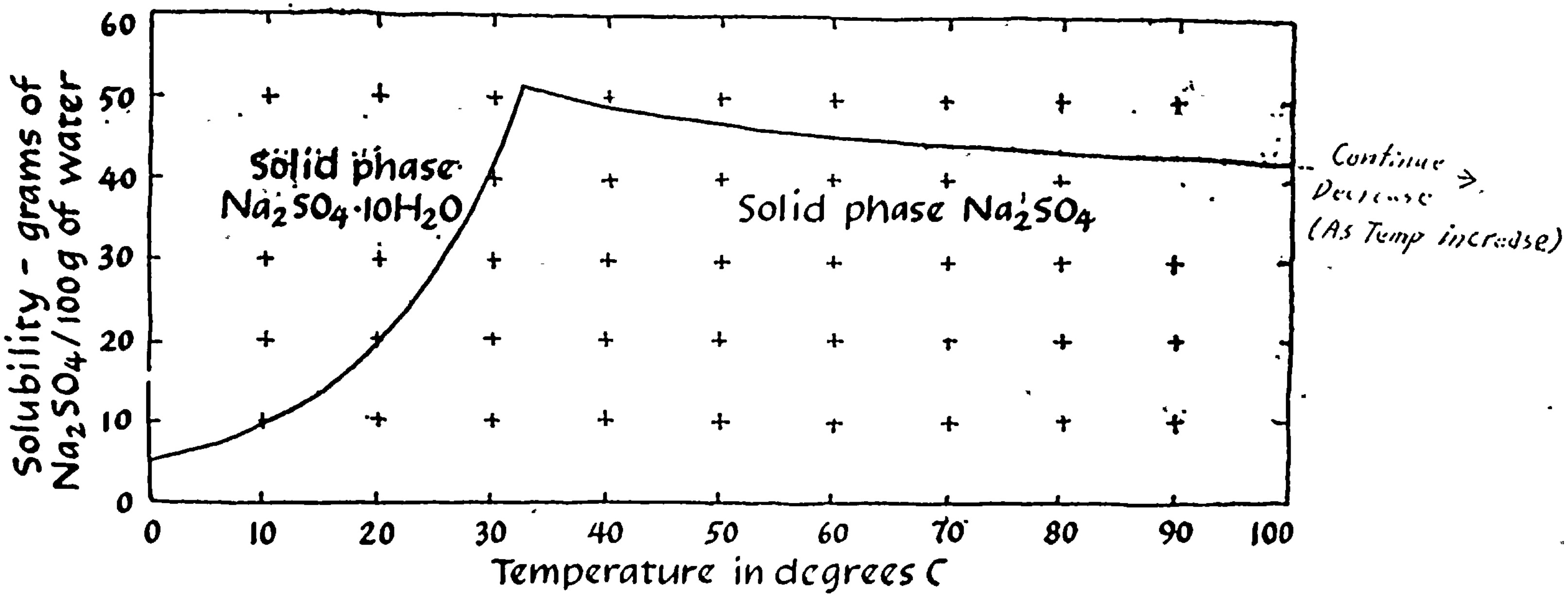


Figure 1. Effect of Sulfate Impurities on Time to Failure (from [1])

The Dependence of Solubility on Temperature



Solubility of sodium sulfate in water.

ATTACHMENT 4

INTERNAL CORRESPONDENCE
FORM 112-2 R 02-80 55-01-013

NIAGARA MOHAWK

(1)

FROM A. M. Salvagno

J. Blasiak

DISTRICT Nuclear Division

DATE August 29, 1991 FILE CODE SM-HP91-0111

SUBJECT Nine Mile Point Unit 2 Reactor Coolant Chemistry Transient Evaluation

SUMMARY

Nine Mile Point 2 declared a Site Area Emergency on August 13, 1991 at 06:00 hour due to a loss of control room annunciators and load reject which had occurred at 05:48 hour. Following the associated reactor scram and during the subsequent cooldown, reactor coolant conductivity and sulfate values exceeded action level values found in the Nuclear Division Directive on Chemistry (NDD-CHE). A brief operational events time line windowing the chemistry transients is found on Table 1 (attached).

The reactor coolant conductivity and sulfate levels as compared to the NDD-CHE valves were as found on Table 2 (attached).

Note: Dilution and/or contamination may have skewed some Ion chromatography data points. Particularly some chloride values are suspect.

The reactor coolant chemistry exceeded NDD-CHE Action Level 2 for sulfate and conductivity for 3 hours, 46 minutes.

The NDD-CHE states the following if an Action Level 2 value has been exceeded:

1. The Chemistry technician shall inform the Station Shift Supervisor (SSS) and Chemistry management. The SSS shall take specific actions required by Technical Specifications and make an Equipment Status Log entry and indicate that water chemistry is a possible mode restraint.

2. The SSS shall notify the General Supervisor Operations that an Action Level 2 has been reached.

3. An assessment shall be made by Chemistry management to determine corrective action and the parameter should be reduced below the Action Level 2 value within 24 hours. (For Fuel Warranty parameters maximum limits shall not be exceeded for more than 48 hours (2 days) in any 12 month period.)

4. If reduction below Action Level 2 has not been achieved within 24 operating hours, an orderly unit shutdown shall be initiated and a cold shutdown shall be achieved within 16 hours, except when more restrictive action is required by Technical Specifications for reactor water conductivity, chloride, or pH.

5. Chemistry shall coordinate the review and enlist the support of Operations, Site Engineering, Technical Support, Radwaste, or other departments as necessary. The cause shall be identified and corrective measures completed prior to restart.

Plots of pertinent plant parameters for the period of concern are found as Attachment 4.

The following discussion examines possible sources of reactor coolant contamination. Finally, some recommendations are offered for monitoring chemistry during restart and for investigating sources of impurities.

BACKGROUND

During the NMP-2 plant shutdown associated with the Site Area Emergency, several system configurations were employed to remove system energy and control reactor vessel water level. The system lineups/conditions are an important basis in calculating impurity ingress and subsequent concentration within the reactor coolant. Chronologically, significant configurations are as follows:

- Reactor water cleanup isolated and the condensate demin bypass valve opened following the scram.
- The reactor was being cooled by the RCIC system.
- Vacuum and steam seals are maintained (until 19:00 hr) for the main condenser system.
- RCIC in standby at 07:40 hr and vessel level being controlled via condensate system. CNM P1A & P1B and CNM P2A in service. Two CND beds in service (D & H) at 1000 gpm and 1200 gpm, respectively.
- Two acid feedpumps for CWS isolated. Remaining 2 pumps throttled back. (North and south flumes receiving acid.)
- Condensate system bypass valve closed. Four CND beds now in service. (Approximately 14:05 hr.)
- Start up 2RHS*P1B in shutdown cooling with reject going to radwaste (15:10 hr).
- 2 CND beds I/S at 2900 gpm each.
- Condenser vacuum broken approximately 19:00 hr.
- Acid feed to CWS isolated 8/14/91 at 05:20 hr.

Additionally, past resin intrusions and reactor coolant sulfate excursions have occurred and resin breakdown has been implicated as a source of sulfate (see Internal Correspondence File Code SM-HP91-0033). Following the NMP-2 return to service on April 12, 1991, and to present, the reactor coolant sulfate concentration was higher than that found in previous operational periods (see Attachment 1).

DISCUSSION

Possible Sources of Sulfate

The apparently inconsistent nitrate to sulfate ratio (see Internal Correspondence from K. Murray to J. Blasiak, File Code NMP-76292) during the excursion likely eliminates a fresh resin intrusion from either the reactor water cleanup or condensate demineralizer systems as the primary source of sulfate. Additionally, hot well temperatures were normal and decreased rapidly upon the plant scram which precludes melting of condensate resin.

The possibility of trapped resin within the reactor system was considered as the source of the sulfate. Trapped resin may be assumed to have contributed to some of the sulfate based on past evidence and the known intrusion of spent fuel pool resin. Elevated sulfate concentration in reactor coolant continued for approximately 40 hours after reactor coolant temperature had been reduced below 200°F. Hydraulic retention within the reactor vessel can explain this observation because reject was occurring and by the following calculation:

$$C_F = C_o e - \frac{\text{reject}}{\text{volume}} (t)$$

$$= 240 \text{ ppb } e - \frac{3.0E4 \text{ lbs/hrs}}{6.67E5 \text{ lbs}} (54.5 \text{ hrs})$$

$$C_F = 20.6 \text{ ppb}$$

One would expect the sulfate to be reduced to 20.6 ppb. The measured sulfate concentration in reactor coolant was 19.8 ppb. This measurement was made 54.5 hours after the peak sulfate concentration of 240 ppb was measured. The conclusion is that a source of sulfate or the conditions needed to break down cation resin rapidly (i.e., > 200°F) have been eliminated from the system during this period of the excursion. Certainly trapped resin and hideout of impurities like sodium sulfate are possible in this vein of thought.

Another plausible explanation for the sulfate source is due to a tube leak in the main condenser. The circulating water system at NMP-2 is a closed cooling tower system and, as such, concentrates lake water and added impurities. In particular, an increase due to addition of approximately 900 gallons per day of sulfuric acid to the CWS water starting on May 1, 1991. This acid addition can impart approximately 300 - 600 ppm sulfate to the system. Additionally, normal lake water sulfate and chloride levels typically concentrate up to approximately 100 ppm in the circulating water.

By back calculating from the found sulfate concentrations in the reactor coolant, the size of a tube leak can be estimated. To do this, associated operational conditions for mass balancing were employed and are as follows:

- 07:40 - 15:10 hr — Make up to vessel via CNM system and Steaming rates were approximately 0.75 mlbs/hr as found in the Daily Periodic Log.

<u>Note</u>: Attachment 2 is the Daily Periodic Log for 8/13/91.

The calculations are found as Attachment 3 and the results show that a leak of approximately 0.3 gpm would have been sufficient to cause the sulfate levels found in the reactor coolant.

In support of this avenue of thought are the following considerations:

° Vacuum was maintained on the condenser.

° Condensate flows were greatly reduced while the condenser vacuum pulled the same size leak as during operation.

° The condensate bypass valve was open allowing flow around the demineralizer beds.

° Reactor water cleanup was isolated.

° Reactor level was maintained via CNM and steaming was occurring.

° The ratio of sulfate to chloride found in the reactor coolant before the event is approximately equal to the circulating water ratio.

° Sulfuric acid addition to the circulating water continued until 8/14/91 at 05:20 hr while lower CWS temperatures and normal blowdown allowed for a reduction in CWS chloride concentration.

° A sulfuric acid hot leg may be present between point of delivery and through the condenser tubes in the circulating water system.

° The relatively small tube leak would not be detectable by CDI conductivity while at normal operation.

° Sulfuric acid is highly corrosive to copper tubes.

° Sulfuric acid (concentrated) is difficult to mix with water and may not thoroughly mix until going through the tubes.

° Addition of 900 gallons per day of sulfuric acid began May 1, 1991.

For this consideration to have merit, the chloride results in reactor coolant must be weighed carefully.

<u>RECOMMENDATIONS</u>

The following actions are recommended in order to maintain reactor coolant chemistry parameter values within NDD-CHE limits during the next unit restart, and to further investigate the source(s) of sulfate.

(1) Maximize reactor water cleanup operation prior to restart and ensure good coolant quality.

(2) Ensure that the condensate demin bypass valve is closed for normal conditions.

(3) Pull a vacuum on the condenser and look for evidence of tube leaks after refilling CWS side of condenser. Possibly contract for sensitive analytical equipment.

(4) Based on results of #3 above, determine (if a leak exists) whether CND system capacity is sufficient to handle the leak within normal operation conditions and anticipated plant run time.

(5) Sample and analyze the effluent of individual condensate demineralizers as the possible source of sulfate due to vessel liner bleed, resin bleed, or resin losses.

(6) Monitor coolant chemistry closely during restart (continuous conductivity, hourly sulfate and chloride) and be prepared to reduce power/temperature if NDD-CHE limits are approached.

(7) Develop plans if a condenser tube leak exists to control reactor coolant buildup of impurities under similar operational conditions as would occur during another plant scram and with RWCU isolated.

Anthony M. Salvagno

A. M. Salvagno, x-7189
Health Physicist
Chem & Rad Protection Support

AMS/sek
001382LL

xc:

R. Abbott	T. Kurtz	M. McCormick
A. Vierling/G. Gresock	G. Corell	E. Tomlinson
B. Cazzolli	C. Senska	C. A. Bernales
M. Colomb	J. Duell	J. Maurice
J. Conway	Y. Soong	S. Czuba
		Records Management

TABLE 1

8/13/91

° 05:48	Loss of Control Room annunciators.
° 05:49	Mode Switch placed in shutdown to manually scram the reactor.
° 05:55	Manually initiated RCIC.
° 06:00	Declared Site area emergency. (Note: RWCU offline and 2CNM bypass open following reactor scram.)
° 06:07	Commenced shutdown procedure.
° 06:10	2CND vessels D & H I/S at approximately 1000 and 1200 gpm respectively. All other beds removed from service.
° 06:15	Stop CNM booster pumps.
° 06:20	Stop CNM P1B, CNM P1C (CNM-P1A I/S).
° 06:22	Annunciator power returned when UPS 1A-D, G were placed on maintenance power supply.
° 06:30	All rods indicate full-in except for 6 rods which have no indication.
° 06:40	Start CNM-P2A.
° 07:00	All rods indicate full-in.
° 07:11	Process computer returned to service.
° 07:38	Start CNM-P1B.
° 07:40	RCIC in standby and control RPV level by condensate system. (Note: RHR used to cool suppression pool.)
° 08:06	RCS flow control valves opened fully.
° 10:26	Isolated 2 of 4 acid feed pumps to the CWS system and throttled back on remaining 2 pumps.
° 10:55	Started 2WCS-P1B for full reject mode.
° 10:56	2WCS-P1B tripped due to Delta-flow timers, cleanup isolated.
° 13:09	2CND D removed from service (2CND H I/S at 1400 gpm).
° 14:00	Shut condensate demin bypass valve (MOV109) 2CND D,E,F into service.
° 14:30	RPV being fed via CNM-P1A, P1B, P2A.

TABLE 1 (Continued)

° 14:57	2RCS*P1B shutdown.
° 15:10	2RHS*P1B S/U in SDC.
° 15:21	Secured CNM-P2A and CNM-P1A to control vessel level by reducing FWS valve leak through.
° 15:22	2CND E and F removed from service (CND H and D at 2900 gpm each).
° 16:15	Notified by Chemistry that we have entered an Action Level 2 per NDD-CHE based on reactor coolant conductivity and sulfate levels.
° 18:02	Directed 2FWS-MOV 21 A/B closed to facilitate RPV level control via RDS and RHS.
° 18:46	Reactor is in Mode 4, RCS suction temperature 199°F.
° 19:43	Terminated Site area emergency.
° 21:37	ESL #91-464 on RWCU cleared. WCS is available.

8/14/91

° 05:20	Acid feed pumps to CWS isolated.

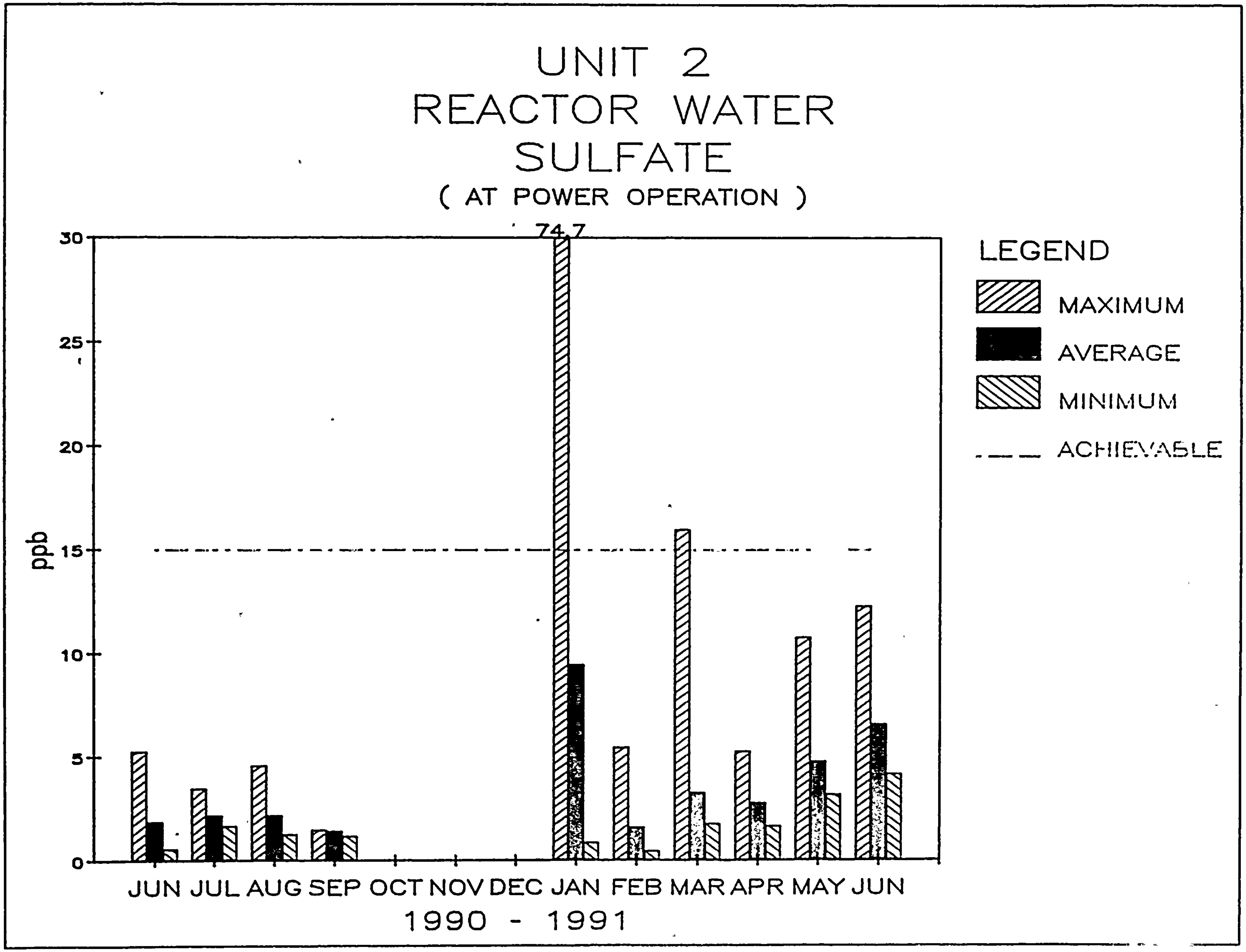
TABLE 2

		RX Temp.	RX Mode	RX Cond. (umho/cm)	RX Chloride (ppb)	RX Sulfate (ppb)	RX pH	RX Nitrate (ppb)
8/13/91	01:00	530°F	1	0.157	1.5	8.1	-----	3.8
	08:30	-----	3	0.220	-----	-----	-----	-----
	10:40	-----	3	0.546	-----	-----	-----	-----
	13:05	342°F	3	0.852	5.8	93.0	-----	5.9
	15:00	325°F	3	1.010	<1	112.0	6.9	5.5
	17:35	213°F	3	-----	1.4	149.7	-----	17.4
	18:46	199°F	4	-----	-----	-----	-----	-----
	18:56	195°F	4	1.040	1.4	240.0 (181**)	6.37	22.4
	23:25	-----	4	1.070	1.3	166.5 (205.6**)	6.36	23.5
8/14/91	02:52	-----	4	-----	12.9 (suspect*)	184.0	-----	17.2
	06:42	120°F	4	1.015	-ND-	169.0	6.3	10.6
	10:45	-----	4	0.973	21.3 (suspect*)	149.0	6.5	12.2
	14:45	117°F	4	0.923	-ND-	124.5	6.5	15.3
	19.05	-----	4	0.897	2.47	176.0	6.52	16.0
8/15/91	00:15	-----	4	0.861	1.5	65.0	6.6	17.4
	04:50	-----	4	0.788	3.2	69.6	6.55	11.4
	08:15	-----	4	0.749	1.8	55.8	6.23	14.5
	13:58	-----	4	0.705	0.68	41.5	6.2	13.1
8/16/91	01:20	-----	4	0.661	0.68	19.8	6.5	11.9

NDD-CHE Reactor Coolant Action Level 2 limits for Hot Standby Conductivity > 1.0 umho/cm, Sulfate > 100 ppb.

* Diluted 1:100.
** Undiluted values.

ATTACHMENT 1


UNIT 2
REACTOR WATER
SULFATE
(AT POWER OPERATION)
74.7
ppb
0
5
10
15
20
25
30
LEGEND
MAXIMUM
AVERAGE
MINIMUM
ACHIEVABLE
JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN
1990 - 1991

ATTACHMENT 2

NINE MILE POINT 2 UNIT 2
DAILY PERIODIC LOG FOR 08/13/91

GROUP DESCRIPTION: REACTOR

TIME	CORE THERMAL POWER P4 MW	REACTOR STM DOME PRESSURE PSIG	CORE DIFF PRESSURE PSID	REACTOR WATER LEVEL INCHES	TOTAL CORE FLOW MLBS/HR	REACTOR FW FLOW LINE A MLBS/HR	REACTOR FW FLOW LINE B MLBS/HR	RWCU FLOW MLBS/HR	CRD FLOW MLBS/HR	TOTAL STEAM FLOW MLBS/HR	MAIN STM LINE PRESSURE PS1A	TURBINE STEAM FLOW MLBS/HR
	NSSQB10H	FWSPA101	NSSPA101	FWSLA101	NSSFA01S	FWSFA100	FWSFA101	WCSFB01	RDSFA101	FWSFA103	MSSPA05	FWSFA104
01:00	3323.09	1004.25	18.21	183.29	106.40	7.00	7.23	0.18	0.03	14.23	992.50	12.62
02:00	3322.88	1004.25	18.29	183.87	106.47	6.99	7.19	0.18	0.03	14.22	992.50	12.65
03:00	3322.75	1004.25	18.42	182.93	106.44	6.98	7.22	0.18	0.03	14.22	992.50	12.68
04:00	3321.81	1004.25	18.26	183.66	106.54	6.94	7.22	0.18	0.03	14.23	992.50	12.67
05:00	3322.84	1004.25	18.25	183.59	106.62	6.97	7.21	0.18	0.03	14.18	992.50	12.69
05:00	3322.59A	1004.25A	18.29A	183.46A	106.49A	6.98A	7.21A	0.18A	0.03A	14.21A	992.50A	12.66A

NINE MILE POINT 2 UNIT 2
DAILY PERIODIC LOG FOR 08/13/91

GROUP DESCRIPTION: REACTOR

TIME	CORE THERMAL POWER P4 MW	REACTOR STM DOME PRESSURE PSIG	CORE DIFF PRESSURE PSID	REACTOR WATER LEVEL INCHES	TOTAL CORE FLOW MLBS/HR	REACTOR FW FLOW LINE A MLBS/HR	REACTOR FW FLOW LINE B MLBS/HR	RWCU FLOW MLBS/HR	CRD FLOW MLBS/HR	TOTAL STEAM FLOW MLBS/HR	MAIN STM LINE PRESSURE PSIA	TURBINE STEAM FLOW MLBS/HR
	NSSQB10H	FWSPA101	NSSPA101	FWSLA101	NSSFA01S	FWSFA100	FWSFA101	WCSFB01	RDSFA101	FWSFA103	MSSPA05	FWSFA104
08:00	0.00	485.63	0.30	182.22	17.70	0.69	0.00		0.03	0.77	500.75	-4.50
09:00	0.00	406.88	1.00	182.39	32.90	0.74	0.00		0.03	0.78	422.75	-4.50
10:00	0.00	274.13	1.07	183.34	33.88	0.80	0.00		0.03	0.75	290.75	-4.50
11:00	0.00	172.87	1.05	183.87	33.51	0.84	0.00		0.03	0.78	188.75	-4.50
12:00	0.00	136.50	1.03	182.76	33.79	0.85	0.00		0.03	0.77	152.50	-4.50
13:00	0.00	109.50	1.01	183.21	34.05	0.87	0.17		0.03	0.78	125.50	-4.50
14:00	0.00	113.25	0.37	182.22	24.17	0.87	0.17		0.03	0.78	128.50	-4.50
15:00	0.00	106.50	0.40	188.39	18.34	0.87	0.17		0.03	0.77	119.50	-4.50
16:00	0.00	35.25	0.57	B	11.42	0.90	0.17		0.02	0.76	52.50	-4.50
17:00	0.00	24.37	0.60	203.24	11.18	0.90	0.17		0.02	0.76	40.50	-4.50
18:00	0.00	10.12	0.57	190.58	10.33	0.90	0.24		0.02	0.76	25.50	-4.50
19:00	0.00	4.12	0.55	185.56	9.85	0.90	0.24		0.02	0.76	10.25	-4.50
20:00	0.00	3.37	0.73	185.95	9.52	0.90	0.24		0.02	0.77	16.25	0.04
21:00	0.00	3.75	0.78	184.51	9.37	0.90	0.24		0.02	0.76	16.25	0.04
22:00	0.00	3.75	0.96	184.00	7.65	0.89	0.17		0.03	0.76	16.25	0.04
23:00	0.00	3.75	1.05	186.04	6.38	0.89	0.24		0.03	0.76	16.25	0.04
00:00	0.00	3.75	1.09	186.70	6.23	0.89	0.24		0.02	0.76	16.25	0.04
00:00	0.00A	111.61A	0.77A	A	18.25A	0.86A	0.15A	A	0.03A	0.77A	125.82A	-3.16A

ATTACHMENT 3

Calculated Sulfate Concentration in Feedwater

Assume:

- RPV = 80,000 gal.
- FW flow for 07:40 hr to 15:10 hr = 0.75 mlbs/hr (steam flow also 0.75 mlb/hr).
- Time period evaluated 8/13/91 @ 07:40 - 8/13/91 @ 15:10.

$$(V)(C) = (V)(C)$$

$$(450 \text{ mins})(5673 \text{ l/min})(C) = (302{,}000 \text{ l})(112 \text{ ppb} - 8.1 \text{ ppb})$$

$$C = 12.3 \text{ ppb}$$

Calculated Size of Tube Leak Based on Calculated Feedwater Sulfate Concentration

Assume:

- 320 ppm sulfate in circulating water.
- 4400 CNM flow (minimum flow for 1 booster pump).
- 2 CND beds I/S at 2200 gpm total and 90% removal eff.

$$(V)(C) = (V)(C)$$

$$(4400 \text{ gpm}) \left[0.012 \text{ mg/l} + \left(\frac{2200}{4400} + 0.9\right)\right] = (V)(320 \text{ mg/l})$$

$$V = 0.3 \text{ gpm leak}$$

Conductivity Check (CDI During Normal Full Power Operation)

Assume:

- 2700 gpm per each of 8 beds (CND) = 21,600 gpm.
- Tube leak rate = 0.3 gpm.
- Circulating water conductivity = 810 umho/cm.

$$(21{,}600)(X) = (0.3 \text{ gpm})(810 \text{ umho/cm})$$

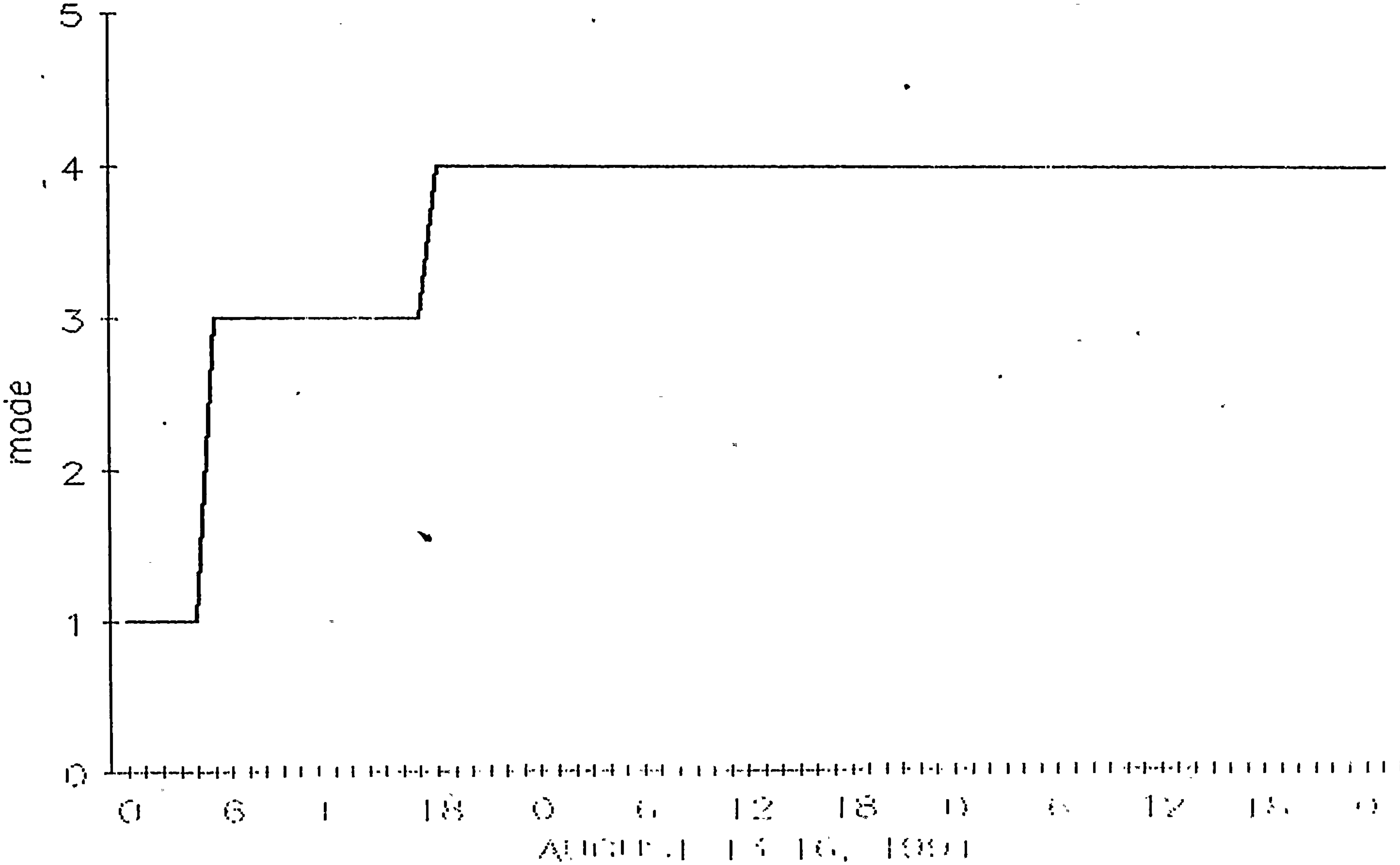
$$(X) = 0.0113 \text{ umho/cm}$$

Plus 0.055 pure water

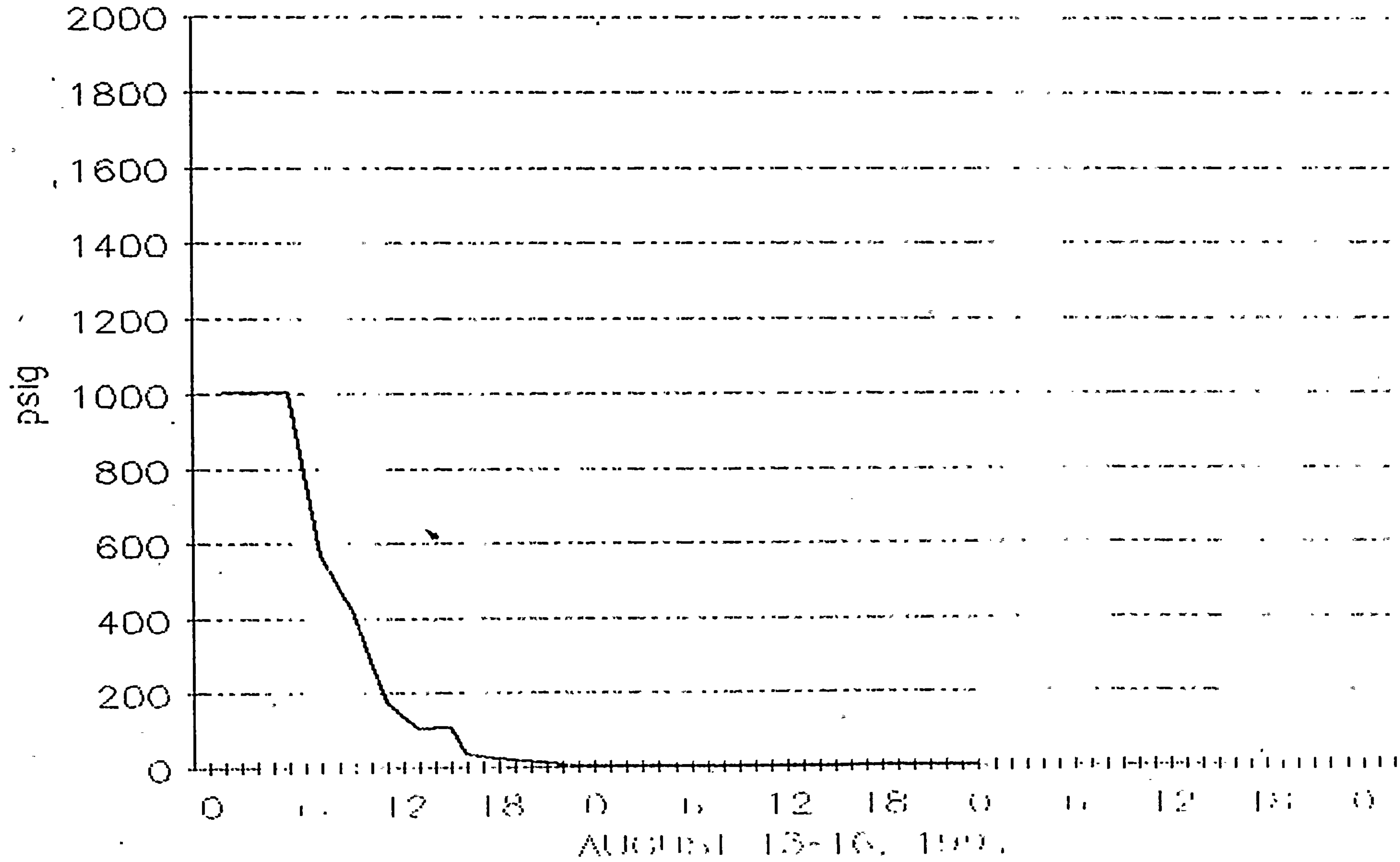
0.066 umho/cm CDI conductivity

ATTACHMENT 4

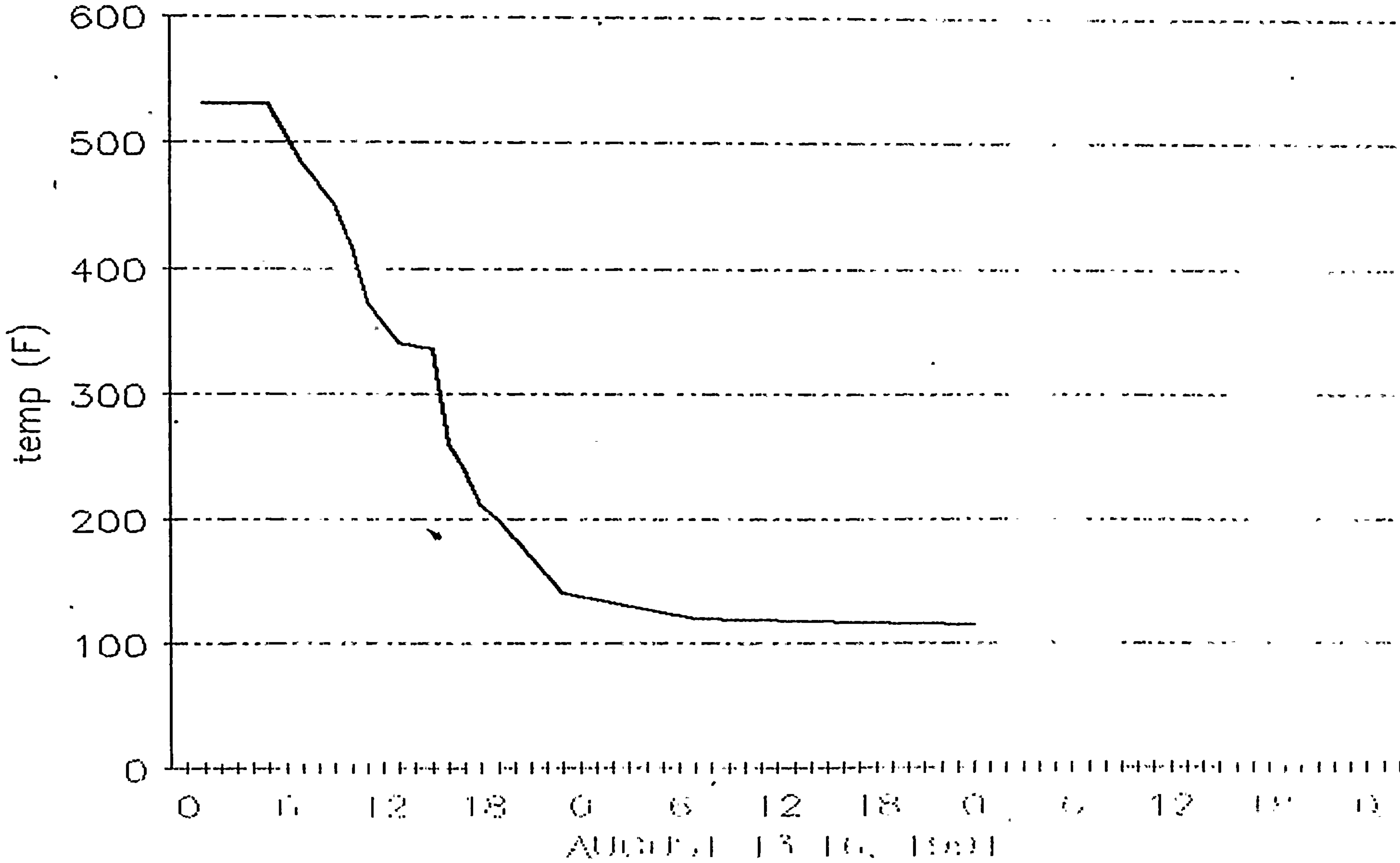
NMP-2
REACTOR
MODE



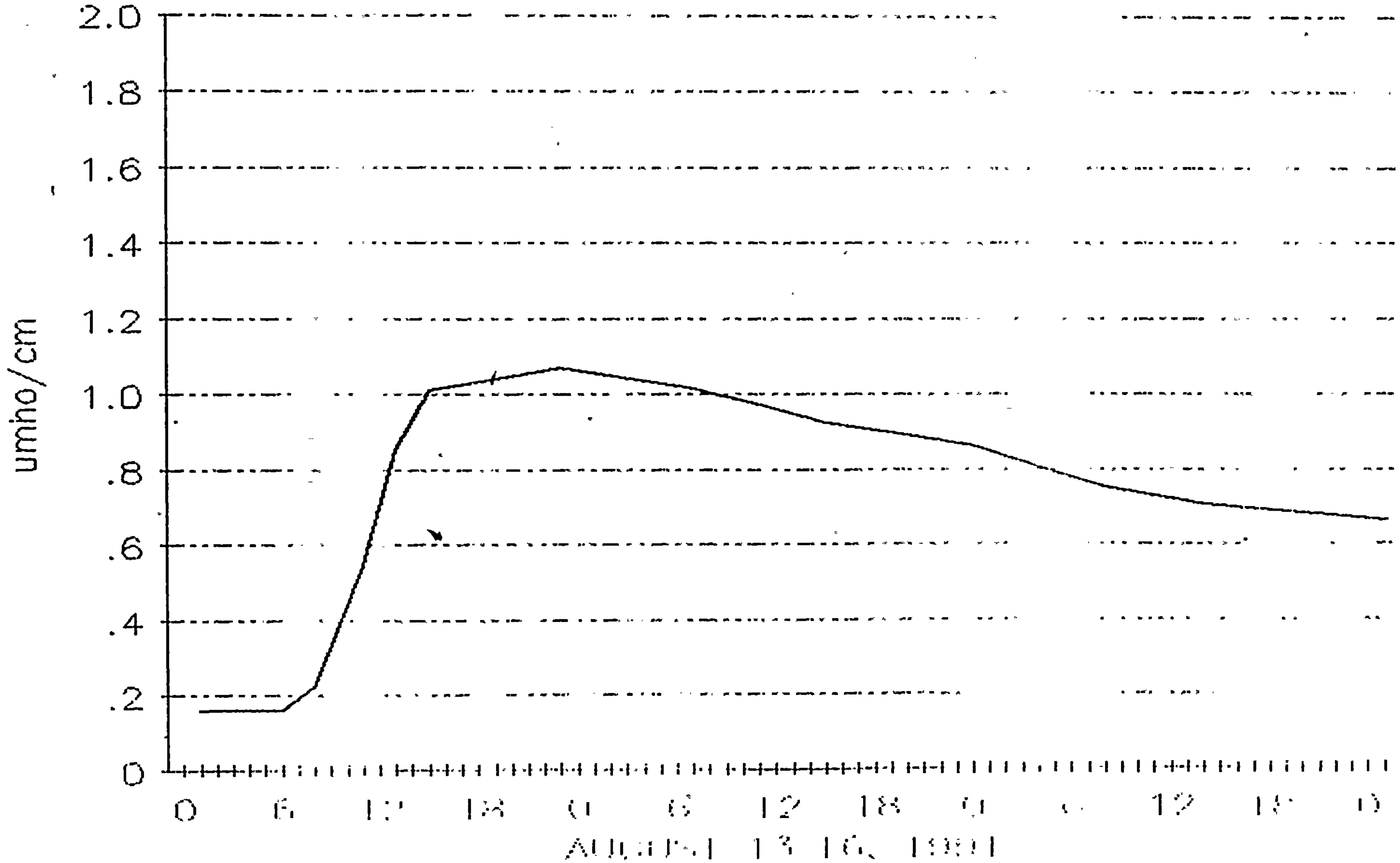
NMP-2 REACTOR PRESSURE



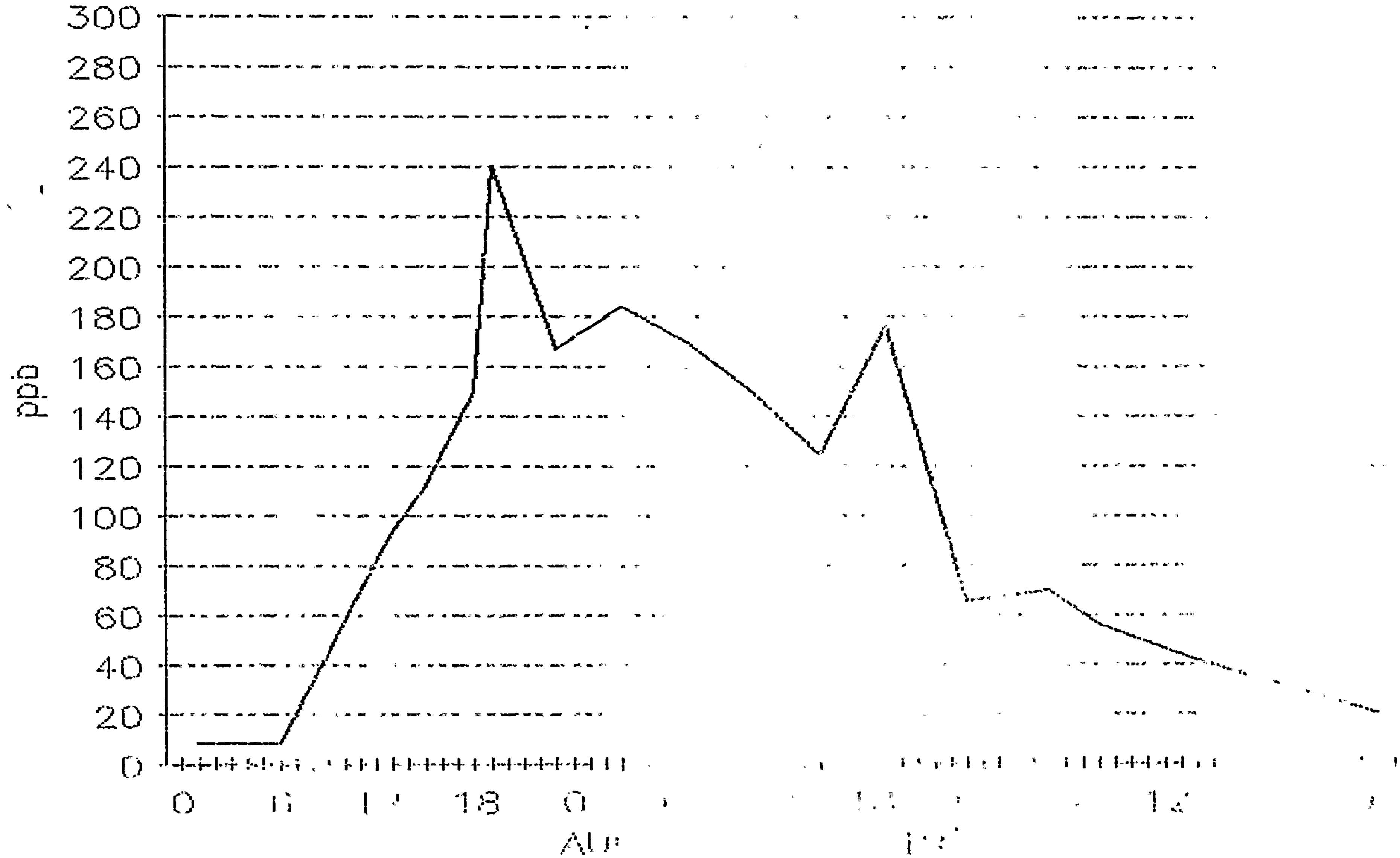
NMP-2
REACTOR
TEMPERATURE



NMP-2
REACTOR WATER CONDUCTIVITY



NMP-2
REACTOR WATER
SULFATE



(2)

INTERNAL CORRESPONDENCE
FORM 112-2 R 02-80 55-01-013

NIAGARA MOHAWK

FROM J. M. Halusic
J. P. Ryan

TO M. McCormick

DISTRICT Nuclear Division

DATE August 15, 1991 FILE CODE SM2-M91-0213

SUBJECT WCS Heat Exchanger Room Walkdown

Engineering was requested to perform a walkdown of the WCS heat exchanger room piping associated with valve 2WCS*FV135 as a result of a potentially damaging transient reported by Operations.

This inspection was performed on August 13, 1991 at approximately 19:50 hours by Engineering and Radiation Protection. This inspection revealed no abnormal conditions with the piping, equipment or supports associated with 2WCS*FV135. No snubbers exist in this portion of the WCS System and, therefore, no action is required per Technical Specification 3.5.7. This inspection meets the surveillance requirements of Technical Specification 4.7.5.d.

Engineering, therefore, has no reservations with Operations returning the WCS System back into service.

J. M. Halusic
Lead Engineer - Mechanical Design

J. P. Ryan
Site Structural/Mechanical Engineer

Concur:

M. D. Jones
Supervisor Plant Evaluation NMP2

JMH/JPR/las
000816MM

xc: Control Room NMP2
R. B. Abbott
L. P. Prunotto
K. D. Ward
Records Management

RECEIVED
AUG 16 1991
M. J. McCORMICK JR.

8/20/91 xc: J. Conway (for Dave) + Mary Meehan – Done

Work No................. W178843
Issued.................. 910120
Depart.................. 300
Status.................. O
Lead or Supprt.......... L
Deficiency Tag Number... 023297
WCC Status.............. 08 · complete reviewing PMT
WCC Resp................ PT
Unit.................... 2
Component No............ 2ASS-AOV145
System No............... ASS
BIP No.................. 001
Safety Class............ NSR
ASME Component.......... N
Cleanness Class......... C, D
Title................... AUX BLR STM INL CONT TO RBLRS
Work Item Description... ASS-AOV145 HAS AN AIR LEAK AT ITS CONTROL BLOCK. THE LEAK CAUSES A LOSS OF AIR TO THE VALVE AND SUBSEQUEN VALVE CLOSURE SO THE VALVE IS NOW PINNED OPEN. REPAI THE LEAK. TAG IS HUNG ON ASS-AOV145 CONTROL AIR BLOCI IN NORTH MSR ROOM TB 306NE.
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Location................ TB,277,C,010.00
Originator.............. RICHARDS D
Approved by............. WINKLER T
Approval date........... 910121
Received By............. PEAVLER T
Rcvd By Dt.............. 910121
Account Code............ 706.30--9531-321258--200-0110
QC Review............... BRIGGS M
QA Review Date.......... 910121
Inspection Req'd........ N
Left Planning........... 910121
IP Code................. 3
Merit Score............. 000
Work Cond. Code......... E
Remarks................. IN FIELD, 910401
Work Type Code.......... CM
Power Block Flag........ N
Staged By............... DUVAL D
Staged By Date.......... 910123
Assign to............... BLUM J
Assigned Date........... 910403
Sched. Start Date....... 910401
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
SSS Notify.............. 910403
Corrective Action Code.. AH
Corrective Action....... PUT IN A NEW PISTON SEAL SO OPS CAN GET THEIR ONE OR TWO STROKES OF THE VALVE BEFORE IT FAILS AGAIN
Cause of Failure Code... AL
Cause of failure........ AGAIN PISTON SEAL INSIDE BLOCK FAILED. PROBLEM IS WITH THE DESIGN OF THE BLOCK AND THE MODIFICATIONS ASSOCIATED WITH IT

CONTINUED

2ASS-AOV145
(continued)

W 178843 (continued)

Attachments............. MATERIAL ISSUES
Mark Up No............. R50288
QCIR Nos............... NA
NCR's.................. NA
Completed by........... BLUM J
Completion date......... 910403
Deficiency Tag Removed.. Y
Supervisor Review....... PEAVLER T
Supervisor Review Date.. 910404
QC Work Accepted by..... BRIGGS M
QC Work Accept date..... 910121
PMT Review By........... PEAVLER T
PMT Rev Date............ 910404
Fld Compl Log Dte....... 910404
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Craft.................. 9213, 9203, 9183
Man Hours.............. 1.0, 5, 5
OT Hours............... 0, 0, 0
Lead/Supprt Dpt......... 300
OMG System Window....... 020
OMG Availability Code... ##, ii
Completion Entry Date... 910404

2A SS - AOV145
(Continued)

Work No................... W164466
Issued.................... 910702
Depart.................... 200
Status.................... O
Lead or Supprt............ L
WCC Status................ 08
Unit...................... 2
Component No.............. 2ASS-AOV145
System No................. ASS
BIP No.................... 001
Safety Class.............. NSR
ASME Component............ N
Cleanness Class........... C, D
Title..................... AUX BLR STM INL CONT TO RBLRS
Work Item Description... INSPECT VALVE AND ACTUATOR DURING NEXT FORCED OUTAGE TO IDENTIFY LOCATION OF AIR LEAK; MAKE REPAIRS TO LEAKING AIR SUPPLY TO ASS-AOV145. MAY REQUIRE REBUILDING ACTUATOR- VENDOR SUPPORT REQD
Location.................. TB,277,C,010.00
Originator................ BUNNELL J
Approved by............... KINNEY D
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Approval date............. 910702
Received By............... BUNNELL J
Rcvd By Dt................ 910702
Account Code.............. 706.30--9521-321256--200-0110
QC Review................. BOOTH J
QA Review Date............ 910702
Inspection Req'd.......... N
Left Planning............. 910702
IP Code................... 3
Merit Score............... 000
Work Cond. Code........... F
Work Type Code............ CM
Power Block Flag.......... Y
Staged By Date............ 910828
Sched. Start Date......... 910828
SSS Notify................ 910828
Corrective Action......... NO WORK REQUIRED I&C DID WORK TO WR 193588
QCIR Nos.................. NA
NCR's..................... NA
Completed by.............. FAHNESTOCK T
Completion date........... 910828
Supervisor Review......... FAHNESTOCK T
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Supervisor Review Date.. 910828
QC Work Accepted by..... BOOTH J
QC Work Accept date..... 910702
Fld Compl Log Dte....... 910829
Lead/Supprt Dpt......... 200
OMG System Window....... 010
OMG Availability Code... ##, 11
Completion Entry Date... 910829

Continued

2ASS-AOV145
(continued)

3

495

Work No................... W193588
Issued.................... 910409
Depart.................... 300
Status.................... C
Lead or Supprt............ L
Deficiency Tag Number..... 027278
WCC Status................ 100
Unit...................... 2
Component No.............. 2ASS-AOV145
System No................. ASS
BIP No.................... 001
Safety Class.............. NSR
ASME Component............ N
Cleanness Class........... C, D
Title..................... AUX BLR STM INL CONT TO RBLRS
Work Item Description..... AIR REG LOCATED AT THE VLV IS LEAKING; VALVE WILL NO
STAY OPEN WITHOUT BEING PINNED. REPAIR REG AS
NECESSARY. TAG LOCATED MN CONTROL RM 2CEC-PNL851
Location.................. TB,277,C,010.00
NPRDS Failcode............ A
Originator................ CROASMUN C
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Approved by............... MURRAY R
Approval date............. 910410
Received By............... PEAVLER T
Rcvd By Dt................ 910410
Account Code.............. 706.30--9521-321258--200-0110
QC Review................. BRIGGS M
QA Review Date............ 910410
Inspection Req'd.......... N
Left Planning............. 910411
IP Code................... 3
Merit Score............... 000
Work Cond. Code........... F
Remarks................... SENT TO CONTROL ROOM 910817, M.I.145122 RESERVED
910723
Work Type Code............ CM
Power Block Flag.......... Y
Staged By................. NOSKO G
Staged By Date............ 910618
Proj Crew................. 2
Proj Dur.................. 10
Assign to................. FITZGERALD B
Assigned Date............. 910825
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Sched. Start Date......... 910819
SSS Notify................ 910821
Corrective Action......... REPLACE ORINGS IN SHUTTLE BLOCK
Cause of failure.......... ORING IN SHUTTLE BLOCK BLOWN OUT AIR IS LEAKING FROM
THIS SPOT

(Continued)

2 ASS- AOV 145
(Continued)

5#5

W193588 (Continued)

Mark Up No............... R01190
QCIR Nos................. NA
NCR's.................... NA
Completed by............. MAYER K
Completion date.......... 910827
Deficiency Tag Removed.. Y
Supervisor Review....... SITNIK T
Supervisor Review Date.. 910828
QC Work Accepted by..... BRIGGS M
QC Work Accept date..... 910410
PMT Review By........... STINIK T
PMT Rev Date............ 910828
PMT Test Rpt............ Y
PMT Ver................. SITNIK T
PMT Ver Dt.............. 910828
Accepted by............. NEWMAN D
Acceptance date......... 910828
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Plan LO................. 910829
Fld Compl Log Dte....... 910828
Craft................... 9203, 9193
Man Hours............... 12, 9
OT Hours................ 4, 4
Lead/Supprt Dpt......... 300
OMG System Window....... 020
OMG Availability Code... ##, HO
Completion Entry Date... 910828

INTERNAL CORRESPONDENCE
FORM 112-2 R 02-80 55:01-013

NIAGARA MOHAWK

(4)

FROM	Samir M. Nashed/Surjit Pabby	DISTRICT	Nine Mile Point Unit..
	M. McCormick	DATE	August 27, 1991 FILE CODE NMP77864
		SUBJECT	RHS Piping System Walkdown

Engineering was requested to perform a walkdown of the RHS Piping System as a result of a transient reported by Operations.

This inspection was performed on August 13, 1991 at approximately 13:50 hours by Engineering Operation and Radiation Protection. This inspection revealed no abnormal conditions with the piping, equipment or supports associated with RHS System. Based on this walkdown, it was determined the transient was not a potentially damaging transient. Therefore, no further actions are required.

Engineering, therefore, has no reservations with Operations returning the RHS System back into service.

Samir M. Nashed

Samir M. Nashed
Sr. Structural Engineer, Site Engineering

Samir M. Nashed for Surjit S. Pabby by Telecon

Surjit S. Pabby
Lead Engineer - Mechanical Design

P C Mangano

P. C. Mangano
Site Engineering Supervisor

SMN/SSP/PCM/bm

cc: R. B. Abbott
L. P. Prunotto
K. D. Ward
NMP PPF

FRISKALL 90250

Work No.................	W192659
Issued..................	910709
Depart..................	300
Status..................	C
Lead or Supprt..........	L
Deficiency Tag Number...	026302
WCC Status..............	100
Unit....................	2
Component No............	NOCOMPID
System No...............	ZZZ
Safety Class............	NSR
EQ......................	N
ASME Component..........	N
Cleanness Class.........	NA
Title...................	FRISKALL 90250
Work Item Description...	DETECTOR 7 SHOWS LOW COUNTS POSSIBLE PREAMP PROBLEMS TAG HUNG ON FRISKALL. CALL 2815 PRIOR TO WORKING ON
NPRDS Failcode..........	C
Originator..............	LUCARIELLO P
Approved by.............	KINNEY D
Approval date...........	910710

Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)

Display of Work Item Data

Received By.............	MEYER J
Rcvd By Dt..............	910716
Account Code............	706.50--9521-321258--200-0110
QC Review...............	QUEEN S
QA Review Date..........	910717
Inspection Req'd........	N
Left Planning...........	910718
IP Code.................	3
Merit Score.............	000
Work Cond. Code.........	A
Remarks.................	IN CLERKS FILE WAITING FOR RP CAL SUPPORT
Work Type Code..........	CM
Power Block Flag........	N
Staged By...............	PUTMAN, M.
Staged By Date..........	910815
Proj Crew...............	2
Proj Dur................	8
Assign to...............	BRIGGS P
Assigned Date...........	910816
Sched. Start Date.......	910815
SSS Notify..............	910815
Corrective Action Code..	AH

Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)

Display of Work Item Data

Corrective Action.......	REPLACED PREAMP 7 WITH NEW ONE
Cause of Failure Code...	AZ
Cause of failure........	PREAMP 7 DEFECTIVE
Attachments.............	MATERIAL ISSUES
QCIR Nos................	NA
NCR's...................	NA
Completed by............	BRIGGS P, SPOTSWOOD J, RUFFOS P
Completion date.........	910817
Deficiency Tag Removed..	Y
Supervisor Review.......	NICOLAOS S
Supervisor Review Date..	910817
QC Work Accepted by.....	QUEEN S
QC Work Accept date.....	910717

W192659 (cont)


```
PMT Review By...........  NICOLAOS S
PMT Rev Date............  910817
PMT Ver.................  NICOLAOS S
PMT Ver Dt..............  910817
Accepted by.............  NEWMAN D
Acceptance date.........  910823
Plan LO.................  910824
Fld Compl Log Dte.......  910823
Craft...................  9183
Option?  (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Man Hours...............  0
OT Hours................  11
Lead/Supprt Dpt.........  300, 520
OMG Availability Code...  11
Completion Entry Date...  910819
```

FRISKALL 90250

(5)
3 of 3

Work No..................	W192659
Issued...................	910709
Depart...................	520
Status...................	C
Lead or Supprt...........	S
WCC Status...............	100
Unit.....................	2
Component No.............	NOCOMPID
System No................	ZZZ
Safety Class.............	NSR
EQ.......................	N
ASME Component...........	N
Cleanness Class..........	NA
Title....................	FRISKALL 90250
Work Item Description....	DETECTOR 7 SHOWS LOW COUNTS POSSIBLE PREAMP PROBLEMS TAG HUNG ON FRISKALL. CALL 2815 PRIOR TO WORKING ON
NPRDS Failcode...........	C
Originator...............	LUCARIELLO P
Approved by..............	KINNEY D
Approval date............	910710
Received By..............	MEYER J

Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)

Display of Work Item Data

Rcvd By Dt...............	910716
Account Code.............	706.50--9521-321258--200-0110
QC Review................	QUEEN S
QA Review Date...........	910717
Inspection Req'd.........	N
Left Planning............	910823
IP Code..................	3
Merit Score..............	000
Work Cond. Code..........	A
Work Type Code...........	CM
Power Block Flag.........	N
Supprt Acct..............	706.50--9725-321263--200-0110
Data Sht Rcvd............	LANGILLE E
Staged By................	RP CALS
Staged By Date...........	910819
Assign to................	LUCARIELLO P
Assigned Date............	910819
Sched. Start Date........	910819
SSS Notify...............	910819
Corrective Action........	COMPLETED SAT PER S-RTP-122
Attachments..............	PROCEDURE CHECKLIST
QCIR Nos.................	NA

Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)

Display of Work Item Data

NCR's....................	NA
Completed by.............	LUCARIELLO P
Completion date..........	910819
Supervisor Review........	LANGILLE E
Supervisor Review Date..	910819
QC Work Accepted by......	QUEEN S
QC Work Accept date......	910717
Acceptance date..........	910823
Plan LO..................	910824
Fld Compl Log Dte........	910823
Lead/Supprt Dpt..........	300, 520
Completion Entry Date...	910823

(6)

Problem 2

Not able to open the feedwater suction valves, 2CNM-MOV84A and B after the condensate booster pump is started

Condition

- o Power was restored to plant annunciators
- o A single condensate pump running
- o No condensate booster pumps were running, since the pumps were manually tripped after reactor water level reached Level 8
- o 2FWS-LV10A, B, C were fully closed
- o Prior to starting a condensate booster pump, the suction feedwater suction isolation valves (2CNM-MOV84A, B, and C) were closed as required in the operating procedure
- o The 2CNM-MOV84 bypass valves (2CNM-HV59A/B and 2CNM-V367A/B) were not opened because Operations did not want to go into the heater bays, since the radiation monitoring system was still not working at that time.
- o The reactor pressure was about 600 psig
- o Condensate booster pump A was started, an operator tried to open 2CNM-MOV84A and B, but it did not open fully. However, both valves received dual indication. Condensate booster pressure was about 685 psig.
- o Operations wanted to use the 2FWS-LV55 valves to control reactor vessel level. Since the feedwater pump suction valves would not open, the operator used 2CNM-LV137 instead.

Conclusions

1. The feedwater suction valves most likely did not open because they torqued out due to the large differential across the valve. Prior to shutting the valve, the condensate pump was running so the system pressure was about 125 psig, and after the valve was shut, the condensate booster was started which increased the system pressure to about 685 psig. Since the suction bypass valves were not opened, the differential pressure across the valve may have been about 500 psig.

   This valve was tested at the factory for opening against differential pressures of 800 psig at 375 degrees F or 955 psig at 100 degrees F. This valve should have opened, if the torque setting is about 63,000 ft-lbs. A review of the MOV setpoints, EP-410C-6, indicates the valves torque settings are as follows:

- o 2CNM-MOV84A, Torque setting 63197 ft-lbs
- o 2CNM-MOV84B, Torque setting 54678 ft-lbs
- o 2CNM-MOV84C, Torque setting 60095 ft-lbs

If the torque settings were set correctly, this valve should have opened.

Since feedwater flow could not be established via the startup valves, 2FWS-LV55's, the dual indication recieved on the 2CNM-MOV84A and B may be attribited to the valve's limit switches not being set correctly. If the valve did come off its seat, it should have went full open. The following WR's have been written to verify valve torque setting: 194591, 192891, and 192892. The scope of these WR's will be expanded to check the valve's limit switches.

The field readings on the valve limit switches are as follows:

2CNM-MOV84		Current Setting	Recommended Setting	Max Setting
A	Open	1-1/2	1-1/2	1-1/2
	Close	1-1/4		
B	Open	1-3/8	1-1/2	1-3/4
	Close	1-3/8		
C	Open	1-1/4	1-7/8	2
	Close	1-1/2		

Engineering, Ken Iandolo, is evaluating the field settings and has contacted C&S Valve Co. and Limitorque to re-review the the setpoints. From the field settings, 2CNM-MOV84A should have opened, if the torque setting was correct. This issue is not expected to be resolved until 8/26.

It is recommended once the valve torque issue is resolved that the valves be opened against the condensate booster pump pressure without opening the 2CNM-MOV84's bypass valves. This will ensure that the torque settings are correct.

2. The operating procedure should be revised as recommended below:

   a. If the pumps have been previously operated earlier and the system has not been drained, then it should not be required to re-close the feedwater suction valves prior to re-starting a condensate booster pump. When the condensate piping is drained and then refilled it is not possible to fully vent the piping. These venting problems were addressed during the 1989 to 90 forced outage (feedpump outage). By keeping 2CNM-MOV84's shut, it minimized the shock to the feed pump suction piping's relief valves, 2CNM-RV71A/B/C, which

reduced the threat of damaging the relief valve's flex hose. Since the feedpump forced outage, there has been no reoccurrence of damage to flex hose on these relief valves.

b. Leave the 2CNM-MOV84A, B and C manual bypass valves (2CNM-V367A, B and C) open after the system is filled and vented, but keep 2CNM-HV59's shut. The original intent for installing the manual valves in the bypass line was for positive isolation for the feedpump seal replacements. This procedure change will not help this issue, since the second isolation valve's (2CNM-HV59A, B and C) control switch is located in the heater bay. It is not recommended that 2CNM-HV59 be placed in the normally open position. If this valve is placed in this position, the ability to isolate the feedwater suction piping will be lost.

Reference: Discussions with Jim Graff on 8/16/91

Phone conversation with C&S Valve Co, Ted Thygesen on 8/16/91. Phone 708-789-5900

EP-410C

2CNM=MOV84S

1 of 2

HIT........................	1
Work No..................	W194591
Issued....................	910817
Depart....................	100
Status....................	0
Lead or Supprt..........	L
WCC Status.............	04
Unit.......................	2
Component No...........	2CNM-MOV84A
System No...............	CNM
BIP No....................	003
Safety Class............	NSR
ASME Component.........	N
Cleanness Class.........	B, D
Title......................	BUTTERFLY OR TRICENTRIC V
Work Item Description...	CHECK AND VERIFY TORQUE SETTING. REFER TO EP 4106 FC SETTINGS
Location.................	HB,277,FA,006.00
Originator...............	FERRER J
Approved by.............	MURRAY R
Approval date...........	910817
Received By.............	GIBSON R

Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)

Display of Work Item Data

Rcvd By Dt...............	910817
Account Code............	706.30--0635-321257--200-0110
QC Review...............	QUEEN S
QA Review Date..........	910817
Inspection Req'd........	N
Left Planning...........	910817
IP Code..................	3
Merit Score.............	000
Work Cond. Code.........	D
Remarks..................	TO SHOP
Work Type Code..........	PL
Power Block Flag........	Y
Staged By...............	DONAHUE G
Staged By Date..........	910827
Proj Crew...............	2
Proj Dur................	4
Assign to...............	PARKER D
Assigned Date...........	910822
Sched. Start Date.......	910827
Craft....................	9531
Man Hours...............	.5
OT Hours................	0

Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)

Display of Work Item Data

Lead/Supprt Dpt.........	100
OMG Availability Code...	##, 11, HO

Work No.................. W192891
Issued................... 910817
Depart................... 100
Status................... O
Lead or Supprt........... L
WCC Status............... 04
Unit..................... 2
Component No............. 2CNM-MOV84B
System No................ CNM
BIP No................... 003
Safety Class............. NSR
ASME Component........... N
Cleanness Class.......... B, D
Title.................... BUTTERFLY OR TRICENTRIC V
Work Item Description.... CHECK AND VERIFY TORQUE SETTING. REFER TO EP 410C FOR SETTINGS
Location................. HB,277,FA,007.20
Originator............... FERRER I
Approved by.............. MURRAY R
Approval date............ 910817
Received By.............. GIBSON R
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
HIT...................... 1
Work No.................. W192891
Issued................... 910817
Depart................... 100
Status................... O
Lead or Supprt........... L
WCC Status............... 04
Unit..................... 2
Component No............. 2CNM-MOV84B
System No................ CNM
BIP No................... 003
Safety Class............. NSR
ASME Component........... N
Cleanness Class.......... B, D
Title.................... BUTTERFLY OR TRICENTRIC V
Work Item Description.... CHECK AND VERIFY TORQUE SETTING. REFER TO EP 410C FOR SETTINGS
Location................. HB,277,FA,007.20
Originator............... FERRER I
Approved by.............. MURRAY R
Approval date............ 910817
Received By.............. GIBSON R
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Rcvd By Dt............... 910817
Account Code............. 706.30--0635-321257--200-0110
QC Review................ QUEEN S
QA Review Date........... 910817
Inspection Req'd......... N
Left Planning............ 910818
IP Code.................. 3
Merit Score.............. 000
Work Cond. Code.......... D
Work Type Code........... PL
Power Block Flag......... Y

W192891 (Continued)

Staged By...............	DONAHUE G
Staged By Date..........	910827
Proj Crew...............	2
Proj Dur................	4
Sched. Start Date.......	910827
Craft...................	9521
Man Hours...............	5
OT Hours................	0
Lead/Supprt Dpt.........	100
OMG Availability Code...	##, 11, HO

2CNM - MOV84S

4 on F

Work No.................	W192892
Issued..................	910817
Depart..................	100
Status..................	O
Lead or Supprt..........	L
WCC Status..............	04
Unit....................	2
Component No............	2CNM-MOV84C
System No...............	CNM
BIP No..................	003
Safety Class............	NSR
ASME Component..........	N
Cleanness Class.........	B, D
Title...................	BUTTERFLY OR TRICENTRIC V
Work Item Description...	CHECK AND VERIFY TORQUE SETTING. REFER TO EP 410C FO SETTINGS
Location................	HB,277,FA,008.20
Originator..............	FERRER I
Approved by.............	MURRAY R
Approval date...........	910817
Received By.............	GIBSON R

Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data

Rcvd By Dt..............	910817
Account Code............	706.30--0635-321257--200-0110
QC Review...............	QUEEN S
QA Review Date..........	910817
Inspection Req'd........	N
Left Planning...........	910818
IP Code.................	3
Merit Score.............	000
Work Cond. Code.........	D
Remarks.................	TO SHOP
Work Type Code..........	PL
Power Block Flag........	Y
Staged By...............	DONAHUE G
Staged By Date..........	910827
Proj Crew...............	2
Proj Dur................	4
Assign to...............	PARKER D
Assigned Date...........	910822
Sched. Start Date.......	910827
Craft...................	9521
Man Hours...............	5
OT Hours................	0

Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data

Lead/Supprt Dpt.........	100
OMG Availability Code...	##, 11, HO

(7)

INTERNAL CORRESPONDENCE
FORM 112-2 R 02-80 55-01-013

NIAGARA MOHAWK

FROM J.J. Blasiak

TO M.J. McCormick Jr.
T.S. Tomlinson

DISTRICT Nine Mile Point Unit 2

DATE September 3, 1991 FILE CODE NMP81341

SUBJECT Assessment of Chemistry Unit 2 Sampling and Analysis Activities During the 8/13/91 Site Area Emergency (RAP-6 Issue)

During the August 13, 1991 site area emergency at Nine Mile Point Unit 2, some opportunities for improvement were identified associated with the timeliness of reactor coolant sampling and analysis. Analysis results for conductivity and iodine were not available until approximately 1-3/4 and 2-1/2 hours after initial sampling request respectively. Attached for reference purposes is a chronology of sampling/analysis actions which occurred shortly after the event. Below is a summary of opportunities for improvements identified, root cause(s) for each problem and corrective actions.

Opportunity 1:

Normal sample tap not available because of RWCU being out of service necessitating Control Room contact and operator action to valve-in alternate sample tap. Resultant delay time was approximately 20 minutes.

Root Cause 1:

Loop A tap not normally valved into service as a result of engineering assessment of flex hose failure in April 1991.

Corrective Action 1:

Chemistry to submit DER by September 5, 1991 to request Loop A sample tap continuous service during normal operation. In addition to allowing for more rapid reactor coolant analysis post accident or after a cleanup trip, this will reduce the risk for a Tech Spec violation in the event the RWCU sample tap becomes unavailable. Based on root cause failure analysis of flex hose failure (ie, attributed to fabrication defect), previous engineering concern (ie, thermal stress) may no longer exist.

Opportunity 2:

Push button to reset SOV 150 was not depressed by Chem Tech for the required 5 seconds. This SOV prevented opening of AOV 150 and establishment of sample flow through Loop A resulting in a 10-15 minute delay in sampling.

Root Cause 2:

Technician forgot that SOV has a 5 second reset delay feature. Possible requal and/or initial training requal deficiency.

Corrective Action 2:

Operator Aid posted above SOV indicating that 5 second delay exists (done). PCR will be submitted to make the posting permanent.
This assessment will be discussed with all Chemistry Techs at Unit 2 by September 5, 1991.
A TRR will be submitted by September 5, 1991 to request inclusion of SOV operation in the training program.

Opportunity 3:

Gamma Spectrometer at Unit 2 was in use. Resultant analysis time was approximately 15 minutes.

Root Cause 3:

Stack sample was being analyzed on the Unit 2 gamma spectrometer. Spare gamma spectrometer at Unit 2 is under repair.

Corrective Action 3:

Repair spare Unit 2 gamma spectrometer consistent with department priorities. No other action required since priority of sample analysis at the time was correct.

Opportunity 4:

Communication was sometimes confusing between lab, OSC, TSC, particularly in the early stages of the event.

Root Cause 4:

Dedicated Chemistry phone lines between OSC, TSC do not exist. Dispatch board to track chemistry sample teams does not exist.

Corrective Action 4:

Revise setup in OSC to facilitate control of Chem sample teams similar to the way Damage Control teams are controlled (Emerg Planning-no date established).

Opportunity 5:

Ion Chromatographic analysis dilution and contamination problems were encountered.

Root Cause 5:

The Chemistry quality control program and training program for ion chromatography does not include analysis of undiluted samples.

Corrective Action 5:

All chemistry technicians currently qualified in ion chromatography will be requalified by September 5, 1991.
Requalification will require successful analysis of an undiluted sample.
A TRR will be submitted to revise the OJT program.

/mak
(RAP)

cc: G. Corell
G. Montgomery
A. Salemi
C. Ware

August 13, 1991 Event

Sequence of Events to Obtain Rx Sample*

0655	Chem Tech requested to get sample from Dose Assessment Advisor
0700-0730	Turnover re: emergency conditions and procedure search
0740	Chem Tech proceeds to Rx Sample Sink
0800	CR notified that normal sample tap cleanup not functional. Chem Tech requested valve V245 opening to establish flow from loop. After valve opening, no flow evident. Operations (J. Emery) cycled isolation valves. Local thermal reset button pressed.
0815	Local thermal reset pressed for required time of seconds; flow established.
0846	Purge complete; sample obtained. Conductivity 0.22 umho/cm.
0850-0905	Chem Tech providing direction in U2 lab. Gamma Spectrometer not available (gaseous effluent analysis underway).
0905-0930	Sample analyzed at U1 using gamma spectroscopy.
0929	Iodine result entered in log (phones busy; tech went to take a second sample).
0958	T. Kurtz notified of 0929 results.

NOTE: a) Other sampling evolutions occurring during this time period:

- Service Water 146A/B and RHR 23A
- Containment $H^2/0^2$
- Gas Chromatography check
- GEMS reboot and vent sampling
- Radwaste recovery tank

b) Tech was monitoring during sampling evolution. Sample dose rate was normal. Tech would have retreated and notified supervision if dose rate >100 mr/hr.

*from conversation with C. Sheldon and T. Kurtz

8

Turbine Turning Gear Trouble

On August 13, 1991 Unit 2 experienced a loss of reliable 120 volt AC when UPS 1A,B,C,D,G malfunctioned. The operators proceeded to shutdown the plant which automatically initiated a reactor scram and subsequent turbine trip.

When the turbine tripped and coasted down fifty minutes later, the turning gear motor tripped on over current and allowed the rotor to come to a complete stop. The rotor did not rotate again until approximately eight hours later. Having the turbine on turning gear after operation is essential to provide even cooling to the large mass of the rotor and its components.

The fact that the turbine would not go on turning gear raised concerns that there was a mechanical problem with the turning gear or the main turbine rotor. Further investigation demonstrated that the turning gear was operating correctly. The turning gear motor was tripping on overcurrent each time the operators tried to put the turbine on gear. This was due to the turbine rotor's resistance to rotate.

When the reliable 120 volt AC power supply was lost there was concern that the turning gear oil pump did not auto start when the main shaft oil pump lost pressure due to coastdown. The pressure switches that auto start the turning gear oil pump make use of the power supplied by 2NHS-MCC009 (ref. ESK-6TML01) which was not effected by the system disturbance. The turning gear oil pump had to receive the start signal upon low discharge pressure from the main shaft oil pump. If the turning gear oil pump did not auto start then the emergency DC bearing oil pump would have auto started had it not been in pull-to-lock.

The control room operators first verified that the turning gear oil pump and lift pumps were running after power was restored in the control room. At this time the rotor was spinning at approximately 400 rpm. A review of the turbine bearing metal temperature did not show any signs of wiping a bearing, however the chart recorder was out of service for part of the coastdown. The telltale drains for each bearing and the return line outlet screens of the lube oil tank were inspected for signs of bearing metal. There were no obvious signs of bearing metal in either location. The chemistry department has taken a lube oil sample to analyze it for metal composition and did not find and metal deposits.

The results from the investigation were not conclusive in determining why the turbine rotor would not rotate. General Electric and Niagara Mohawk reviewed and analyzed the incident and determined that there was no evidence that would conclude damage to the turbine or its components. It was also determined that there was no need for an immediate internal inspection. Both agreed that the problem was most likely thermally induced. The uneven cooling of the rotor caused a slight bow in the rotor which created a rub that prevented the rotation of the turbine. The turbine is highly susceptible to thermally induced problems because of the tight tolerances and clearances used in assembly. The supporting evidence was the fact that the turning gear motor could not produce the breakaway torque needed for rotation until the rotor had cooled for approximately eight hours.

The turbine was placed on turning gear approximately eight hours after it came to a complete stop. A walkdown of the turbine was completed immediately after it was placed on turning gear. There were no unusual discrepancies identified during the walkdown. Based on the review of the available data the turning gear oil pump started as per design. The turning gear performed as per its design and been known to trip on overcurrent at times therefor will not require unscheduled maintenance. There will be no special recommendations for turbine startup or shutdown as a result of this problem.

HIT.....................	1
Work No..................	W193343
Issued...................	910813
Depart...................	100
Status...................	C
Lead or Supprt...........	L
Deficiency Tag Number....	036050
WCC Status...............	100
Unit.....................	2
Component No.............	2ICS*AOV156
System No................	ICS
BIP No...................	035
Safety Class.............	SR
EQ.......................	Y
ASME Component...........	Y
Cleanness Class..........	B
Title....................	TESTABLE CHECK VALVE
Work Item Description....	WITH THE SYSTEM SECURED 2ICS*AOV156 INDICATES FULL OPEN 2CEC-PNL601 AND SEE WR 194584 FOR PACKING LEAK. DEF TAG.LOCATED AT 2CEC*PNL601 AND RB289 AT VALVE
Location.................	SC,292,46,163.00
NPRDS Failcode...........	E

Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)

Display of Work Item Data

Originator...............	HOLT D
Approved by..............	MCANDREW J
Approval date............	910814
Received By..............	GIBSON R
Rcvd By Dt...............	910814
Account Code.............	706.30--0635-321257--200-0110
QC Review................	QUEEN S
QA Review Date...........	910814
Inspection Req'd.........	Y
Left Planning............	910814
IP Code..................	3
Merit Score..............	000
Work Cond. Code..........	F
Work Type Code...........	CM
Power Block Flag.........	Y
Staged By................	HAYES K
Staged By Date...........	910816
Proj Crew................	2
Proj Dur.................	8
Assign to................	BARRETT D
Assigned Date............	910818
Sched. Start Date........	910816

Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)

Display of Work Item Data

SSS Notify...............	910817
Corrective Action Code...	AA
Corrective Action........	ADJUSTED ACTUATING CAM TO ALLOW SWITCHES TO MAKE PROPERLY
Cause of Failure Code....	BC
Cause of failure.........	ACTUATING CAM OUT OF ADJUSTMENT

(CONTINUED)

ZICS* AOV 156

W 193343 (Continued)

Mark Up No............... R50820
QCIR Nos................. NA
NCR's.................... NA
Completed by............. PARKER D
Completion date.......... 910819
Deficiency Tag Removed.. Y
Supervisor Review....... FOX F
Supervisor Review Date.. 910819
QC Work Accepted by..... BOOTH J
QC Work Accept date..... 910819
ISI Dt.................. 910819
PMT Review By........... FOX F
PMT Rev Date............ 910819
PMT Procedures.......... N2-OSP-ICS-R003
PMT Ver................. DRAGOMER E
PMT Ver Dt.............. 910819
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Accepted by............. DRAGOMER E
Acceptance date......... 910819
Plan LO................. 910820
Fld Compl Log Dte....... 910819
Craft................... 9531, 9521, 9541, 9511
Man Hours............... 4, 0, 0, 0
OT Hours................ 13, 9.5, 11.5, 6.5
Lead/Supprt Dpt......... 100
OMG Availability Code... ##, HO, 11
Completion Entry Date... 910819

2ICS* AOV156

3 of 4

HIT....................... 1
Work No................... W194584
Issued.................... 910814
Depart.................... 200
Status.................... C
Lead or Supprt............ L
Deficiency Tag Number... 036050
WCC Status............... 100
Unit...................... 2
Component No............. 2ICS*AOV156
System No................. ICS
BIP No.................... 035
Safety Class.............. SR
EQ........................ Y
ASME Component........... Y
Cleanness Class.......... B
Title..................... TESTABLE CHECK VALVE
Work Item Description... WITH SYSTEM SECURED 2ICS*AOV156'S PACKING WAS LEAKING. THIS WR GENERATED TO CORRECT DEFICIENCY NOT ON WR 193343, INDICATOR ARE MAY BE BENT. REPAIR AS NECESSARY
Location.................. SC,292,46,163.00
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
NPRDS Failcode........... E
Originator................ GIBSON R
Approved by............... MCANDREW J
Approval date............. 910814
Received By............... FAHNESTOCK T
Rcvd By Dt................ 910814
Procedure No.............. N2-MMP-GEN-213
Account Code.............. 706.30--9521-321256--200-0110
QC Review................. QUEEN S
QA Review Date............ 910814
Inspection Req'd......... N
Left Planning............. 910815
IP Code................... 3
Merit Score............... 000
Work Cond. Code.......... F
Remarks................... TO ISI
Work Type Code........... CM
Power Block Flag......... Y
Staged By................. CARROLL P
Staged By Date............ 910815
Proj Crew................. 4
Proj Dur.................. 20
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Assign to................. CARSON R
Assigned Date............. 910818
Sched. Start Date........ 910818
SSS Notify................ 910814
Corrective Action........ SPARYED INDICATOR SHAFT WITH WD 40

(continued)

W194584 (Continued)

4 of F

Attachments.............	MATERIAL ISSUES
QCIR Nos.................	NA
NCR's....................	NA
Completed by............	CARSON F
Completion date.........	910822
Deficiency Tag Removed..	0
Deficiency Tag Remarks..	TAG WITH WR 193343
Supervisor Review.......	BLUNT E
Supervisor Review Date..	910823
QC Work Accepted by.....	DEAN J
QC Work Accept date.....	910824
ISI Dt..................	910824
PMT Review By...........	FAHNESTOCK T
PMT Rev Date............	910814
PMT Test Rpt............	Y
PMT Ver.................	RANALLI D
PMT Ver Dt..............	910826

Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)

Display of Work Item Data

Accepted by.............	RANALLI D
Acceptance date.........	910826
Plan LO.................	910826
Fld Compl Log Dte.......	910825
Craft...................	9591
Man Hours...............	0
OT Hours................	6
Lead/Supprt Dpt.........	200
OMG Availability Code...	##, 11
Completion Entry Date...	910824

2/13/91

0740 OFG walkdown 13 A/B has been Completed. NO problems, <1 mr/hr G/A, <100 dpm/100 cm2 4 mr/hr e cart with Filters on skid. No peaks found on 4L mcr/ 8-26-91 [illegible] OPS

0745 Ops Request discovered leak on [illegible] to T.B. Starting DFR-TK2A, discharge Requested By RP. Supr. hose within sump. GA

Spraying sump cover and

0810 Ops calle leaking out from inspection Floor @ Rx 175 [illegible] cover plate, small puddle of Ramp Sending R[illegible] collecting next to sump. Wrote WR# 193371 placed Hold out # 2-91-H0802 ON OA

1330 Survey @ R DFR-P2B, DFR-P2A and 2K/100cm2 on water, is in service Ramp, Note all Sumps [illegible] But only DER Sump 2 Boundary area. GA

0830 TB walkdown Survey <1 mR Gen all Elevations <100 dpm/100 cm2 open AREAS Now Allowing Access GA Taking 4L air sample on TB [illegible] AREA to support any possible Steam leak. [illegible] Shift Team. GA

8/26 1:45

0845 Walkdown of "A" RHR system has been Completed. No changes in Dose Rates, same as Posted. GA

STAYKREST

(2MSS * AOV6D)

HIT......................	1
Work No..................	W193349
Issued...................	910812
Depart...................	300
Status...................	C
Lead or Supprt...........	L
Deficiency Tag Number...	025478
WCC Status...............	100
Unit.....................	2
Component No.............	2MSS*AOV6D
System No................	MSS
BIP No...................	001, 021, 085
Safety Class.............	SR
EQ.......................	Y
ASME Component...........	Y
Cleanness Class..........	B, D
Title....................	MSIV Y PATTERN VALVE
Work Item Description...	2MSS*AOV6D INDICATED DUAL POSITION WHEN TAKEN TO CLOSE FOR N2-OSP-MSS-CS001
Location.................	PC,251,,
Originator...............	HELKER J
Approved by..............	MCANDREW J
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?) D	
Display of Work Item Data	
Approval date............	910814
Received By..............	GIBSON R
Rcvd By Dt...............	910814
Account Code.............	706.30--9521-321257--200-0110
QC Review................	QUEEN S
QA Review Date...........	910814
Inspection Req'd.........	Y
Left Planning............	910816
IP Code..................	3
Merit Score..............	000
Work Cond. Code..........	F
Remarks..................	SENT TO CONTROL ROOM 910817
Work Type Code...........	CM
Power Block Flag.........	Y
Staged By................	PUTMAN M
Staged By Date...........	910816
Assign to................	DIFABIO M, MAYER K
Assigned Date............	910819
Sched. Start Date........	910819
SSS Notify...............	910818
Corrective Action........	MOVED LIMIT ARM BACK ON PLATE NO ADJUSTMENT NECESSARY
Cause of failure.........	LIMIT SWITCH MIGRATED OFF OF LIMIT SWITCH PLATE DUE
~~Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)~~	
~~Display of Work Item Data~~	
	TO UNKNOWN SPECIFIC CAUSE. HOWEVER REPEATED HEATING COOLING MAY HAVE BEEN A PREDOMINANT FACTOR

(Continued)

(2MSS * AOV6D)

2 of F

W193349 (Continued)

QCIR Nos................	NA
NCR's...................	NA
Completed by............	MAYER K
Completion date.........	910819
Deficiency Tag Removed..	Y
Supervisor Review.......	SITNIK T
Supervisor Review Date..	910819
QC Work Accepted by.....	BOOTH J
QC Work Accept date.....	910819
ISI Dt..................	910819
PMT Review By...........	RANALLI D
PMT Rev Date............	910813
PMT Procedures..........	N2-OSP-MSS-CS001
PMT Ver.................	RANALLI D
PMT Ver Dt..............	910828
Accepted by.............	RANALLI D
Acceptance date.........	910828
Plan LO.................	910828
Fld Compl Log Dte.......	910820
Lead/Supprt Dpt.........	300

Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)

Display of Work Item Data

OMG Availability Code...	##, HO, 11
Completion Entry Date...	910820

2ASS-PV113

(12)

1 of F

HIT....................... 1
Work No................... W193207
Issued.................... 910708
Depart.................... 300
Status.................... O
Lead or Supprt............ L
Deficiency Tag Number... 026330
WCC Status................ 05
Unit...................... 2
Component No.............. 2ASS-PV113
System No................. ASS
BIP No.................... 001
Safety Class.............. NSR
ASME Component............ N
Cleanness Class........... C, D
Title..................... CLN STM RBLR CONT V
Work Item Description... 2ASS-PV113 DOES NOT CONTROL STEAM PRESSURE WHEN 2ASS-STV112 IS OPEN. STEAM PRESSURE CONTINUED TO RISE UNTIL PRESSURE REACHED 112 LBS ON P851 THEN 2ASS-STV112 WAS SHUT
Location.................. TB,280,W,011.00
NPRDS Failcode............ C
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Originator................ LOMBER D
Approved by............... KINNEY D
Approval date............. 910709
Received By............... DARLING T
Rcvd By Dt................ 910709
Account Code.............. 706.50--9571-321258--200-0110
QC Review................. SIEMERS W
QA Review Date............ 910710
Inspection Req'd.......... N
Left Planning............. 910710
IP Code................... 3
Merit Score............... 000
Work Cond. Code........... D
Remarks................... TO FLD 910826
Work Type Code............ CM
Power Block Flag.......... Y
Staged By................. TAYLOR S
Staged By Date............ 910710
Proj Crew................. 2
Proj Dur.................. 8.0
Sched. Start Date......... 910826
SSS Notify................ 910826
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Lead/Supprt Dpt........... 300
QMG Availability Code... ##, 11, HO

work 8/30

13

NIAGARA MOHAWK

PLANT CHANGE REQUEST

(AP-6.0, Form 2, Rev 00)

Plant Change Control Number

P C 2 - 0 2 5 8 - 9 1

1.0 - Proposal

1.1 Plant Change Title: Change Power Supply for LOCA override switches + logics — Unit: ☐ 1 ☒ 2

1.2 Description

LOCA override switches + logics do not work without UPS (Black) power ~~and comm~~ to have them powered from a Safety related bus

87-205 / OUT ON 88 / 88-5

1.3 Reason for change or commitment (explain): ☐ Regulatory ☒ Nuclear Safety ☐ Operability/Maintainability ☐ Personnel Safety ☐ ALARA ☒ Other: RAP-6 Scram 91-21

want LOCA override switches + logics to be able to function without (Black) UPS Power (see attached)

1.4 Committal Reference		Commitment Date
1.5 System No. CCP-13	Component No. ~~+A-2CCP~~	Equipment Name
Procedure No.	Drawing No. ESK-6DRS01-02, ESK-7DRS01, EE-115	Code/Standard
1.6 Plant Change is: ☒ Safety Related ☐ Non-Safety Related ☐ Q Related ☐ Fire Protection Related	1.7 Plant Outage Required: ☐ Yes ☐ No; System/Component Outage Required: ☐ Yes ☐ No	Recommended Scope: ☐ Major Modification ☐ Minor Modification ☐ Simple Design Change
1.8 Originator John Bandanza	Dept. Rx U-2	Date 5/16/91
1.9 Approver (Supervisor) [illegible signature]		Date 5/16/91
1.10 Recommended Priority		
1.11 Modification Coordinator		Date

2.0 - Review Signatures

2.1 System Engineer: ☐ Approve ☐ Disapprove	Date
2.2 Manager Technical Support: ☐ Approve ☐ Disapprove	Date
3 Supervisor Project Management Approve as: ☐ Modification ☐ Simple Design Change ☐ N/A	Date
2.4 Modification Control Number N _ _ - _ _ _ - _ _ _	
Simple Design Change No. SC _ _ - _ _ _ _ - _ - _ _	

313-330 R11-90 SYMBOL NO. SS-32-350

1) DRYWELL COOLING WAS LOST BECAUSE UPS1A TRIPPED. THE LOGIC REQUIRES AN ENERGIZE TO FUNCTION RELAY TO ACTUATE TO SATISFY THE CIRCUIT FOR PROPER CCP (CIV) VALVE POSITION OR LOCA OVERRIDE.

THE DRYWELL UNIT COOLER LOCA OVERRIDE AND VALVE POSITION LOGIC CIRCUITS HAD NO POWER. (REF: ESK-7DRS01 THE ULTIMATE POWER SOURCE IS 2VBS-UPS1A.) THE ASSOCIATED RELAYS THAT SEND A PERMISSIVE SIGNAL TO THE UNIT COOLER START WERE DE-ENERGIZED WITH THEIR NORMAL OPEN CONTACTS OPEN. THEREFORE THE CONTACTORS FOR THE DRYWELL UNIT COOLERS COULD NOT ENERGIZE.

REFERENCES ESK-6DRS01 & 02, ESK-7DRS01, EE-11J

2)THE HIGHEST LEVEL KNOWN IS 202.3". POST ACCIDENT MONITORING RECORDERS WERE UP SCALE AND THE UPS's WERE NOT RESTORED WHEN LEVEL PEAKED THIS OCCURRED AT APPROXIMATELY 0612.

3)THERE WAS NO AUXILIARY (MAIN) STEAM TO THE REBOILERS BECAUSE THE AUTOMATIC SWAP FROM EXTRACTION STEAM (2ESS-STV104) TO MAIN STEAM (2ASS-STV112) WAS NOT AVAILABLE BECAUSE 2ASS-PV113 MAIN STEAM TO REBOILER PRESSURE CONTROL VALVE WILL NOT CONTROL PRESSURE REFER TO WORK REQUEST 193207 DATED 7/8/91. LAST KNOWN POSITION CLOSED.

4)IT IS NOT KNOWN ~~WHY~~ IF UPS1H FAILED. TSC NOTIFIED TO CHECK ON UPS1H

5)SUPPRESSION POOL COOLING WAS STARTED SHORTLY AFTER RCIC WAS INITIATED(0555), AND WAS RUNNING BEFORE ANNUNCIATORS WERE RESTORED (0622).

6)NO, THE LOW PRESSURE FEEDWATER HEATER STRING BYPASS 2CNM-AOV101 IS STILL OPEN.

7) YES REDUNDANT REACTIVITY CONTROL SYSTEM (RRCS) WAS INITIATED ON RUBIC'S CUBE. THE INDICATIONS ON THE RRCS DISPLAY WHEN RESET WERE AS FOLLOWS: -ARI INIT, ARI READY TO RESET,
READY TO RESET, & LFMG TRANSFER
REACTOR OPERATOR M. BODOH RESET RRCS, REACTOR OPERATOR D. RATHBUN RESET ARI RESPECTIVELY.

8)NO RED LIGHTS WERE NOTED ON P608. REACTOR OPERATOR D. HANZCYK NOTED NO RED LIGHTS ON P608. SENIOR REACTOR OPERATOR M. ERON NOTED NO RED LIGHTS ON P608.

9)YES, CONDENSATE BOOSTER PUMP 2CNM-P1A TRIPPED AND CONDENSATE BOOSTER PUMP 2CNM-P1C AUTOMATICALLY STARTED. THIS WAS CONFIRMED BY REACTOR OPERATOR M. BODOH AND SENIOR REACTOR OPERATOR M. ERON WHEN CONDENSATE BOOSTER PUMPS WERE SECURED.

NIAGARA MOHAWK **PLANT CHANGE REQUEST**

(AP-6.0, Form 2, Rev 00)

Plant Change Control Number P C 2 - 0 2 5 7 - 9 1

1.0 - Proposal

1.1 Plant Change Title: Reliable Reactor Vessel Upset Level — Unit: ☐ 1 ☒ 2

1.2 Description: Want the Reactor Vessel Upset range to be made available on the Process Computer and to be powered by a Safety Related Bus.

1.3 Reason for change or commitment (explain): ☐ Regulatory ☒ Nuclear Safety ☐ Operability/Maintainability ☐ Personnel Safety ☐ ALARA ☒ Other: RAP-6 Scram 91-01

Want Reactor Vessel Upset range to properly record during transients that involve power failure.

1.4 Committal Reference		Commitment Date
1.5 System No. ISC - 28	Component No. 2-ISC-LR160B	Equipment Name Level Recorder
Procedure No. N2-ICP-FWS-D004	Drawing No. ILZISC-090-LCR	Code/Standard

1.6 Plant Change is: ☒ Safety Related ☐ Non-Safety Related ☐ Q Related ☐ Fire Protection Related

1.7 Plant Outage Required: ☐ Yes ☒ No — System/Component Outage Required: ☒ Yes ☐ No

Recommended Scope: ☐ Major Modification ☒ Minor Modification ☐ Simple Design Change

1.8 Originator Miguel Armenta	Dept. Rx ENG. U2	Date 8/16/91
1.9 Approver (Supervisor) [signature]		Date 8/16/91
1.10 Recommended Priority		
1.11 Modification Coordinator		Date

2.0 - Review Signatures

2.1 System Engineer: ☐ Approve ☐ Disapprove	Date
2.2 Manager Technical Support: ☐ Approve ☐ Disapprove	Date
2.3 Supervisor Project Management Approve as: ☐ Modification ☐ Simple Design Change ☐ N/A	Date
2.4 Modification Control Number N _ _ - _ _ - _ _	
Simple Design Change No. SC _ _ - _ _ - _ _	

313-330 R11-90 SYMBOL NO. 55-32-350

Nine Mile Point Master Equipment List (MEL2)
1?:35:02 16 AUG 1991 Unit 2 All Fields - SEEK Page 3

r......................	1
ECORD ID................	008106990
COMPONENT ID.............	2ISC-LR1608
VALID....................	Q
COMPONENT DESCRIPTION.....	LEVEL RECORDER , RECORDS WIDE RANGE REACTOR VESSEL WATER LEVEL
BLDG.....................	CCR
ELEV.....................	306
SYS......................	ISC
SFTY.....................	Q5
QUALGRP..................	NA
SEIS (SSE)...............	I
SPEC NBR.................	P800A
ASME CODE CLASS..........	NA
QA CATEGORY..............	2
EQ FLAG..................	N
SQ FLAG..................	N
TORN.....................	P
DESIGN STATUS FLAG.......	C
IEEE.....................	NONE
MODEL NUMBER.............	772

Nine Mile Point Master Equipment List (MEL2)
13:35:19 16 AUG 1991 Unit 2 All Fields - SEEK Page 4

ASSOC EQUIPMENT ID........	2CEC*PNL603
COMP CAT..................	INDREC
COMP TYPE.................	LR
MPL NUMBER................	C33-R608
IVISION...................	N
VENDOR NAME...............	GENERAL ELECTRIC
REMARKS...................	IE.GENE.010
MANUFACTURER..............	BAILEY (BABCOCK & WILCOX)
BIP NUMBER................	028.001
LAST ANALYZED.............	870908
LAST ANALYZER CHANGE......	40***(null)***NA, 49***(null)***P
DATE INITS................	08/25/87 SMB
ANALYZED FLAG.............	Y

Following is a list of CDS Release documents Page : 1
for strategy :GEMPL=C33-R608]

TYPE	DOCUMENT ID	SHEET	REV	SWEC/NMPC FILE NO. NMPC FILE SEQ. NO.	FSAR
Documents for COMPID 2ISC-LR1608					
INST	GEY5576		01	N2G08000MISE004 N20270	
LCR	IL2ISC-039 *Wide Range*		01		
LCR	IL2ISC-090 - *upset Range*		00		

NIAGARA MOHAWK STMDOL NO. 55-32-182 **MODIFICATION REQUEST FORM** 313-138 NC

1.0 PROPOSAL UNIT: ☐ 1 ☒ 2 I 20550

1.1 MODIFICATION TITLE Add PMS/ERF Computer Point to Monitor the Upset Range Reactor Level

1.2 DESCRIPTION OF CHANGE Take Upset Range Reactor Level signal from C33A-SRU6(C33-N017) ofFee Control System and Input to Process Computer and ERF computer.

1.3 REASON FOR CHANGE: ☐ REGULATORY ☐ SAFETY ☐ EFFICIENCY ☐ ALARA ☒ PLANT OPERABILITY/MAINTAINABILITY

☒ OTHER Only Narrow Range and Wide Range Reactor Level Indications are available in th Remote Shutdown Panels, In case of that the Reactor Level exceeds 205 inches during operation from remote shutdown room the operation can not tell the reactor water level Add the Upset Range Reactor Level computer point to PMS/ERF computer would be an easy way to solve the problem.

1.4 REFERENCES: NRC REGULATION ______ CODE OR STANDARD ______ SYSTEM NO. 91 / IHC

COMPONENT NO. ______ EQUIPMENT TITLE ______

DRAWING GE ED807E160TY SH 4 PROCEDURE ______ NONCOMFORMANCE ______

1.5 MODIFICATION SAFETY CLASS: CLASS ☐ I ☐ II ☐ III • NRC SAFETY RELATED ☐ YES ☒ NO

1.6 RECOMMENDED PRIORITY GROUP 6-6 REMARKS MS 6/13/88

1.7 ORIGINATOR NAME Teddy Pao Teddy Pao DEPT. Power Ascension DATE 5/20/1988

1.8 APPROVED John T. Conway SUPERVISOR DATE 5/20/8

1.9 MOD. CONTROL NO. N Y MX MOD. COORD. ______ DATE ______

2.0 REVIEW

2.1 RECOMMENDED DESIGN ORGANIZATION ☐ NUCLEAR ENG. ☐ TECH. SUPPORT WITH NUCLEAR ENG. SUPPORT

RECOMMENDED SITE CONTACT ______

SUPERVISOR TECH. SERVICES ______ DATE ______

2.2 PROPOSAL ☐ APPROVED ☐ TABLE. RECONSIDER DATE ______ ☐ DISAPPROVED ______ TECHNICAL SUPERINTENDENT

2.3 PROPOSAL ☐ APPROVED ☐ TABLE. RECONSIDER DATE ______ ☐ DISAPPROVED

PRIORITY GROUP: 1. ☐ NEED PRIOR TO NEXT OUTAGE 2. ☐ NEED NEXT OUTAGE 3. ☐ WANT PRIOR TO NEXT OUTAGE

4. ☐ WANTS NEXT OUTAGE 5. ☐ WANTS OUTAGE INDEPENDENT 6. ☐ DEFER PRIORITIZING

7. ☐ OTHER ______

ASSIGN TO: ☐ NUCLEAR ENGINEERING ☐ TECHNICAL SUPPORT WITH NUCLEAR ENG. SUPPORT

______ STATION SUPERINTENDENT OR ______ GENERAL SUPERINTENDENT ______ DATE

3.0 TRANSMITTAL

3.1 UPDATE MODIFICATION LOG ☐ DISAPPROVED ☐ REVIEW REQUESTED ON ______ DATE

☐ TRANSMIT MODIFICATION REQUEST TO DESIGN GROUP

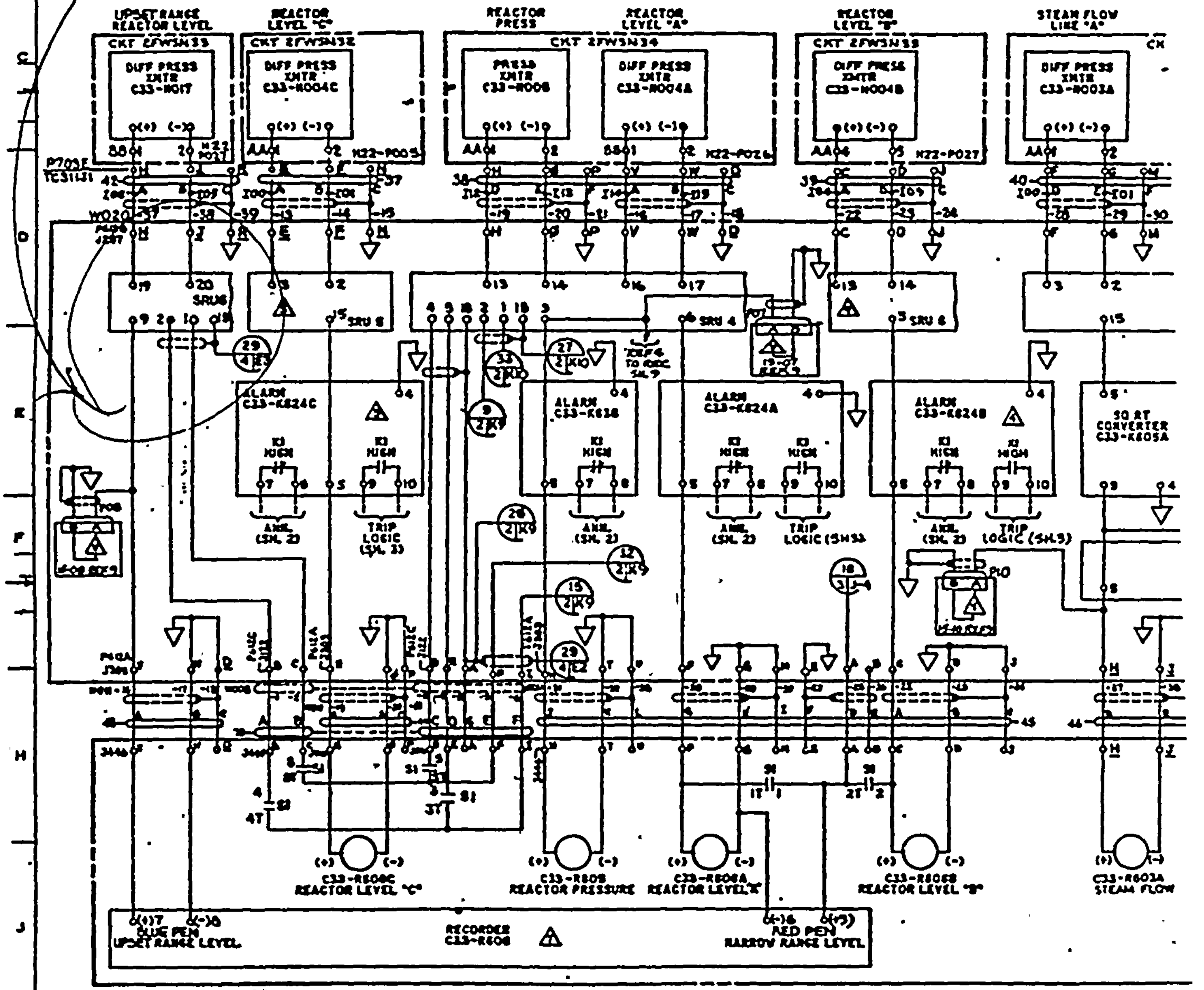
SENT TO ______ NAME ______ TITLE ______ MOD. COORDINATOR ______ DATE

3.2 CONCUR ON ASSIGNMENT AND PRIORITY GROUP ______ MANAGER DESIGN ENGINEERING ______ DATE

3.3 INITIATE WORK TRACKING DATA FILE ______ MOD. COORDINATOR ______ DATE

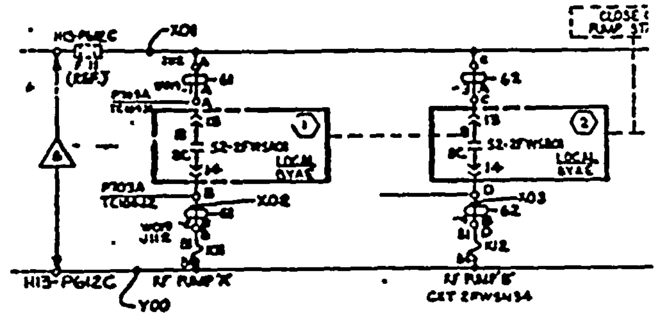
DISTRIBUTION: PART 1 (WHITE) SITE FILE; PART 2 (YELLOW) ORIGINATOR; PART 3 (PINK) @ STEP 3.2 ENGR. MOD. GRP.; PART 4 (G'ROD.) @ STEP 3.1 MOD. COORD.

Pickup upset Range Reactor Level Signal from FWC system



DWG 807E160TY SH 4

S&W File NO. 0007222.001.006R



C90042-I

NIAGARA MOHAWK MODIFICATION REQUEST

APPENDIX 1

UNIT: ☐ 1 ☑ 2

N ___ - ___ ___ - ___ ___

1.0 PROPOSAL

1.1 MODIFICATION TITLE ADD RPV UPSET LEVEL TO PLANT COMPUTER

1.2 DESCRIPTION ADD NECESSARY CABLES, CONDUIT, AND OPTICAL ISOLATORS TO BRING AN ANALOG LEVEL SIGNAL FROM THE RPV UPSET LEVEL TRANSMITTER 2ISC-PDT110 (C33-N017) TO THE PLANT COMPUTER. ~~[illegible]~~

1.3 REASON FOR CHANGE OR COMMITMENT (EXPLAIN): ☐ REGULATORY ☑ OPERABILITY / MAINTAINABILITY ☐ ALARA ☐ EFFICIENCY ☐ SAFETY ☐ OTHER

SORC OPEN ITEM #1024-00 FROM SORC MEETING #88-14

"THE PURPOSE OF THIS CHANGE IS TO IMPROVE RECOGNITION AND RESPONSE TO A LOSS OF INSTRUMENT AIR". ALSO, THE CHANGE WILL IMPROVE MONITORING OF REACTOR WATER LEVEL DURING UPSET CONDITIONS.

1.4 COMMITTAL REFERENCE SORC OPEN ITEM #1024-00 COMMITTMENT DATE SORC MEETING #88-14

1.5 SYSTEM NO. ISC COMP. NO. 2ISC-PDT110 EQUIP. NAME LEVEL TRANSMITTER

PROCEDURE NO. ______ DRAWING PID-28A CODE/STANDARD ______

1.6 MODIFICATION IS: ☑ SAFETY RELATED ☐ NON-SAFETY RELATED

1.7 OUTAGE REQUIRED: ☐ YES ☑ NO RECOMMENDED SCOPE ☑ MAJOR ☐ MINOR

1.8 RECOMMENDED PRIORITY: ______ COMMENTS ______

1.9 ORIGINATOR ULDIS BUIVA U. Buiva DEPT. ELEC. DESIGN NMP2 DATE 1/4/889

1.10 APPROVER Anil K. Julka SUPERVISOR DATE 1/4/89

1.11 MODIFICATION COORDINATOR ______ DATE ______

2.0 REVIEW

2.1 RECOMMENDED DESIGN ORGANIZATION ☐ NUCLEAR ENGINEERING ☐ SITE TECHNICAL SERVICES

SUP'T TECHNICAL SERVICES: ☐ APPROVE ☐ DISAPPROVE ______ DATE ______

2.2 TECHNICAL SUPERINTENDENT ☐ APPROVE ☐ DISAPPROVE ______ DATE ______

2.3 STATION SUPERINTENDENT ☐ APPROVE ☐ DISAPPROVE ______ DATE ______

PROPOSED PRIORITY:
- 1000 ☐ NEED - REGULATORY / SAFETY;
- 2000 ☐ HIGH POTENTIAL / SHORT TERM FAILURE
- 3000 ☐ IMMEDIATE - 1 YEAR PAYBACK;
- 4000 ☐ HIGH POTENT / LONG TERM FAIL - MAJOR IMPACT
- 5000 ☐ HIGH POTENT / LONG TERM FAIL LOW IMPACT;
- 6000 ☐ DESIRABLE

2.4 SITE PLANNING TRANSMIT TO ENGINEERING ______ DATE ______

3.0 COMMITTEE REVIEW

3.1 DESIGN ORGANIZATION ☐ NUCLEAR ENGINEERING ☐ SITE TECHNICAL SERVICES

3.2 MODIFICATION SCOPE ☐ MAJOR MOD (AP-6.0 / 6.1 APPLICABLE) ☐ MINOR MOD (AP-6.2 APPLICABLE)

3.3 PRIORITY ASSIGNMENT ______ COMMENTS ______

3.4 COMMITTEE APPL DATE ______ MTG. MINUTES REV'D ______ DATE ______

3.5 SITE PLANNING COMPLETE DISTRIBUTION ______ DATE ______

NM NIAGARA MOHAWK 9 MILE POINT SORC OPEN ITEM ACTION SHEET

313-240

SYMBOL NO. 55-32-198 N10-85

SORC MEETING NUMBER		ITEM NUMBER	DATE
88-14	UNIT 1 ☐ UNIT 2 ☒	1024-00	4/27/88

IDENTIFIED PROBLEM

Get the upset range on the computer

{N2-OP-19 (TCN)}

RESPONSIBLE PARTY

☐ CHEM./RAD MGT.
☐ LICENSING
☐ QUALITY ASSURANCE
☐ TECHNICAL SERVICES
☐ MAINTENANCE
☒ ENGINEERING Pike
☐ STRUCTURAL
☐ MECHANICAL
☐ ELECTRICAL
☐ TRAINING
☐ OPERATIONS
☐ OTHER ______

RESPONSE

☐ MODIFICATION REQUEST NUMBER ______ ☐ NA

☐ CHANGE TO PROCEDURE NO. ______ ☐ NA

DISCUSSION

APPROVAL	ACTION COMPLETED AND SATISFACTORY	SORC MEETING NO.	DATE

SORC CHAIRMAN ______ DATE ______

MEETING MINUTES (Cont'd):

The committee reviewed a Lessons Learned regarding the scram on January 20, 1988. Mr. T. Chwalek recommended that the effects of the emergency plan be expanded. He suggested to include in the lessons learned that the Chemistry Technician be utilized more to decrease the burden on the operators. Some further suggestions from an emergency view concerned notifying the outside agencies of any corrections, (ie. time of the event), and identifying the emergency action level. The committee agreed to include these recommendations in the lessons learned. The lessons learned transmittal included discussion verifying valve positions when placing a markup; the CSO being informed when equipment is taken in and out of service during markups; and per AP-3.3.1, the CSO directing other operators in the placement of tags. The lessons learned transmittal discussed controls. The operators must check more than one indication or observe redundant information prior to taking manual control of automatic systems. When automatic controllers are placed in manual, the operator must check the parameters that input into the automatic controls to verify proper setting of controls. The lessons learned also discussed operation. The closure of the minimum flow valves is a silent event that can go unrecognized. The operators were unaware for several minutes that feedwater was re-established and filling the vessel. The overfilling of steam lines could lead to significant stresses on nozzles and various main steam line appendages. The operators must keep the core covered but should also have an awareness of problems caused by overfilling the vessel. The committee noted this as such.

Mr. G. Moyer presented to the committee the following Temporary Change Notices for Unit #2, (See Summary for Titles):

N2-OP-19 The purpose of this change is to improve recognition and response to a loss of instrument air. The committee recommended SORC Open Item #1024-00 for D.L. Pike to get the upset range on the computer. It was noted that this change will be permanent at the next revision. The committee recommended approval as submitted.

N2-OP-101C The purpose of this change is to add a note to alert the operator to monitor reactor water level with level control in manual. The committee recommended approval as submitted.

The meeting adjourned at 1:15 p.m. and was re-convened at 4:00 p.m. to review Pre-Operational Test Procedure, N2-POT-7 (Addendum 1) for Unit #2, (See Summary for Title) with the following in attendance:

T.J. Perkins	-	General Superintendent Nuclear Generation
R.B. Abbott	-	Station Superintendent NMP#2
W.C. Drews	-	Technical Superintendent
K.A. Dahlberg	-	Superintendent Site Maintenance
C.L. Stuart	-	Superintendent Chemistry/Radiation Management
A. Hwu	-	General Electric
W. Schmidt	-	NRC Inspector

2RHS* MOV142

1 of 2

HIT...................... 1
Work No.................. W193350
Issued................... 910813
Depart................... 100
Status................... C
Lead or Supprt........... L
WCC Status............... 100
Unit..................... 2
Component No............. 2RHS*MOV142
System No................ RHS
BIP No................... 031
Safety Class............. SR
EQ....................... Y
ASME Component........... Y
Cleanness Class.......... B
Title.................... RHR DISCHARGE TO RADWASTE GLOBE VALVE , MOTOR OPERATED VALVE
Work Item Description.... RHS*MOV142 WILL NOT OPEN FROM P601 WHEN SWITCH TAKEN TO OPEN. TROUBLESHOOT
Location................. ABS,177,W,029.00
NPRDS Failcode........... A
Originator............... DRAGOMER E
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Approved by.............. DRAGOMER E
Approval date............ 910813
Received By.............. MORYL S
Rcvd By Dt............... 910813
Account Code............. 706.50--9581-321257--200-0110
QC Review................ SIEMERS W
QA Review Date........... 910813
Inspection Req'd......... Y
Left Planning............ 910814
IP Code.................. 1
Work Cond. Code.......... A
Work Type Code........... CM
Power Block Flag......... Y
Staged By Date........... 910813
Assign to................ WHITMORE L
Assigned Date............ 910813
Sched. Start Date........ 910813
SSS Notify............... 910813
QA Notified date......... 910813
Corrective Action Code... AA
Corrective Action........ CLEANED CONTACTS 39C-39 ON SW12-2RSSN91 AT P405
Cause of Failure Code.... BE
Option? (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Cause of failure......... DIRTY CONTACTS

(CONTINUED)

W 193350

2c1F

```
Attachments.............  PROCEDURE CHECKLISTS
QCIR Nos................  NA
NCR's...................  NA
Completed by............  WHITMORE L
Completion date.........  910813
Supervisor Review.......  MORYL S
Supervisor Review Date..  910813
QC Work Accepted by.....  SIEMERS W
QC Work Accept date.....  910813
ISI Dt..................  910813
PMT Review By...........  MORYL S
PMT Rev Date............  910813
PMT Test Rpt............  Y
PMT Ver.................  MORYL S
PMT Ver Dt..............  910813
Accepted by.............  ERON M
Acceptance date.........  910814
Plan LO.................  910814
Fld Compl Log Dte.......  910814
Lead/Supprt Dpt.........  100
OMG Availability Code...  ##, 11
Option?  (NL, Hn, D, DP, SR, RD, RV, S, Q, ?)
Display of Work Item Data
Completion Entry Date...  910814
```

(18)

NM NIAGARA MOHAWK

PLANT CHANGE REQUEST

(AP-8.0, Form 2, Rev 00)

Plant Change Control Number
P C 2 1 - 0 2 8 8 1 - 9 1

1.0 - Proposal

1.1 Plant Change Title COOLING TOWER BYPASS GATE VALVE CONTROL LOGIC Unit: ☐ 1 ☒ 2

1.2 Description PRESENT LOGIC CAUSES THE COOLING TOWER BYPASS GATE VALVES TO GO OPEN UPON LOSS OF POWER TO THE TEMPERATURE INSTRUMENTS IN THE BASIN. THIS CAN CAUSE AN OVERFLOW OF THE BASIN AND A LOSS OF THE CIRCULATION WATER HEAT SINK. PERHAPS A CONTACT COULD BE PLACED IN LINE WITH THE "23X-1-" CONTACT FROM THE TEMPERATURE INSTRUMENTS. THIS NEW CONTACT WOULD BE NORMALLY CLOSED BUT WOULD OPEN ON A LOSS OF POWER SOURCE TO THE TEMPERATURE ELEMENTS.

1.3 Reason for change or commitment (explain): ☐ Regulatory ☐ Nuclear Safety ☒ Operability/Maintainability ☐ Personnel Safety ☐ ALARA ☐ Other:

TO PREVENT AN OVER FLOW OF THE COOLING TOWER BASIN AN A LOSS OF CIRCULATION WATER HEAT SINK UPON LOSS OF POWER TO THE BASIN TEMPERATURE ELEMENTS

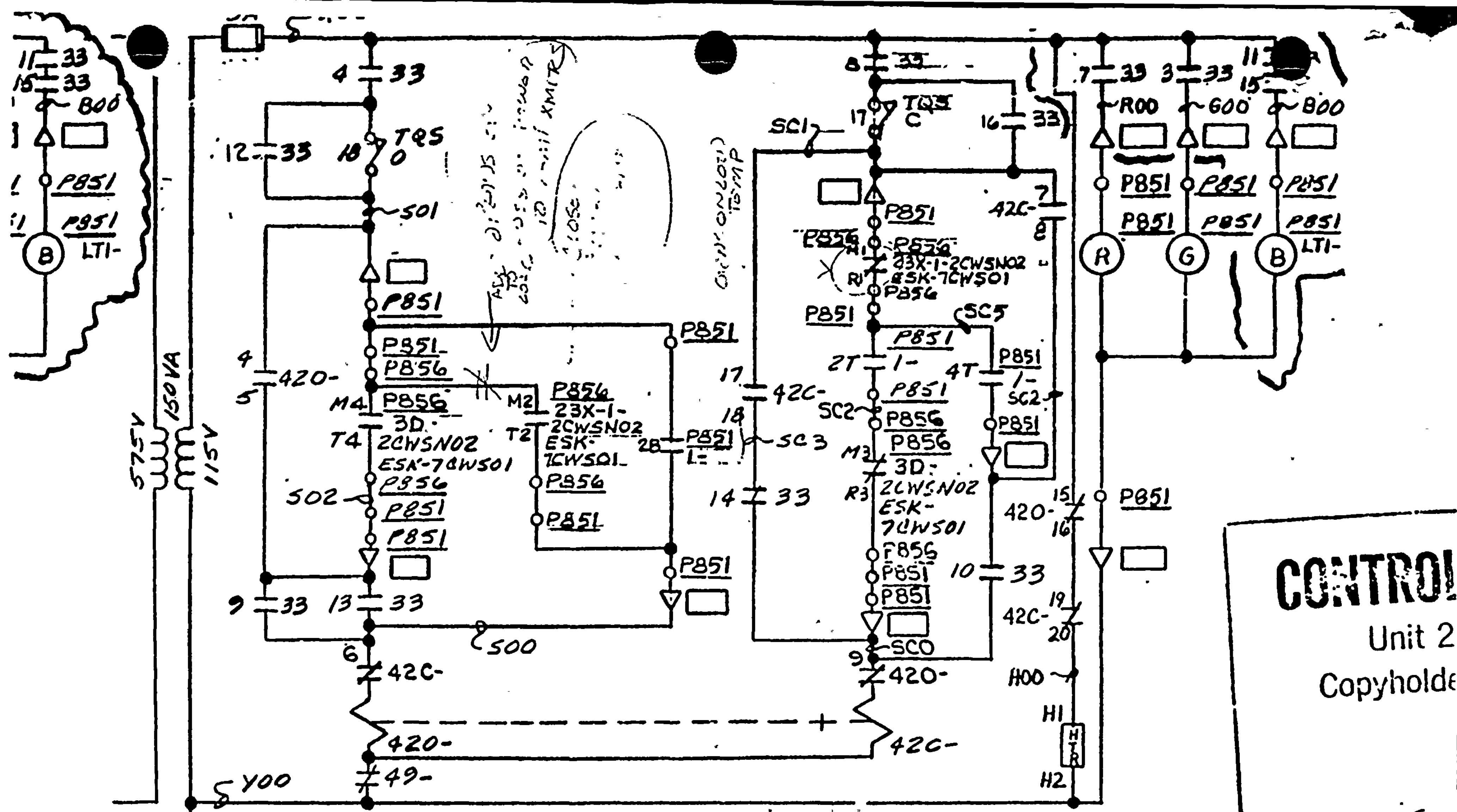
1.4 Committal Reference SCRAM 91-01 DEFICIENCIES		Commitment Date —
1.5 System No. 10	Component No. 2CWS-MOG52A,B,C	Equipment Name TOWER BYPASS GATE
Procedure No. N2-OP-10A	Drawing No. ESK-6CW509, 10 ESK-7CW501	Code/Standard
1.6 Plant Change is: ☐ Safety Related ☒ Non-Safety Related ☐ Q Related ☐ Fire Protection Related	1.7 Plant Outage Required: ☒ Yes ☐ No; System/Component Outage Required: ☒ Yes ☐ No	Recommended Scope: ☐ Major Modification ☐ Minor Modification ☒ Simple Design Change
1.8 Originator Thomas A. [signature]	Dept. NMP2 OPS	Date 8/26/91
1.9 Approver (Supervisor) [signature]		Date 8/26/91
1.10 Recommended Priority		
1.11 Modification Coordinator		Date

2.0 - Review Signatures

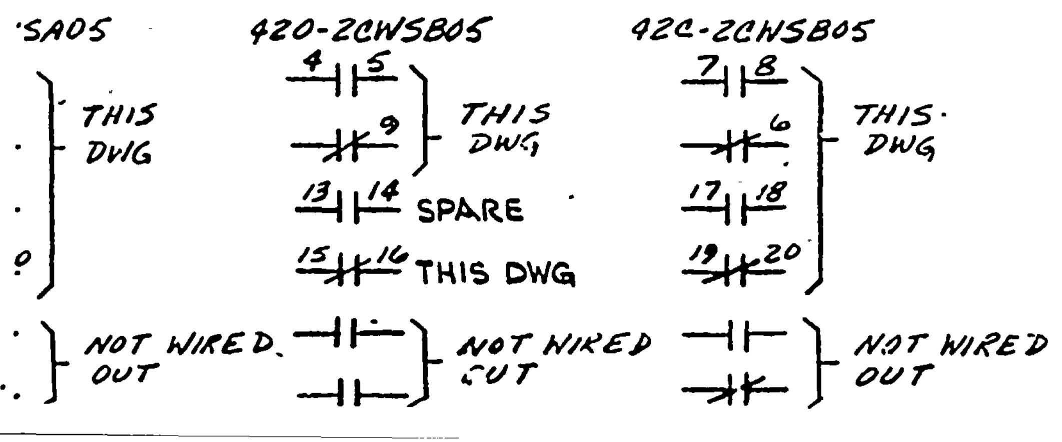
2.1 System Engineer: ☐ Approve ☐ Disapprove	Date
2.2 Manager Technical Support: ☐ Approve ☐ Disapprove	Date
2.3 Supervisor Project Management Approve as: ☐ Modification ☐ Simple Design Change ☐ N/A	Date
2.4 **Modification Control Number** N __ __ - __ __ __ __ - __ __	
Simple Design Change No. SC __ __ - __ __ __ __ - __ __	

313-330 R11-90

SYMBOL NO. 55-32-350



9CK) COOLING TOWER BY-PASS V 2CWS-MOG52B, 2NHS-MCC13B, CKT-2CWSB05 (BLACK) 10115 -



NOTES:

1. LIMIT SWITCHES LOCATED ON VALVE ACTUATOR. ALL OTHER EQPT LOCATED AT MCC UNLESS OTHERWISE NOTED.
2. LOGIC DIAG LSK-2-1.1L.
3. HEATERS LOCATED AT VALVE ACTUATOR

QA CAT II

AC ELEM DIAG 600V MCC CKTS
CIRCULATING WATER SYSTEM

(21)

8/23/91

Problem 1

Feedwater pumps B & C, and booster pump A tripped during the scram event on 8/13/91

Condition

When UPS power was lost, power supplies to the Foxboro Loops 2CNM038 and 2CNM068 were also lost. These loops provide suction flow signals to the minimum flow valves for both the feedwater and condensate booster pumps. If the pumps were operating, loss of a suction flow signal would cause the pump's minimum flow valve to go full open. These Foxboro Loops receive power from UPS via panels 2VBS-PNLA101 (2VBB-UPS1A) and PNLB101 (2VBB-UPS1B).

Conclusion

The system flow exceeded the supply capacity of the condensate system causing system pressure to decrease. The operating "B" and "C" feedwater pumps and "A" condensate booster pump tripped on low suction pressure. The system's low pressure is confirmed by the automatic start of the "C" condensate booster pump.

References: Discussions with Anil Julka
Foxboro Loops 2CNM038 and 2CNM068

INTERNAL CORRESPONDENCE

(22)

FROM Raymond J. Dean

TO John T. Conway

DISTRICT Nuclear Generation

DATE August 26, 1991

SUBJECT RMCS indications during the Site Area Emergency of August 13, 1991.

INTIIAL EVENTS

On August 13, 1991 Nine Mile Point Unit 2 experienced the loss of 5 non-essential UPS's. The loss of 2VBB-UPS1A and 2VBB-UPS1B resulted in the loss of all power to the Reactor Manual Control System (RPIS, RDCS, RSCS, RWM, and DMM). Approximately 30 minutes later the power was restored and operations personnel began verifying that all control rods had scrammed.

During this verifaction the following conditions were noted:

a) RSCS indicated that 15 rods were not full in,

b) The Full Core Display (DMM) indicated that 6 rods were not full in and numerious indicato lights were lit,

c) RWM indicated that all rods were full in,

d) The four rod display indicated blanks for the selected rod when the six rods noted in b were selected,

e) RDCS was failed (Locked up).

At the time these conditions were noted the "scram" signal had not been reset.

Operations then proceeded in restarting RDCS. RDCS restarted and operated properly at this point. Operations then reset the "scram" signal. This removed scram pressure from the control rods allowing them to settle to the normal full in position of "00". At this point the Operators again verified that all control rods were full in. All the affected systems agreed that the rods were full in (note: the RWM alternately indicated rod 14-31 as Full-In and Not Full-In due to a previously identified problem in indication, WR 194253). A troubleshooting WR was initiated to investigate the cause of the discrepancies noted prior to resetting the scram.

INVESTIGATION

The troubleshooting started initially by the operators checking the light bulbs for full in indication on the full core display. This resulted in three of the six failures noted above on the full core display being attributed to burned out light bulbs. Troubleshooting then proceeded to the electronics in the Reactor Manual Control System.

The Probe Data Processor III card, in RPIS, converts the position indicating probe Vertical and Horizontal data to Tens, Units, and status data. This card has been updated since the vendor manual release. This card was checked for PROM revisions and circuit board revision.

Panel P615 Module A1 File A1 is the physical cabinet location of this circuit card. The assembly # is GE 219B4569 G005. The stamped rev# is 2C-2B V4533-001-1. The serial# is 1. This group designation is not in the existing vendor manual but is identified by the FDDR which installed the revised components. The PROMS found on this assembly are listed below:

U4	272A8043	P1PLPD0A
U5	272A8043	P1PLPD1A
U6	272A8043	P1PLPD5B
U7	272A8043	P1PLPD4B
U8	272A8043	P1PLPD3A
U9	272A8043	P2PLPD2A

The RWM system receives the POSITION word from RPIS which contains the RPIS probe position data. The Position data of either a Tens and Units "00" position or a Full-In position is interpeted by the RWM as indicating the control rod is Full-In. Once the control rod is Full-In or at "00" a latch function exist in the software to hold the rods-full-in signal.

The Display Memory Module (DMM) system receives the Full-In data from the POSITION word as the signal to light the Full-In light on the display. Based on the troubleshooting performed, it can be concluded that the most probable cause of the three rods on the full core display not indicating full in was settling of the rods from "FI2" to "00" positions. This settling of control rods is normal post scram. This conclusion assumes that the "FI1" position switch is failed in three control rods. Work Request 162397 has been written to individually scram the six rods that did not initially indicate full in. These rods are 18-47, 14-31, 34-27, 50-19, 50-11, and 26-11. Additionally numerious lights on the Full Core Display were lit. This is normal post scram. The "Full In", "Accum", "Scram" and "Dnsc" lights should have been lit.

The RSCS system receives the POSITION word from RPIS. The RSCS uses the POSITION data for Full-in and the Data Fault 'quality' bit to validate the Full-In signal. The reason for the failure of fifteen control rods to show full-in is discussed below in the description of the troubleshooting performed. In summary RSCS receives a data fault "Fd" bit whenever "FI1" or "FI2" is seen without "00". During a scram the rods are frequently forced past "00" and held there. This condition will result in RSCS not indicating properly until the scram is reset and the rods settle back to "00".

Control rod 14-31 was used as a test to determine the indications received for various control rod combinations of Tens-Units "00", "FI1", and/or "FI2". The data taken was based on observing the RSCS Operator Display, electing control rod 14-31, observing the RWM operator display, and observing the DMM display.

Position Simulated	V H	V H	DMM	RWM	RSCS
00, FI1	1----4	32---1	Full-In	00	Full-In
00		32---1	Full-In	00	Full-In
FI1	1----4		Full-In	Full-In	------
00, FI2	1----16	32---1	Full-In	00	Full-In
FI2	1----16		Full-In	Full-In	------

Note: The single reed switch closures for "FI1" and "FI2" also cause a Data Fault (indicated on the operator benchboard). The data fault causes the Full-In data on the Position word to be ignored by the Rod Pattern Controller in RSCS. This causes the Full-In Led to be off on the RSCS Operator's display while the DMM display shows Full-In.

The RSCS affect was further localized by placing rod 14-31 at position "FI1" on the back of the Probe Multiplexer card. The Rod Pattern Controller was powered down (5 sec.) then powered up. The RSCS display showed no Full-In indication for 14-31, even though the RWM and DMM displayed Full-In.

The cause of the lockup of RDCS has been determined to be a design feature. The RDCS is designed to lockup on power up to prevent erroneous control information from being sent to the directional control valves on the HCU's. Therefore it can be concluded that RDCS operated properly and that operator actions were correct.

CONCLUSIONS

The operation and indications produced by the Reactor Manual Control System were as designed. However, the design calculations are different for each of the three indicating sub-systems:

RSCS -- Full-In and NO Data Fault

RWM -- (Tens, Units 0,0) OR Full-In OR Latch function

DMM -- Full-In

The solutions could be to use the RWM and DMM for full-in rod positions verification OR change the Data Fault data-bit for the "FI1" and "FI2" entries in EPROM U7 on the Probe Data Processor III card. Use of the RWM in conjunction with the Full Core Display and RSCS vise RSCS alone is highly recommended. This method of verification of rod position post scram is already incorporated in current operating procedures (OP).

23

N2-RAP-6 CHEMISTRY CONCERNS

1. Was the stack GEMS local monitor operable during the event?

2. How soon did we know what was going out the stack or vent?

3. Was the stack or vent continuously monitored by a person who would notify the Control Room if a release started?

4. When the air removal pumps started, could we have had an unmonitored release?

5. At the start of the event, could we have had an unmonitored release by vent or stack?

6. When were the results of the Rx Coolant Sample known?

1. The stack GEMS was operable during and after the site area emergency although the Control Room chart recorder lost communication with GEMS for a brief period. Particulate and iodine sample acquisition was continuous during and after the event. Computer Control of the system was interrupted for two (2) brief periods.

<u>Period A</u> - At 0551 the system apparently had a power interruption and automatically restored itself within one (1) minute. However, communication with the Control Room Chart recorder was apparently lost a this time which also affected input to SPDS. The cause of the loss of communication with the Control Room recorder is currently under investigation but is believed to be related to a GEMS software response after a power interruption.

<u>Period B</u> - The system was manually shut down at 0757 using the TB306 computer terminal to initiate a reboot of the system and attempt to restore communication with the Control Room Chart recorder. Reinitialization of the program was successfully completed at 0828.

2. Chemistry Supervisor T. Kurtz dispatched Chemistry Technician J. Hauke to TB306 to evaluate plant effluents at approximately 0700. Radiation levels in the plant per the TSC were normal at this time.

Technician J. Hauke examined the GEMS data logger/display and noted that stack effluent release was normal (i.e., 3.38 cps) at 0707. This information was communicated to the dose assessment advisor in the Control Room who in turn communicated the information to SSS Conway.

Since the vent GEMS was taken out of service on 8/11/91 for once/refuel cycle calibration, Mr. Hauke was directed to sample and analyze the Vent Noble Gas effluent. This was done; analysis results were available at 0855. No detectable activity was found.

Between 0730 and 0757, Mr. Hauke evaluated the spectral display on the Stack Multichannel Channel analyzer which was actively updating and collecting a spectrum. No anomalous peaks or count rates were observed.

The stack particulate and iodine samples were changed out at approximately 1120 on 8/13/91 to assess whether operation of the mechanical air removal pumps resulted in increased effluent releases. Results of the analysis were available at 1425 and indicated for the period 8/6/91 to 8/13/91.

I-131	77 μCi
I-133	3516 μCi
Cr-51	88 μCi
Mo-99	12 μCi
Co-60	5 μCi

These results were considered higher than normal operation but not abnormal for a reactor scram.

Since vent noble gas release rates were normal and there was no evidence of fuel damage during the event, the vent particulate and iodine samples were not changed out until 8/14/91 at 1130. Results of these analyses showed no detectable activity.

3. As indicated in response to Q2, Chemistry Technician J. Hauke was dispatched at approximately 0700 to monitor effluent releases. He was in contact with PASA/Effluent OSC Coordinator T. Kurtz who in turn was in contact with PASA/ Effluent TSC Coordinator J. Blasiak.

   Restoration of the Stack GEMS communication with the Control Room recorder at 0828 provided a direct link to the Control Room and SPDS for effluent releases. Chemistry Technician (Effluent Specialist) P. Chalone was stationed in the Main Control Room at about 0930 after the Stack GEMS problems were resolved.

4. At 0730, when the air removal pumps were started, the Stark GEMS was actively monitoring noble gas effluents. Computer printouts from the system at 0727, 0737, 0747, and 0757 yield normal noble gas count rates of 2.15, 2.36, 3.54, 2.70 cps respectively (corresponding to $< 10\ \mu Ci/sec$).

5. An unmonitored release could not have occurred out of the stack or associated systems (i.e., HVT) since (a) Stack GEMS remained operable during the event, (b) examination of the spectral display at approximately 0730 - 0757 was normal, (c) noble gas count rate printouts beginning at 0706 were normal, and (d) particulate and iodine samples (which were continuously acquired) showed normal activity for a post scram event.

   Monitoring of vent releases during and after the event showed no detectable activity as described in Q2. Furthermore, Reactor Building and Radwaste area monitors, containment gaseous and particulate monitors and Reactor Building Ventilation monitors were all normal during the event.

6. The attached log of activities shows Reactor Coolant sample results were available at 0850 (conductivity) and 0929 (iodine).

8/13/91 Event

Sequence of Events to Obtain Rx Sample*

0655	Chem Tech requested to get sample from Dose Assessment Advisor
0700-0730	Turnover re: emergency conditions and procedure search
0740	Chem Tech proceeds to Rx Sample Sink
0800	CR notified that normal sample tap from cleanup not functional. Chem Tech requested valve V145 opening to establish flow from loop. After valve opening, no flow evident. Operations (J. Emery) cycled isolation valves. Local thermal reset button pressed.
0815	Local thermal reset pressed for required time of seconds; flow established.
0846	Purge complete; sample obtained. Conductivity 0-22 umho/cm.
0850-0905	Chem Tech providing direction in U2 lab. Gamma Spectrometer not available (gaseous effluent analysis underway).
0905-0930	Sample analyzed at U1 using gamma spectroscopy.
0929	Iodine result entered in log (phones busy; tech went to take a second sample).
0958	T. Kurtz notified of 0929 results.

NOTE:

a) Other sampling evolutions occurring during this time period:

- Service Water 146A/B and RHR 23A
- Containment H_2/O_2
- Gas Chromatography check
- GEMS reboot and vent sampling
- Radwaste recovery tank

b) Tech was monitoring during sampling evolution. Sample dose rate was normal. Tech would have retreated and notified supervision if dose rate >100 mr/hr.

*from conversation with C. Sheldon and T. Kurtz

07-5/12-91-

Power Failure Left A-Plant In Confusion

Reactor Undamaged, Utility Officials Say

By MATTHEW L. WALD

Special to The New York Times

SCRIBA, N.Y., Aug. 14 — After a power failure disrupted the control room of a nuclear plant here on Tuesday, the operators had difficulty determining which instruments were still working and which were not, the Nuclear Regulatory Commission said today. And in at least one case, the commission said, the operators reached the wrong conclusion.

But officials said today that beyond the damage to electrical systems that occurred when problems began at the Nine Mile Point Nuclear Station, there was no damage to the nuclear fuel or other parts of the reactor and no radiation escaped from the plant.

As officials of the Niagara Mohawk Power Corporation debriefed the five operators on duty when the power failure hit yesterday morning, a team from the Nuclear Regulatory Commission began its investigation.

At First, an Unknown Risk

Both Federal and utility officials said early indications were that the actions of the plant's operators were proper, including the decision to declare the second-most serious type of emergency in the official Federal ranking. It was only the third time that such an emergency had been declared since the ranking was developed 12 years ago.

Edward Jordan, the Commission's senior reactor safety expert, said that when the incident began, "no one knew what the risk was" because no one was certain exactly what was happening.

The plant's chief engineer, Richard B. Abbott, said the control room personnel did not immediately recognize that the reactor and the steam turbine had automatically shut down. He said he was confident that the crucial automatic shutdown system had worked. But this will be difficult to prove, he said, because the computer system that engineers rely on to record each event and action in the plant was also knocked out by loss of power. Asked about the level of seri-

SI APERTURE CARD

Also Available On Aperture Card

THE NEW YORK TIMES, THURSDAY, AUGUST 15, 1991

A-Plant Failure Left Uncertainty on Instruments

Continued From Page B1

ousness of the failures, he said, "It's not a comfortable feeling for the operators, by any means."

Mr. Jordan said the operators had been misled by a meter that said — correctly, as it turned out — that the strength of the nuclear reaction in the core was declining — a sign that the reactor was shutting down; they concluded that the meter itself was failing.

When power is lost in a control room, Mr. Jordan said, "One instrument fails up-scale, and another fails down-scale, and then you have a problem." He said one instrument might give its maximum reading and another its minimum, its position offering no clue about whether it was working.

The operators knew that they had lost parts of the monitoring system known as annunciators, which are small plastic panels that are lighted and set off chimes or bells when a pump, valve or other part malfunctions, because they saw some lights go out, he said, and they knew that they had lost the use of a display that tells them the approximate location of the 185 control rods that shut off the nuclear reaction. But among the hundreds of other indicators on their control panel, they did not know which they could trust, he said.

Among the systems lost in the blackout were the radiation monitors outside the plant, so the company dispatched two teams with radiation detectors to patrol outside the fence.

> The failure was like a karate chop to the face.

The plant, New York State's newest and largest reactor, on the shore of Lake Ontario about six miles northeast of Oswego, reached "cold shutdown" late Tuesday, a condition where the cooling water is below boiling temperature at atmospheric pressure — a condition where it is extremely unlikely that anything could go wrong. At that point the emergency declaration was lifted.

The Institute of Nuclear Power Operations, an industry group in Atlanta, released information on the incident to all American reactor operators, but the Nuclear Regulatory Commission has not yet offered advice or ordered changes for the 110 other operating plants around the country.

A team of seven from the Commission, including one specialist in emergency preparedness and another in "human factors," arrived here last night, and about 20 people from Niagara Mohawk were also investigating today. The primary question is how the power systems failed. Joseph Fouchard, a Commission spokesman, said Wednesday that the systems "were supposed to be non-interruptible."

Both Backups Failed

The systems are supplied two ways. After electricity is produced in Nine Mile Point 2's generator, most goes through a bank of three transformers that boosts the voltage and sends the power out to the state's electric transmission system. But before reaching the main transformer bank, some electricity is diverted through a separate transformer and reduced to voltage for use on the site. That electricity goes through another transformer, dropping the voltage further, and then to an "uninterruptible power source," a kind of pool from which several systems are fed.

If the main flow to the pool stops, electricity is supposed to flow in from a second, independent source. If that fails, a bank of batteries is supposed to kick in. But both of these alternates, which are supposed to begin in a tenth of a second, failed.

The event that started the power failure was an electrical fault in one of the three main transformers, which caused some kind of voltage change deep in the system. Like a karate chop to the [illegible], it knocked out part of the control room.

An Important Question

The plant has other uninterruptible power systems that continued to work, supplying power to instruments that, among other things, show the level of water in the reactor vessel and the pressure.

An important question for the company and the Nuclear Regulatory Commission is whether the uninterruptible power supply that serves those safety-related instruments could also be interrupted. Mr. Abbott said those systems were fed not by the plant's output, but by power from the outside grid, and that the initial belief is that the hardware used in those systems is superior. But a full evaluation will take weeks, he said.

Another issue, he said, is whether the plant had operated outside the range of events it was designed for. The first problem, the faults in a main transformer, usually occurs several times a year in nuclear plants around the country, although never before with the results observed on Tuesday.

Your Money: Saturday, in Business Day

07 9305050237-11

[illegible]

07.5117.91

Wiring Flaw and Battery Failure Cited in Nuclear-Plant Accident

By MATTHEW L. WALD

The accident last month at the Nine Mile Point 2 nuclear plant near Oswego resulted from a wiring design error and the failure to replace two batteries no larger than those used in flashlights, the company that runs the plant told the Nuclear Regulatory Commission yesterday.

In the accident, five "uninterruptible power supplies" failed and key parts of the control room were blacked out for more than half an hour. Control room operators, unsure of what was happening, declared a Site Area Emergency, the second-most-serious category and only the third such emergency since the Three Mile Island accident 12 years ago.

The utility, the Niagara Mohawk Power Corporation, had failed to change the batteries, which are in a "logic board" similar to a board in a personal computer, which in turn controls the uninterruptible power supplies.

But at a meeting at the commission's headquarters in Rockville, Md., the utility complained yesterday that the company that supplied the computer had failed to include the batteries in a list of maintenance items in the manual. The batteries last four years and this was the fifth year, the plant manager, Martin J. McCormick Jr., said later in a telephone interview.

'Went Brain Dead'

The accident began with an electrical short circuit in one of the three main transformers of the 1,080-megawatt reactor. That sent a voltage surge lasting one-fifth of a second deep into the plant, including into the circuit from which the logic board draws its power.

If the regular power supply fails, the logic board is supposed to route power to the uninterruptible power supply from a bank of back-up batteries, each about twice the size of a car battery. But the logic board itself, in the words of one commission investigator, "went brain dead" from the initial voltage surge. That cut off the uninterruptible power supply from all sources of power.

The problem could have been avoided if the logic board had drawn its own power from the bank of back-up batteries in the first place, utility officials said. Feeding the logic board from the regular power supply "raises a question about overall reliability," B. Ralph Sylvia, Niagara Mohawk's executive vice president, said at the hearing, The Associated Press reported. "A chain's no stronger than its weakest link," he said.

Listed Maintenance Checks

The problem was compounded by the failure of the logic board's internal batteries, experts said. Those batteries, about the size of a flashlight battery, are primarily intended to power the logic board during maintenance, but the leader of the commission's investigative team, Jack E. Rosenthal, said, "If its own internal batteries had worked, that would have been enough. You would never have seen the event."

The plant manager, Mr. McCormick, said that the logic circuits were checked on every shift by operators. "This thing was not just left laying in a corner," he said. The utility, he said,

> 'A chain's no stronger than its weakest link.'

performed all maintenance checks in a list in the manual. Checking the batteries was not on the list, he added, thought it was recommended in the manual's text.

"You think you're right up there," he said. "You do a lot of work, and then there's a sneaker up there, and something happens, and it makes us all look like boobs," he said.

He added that five other uninterruptible power supplies, with electronics supplied by a different company, continued to function through the accident.

The accident did not result in a release of radiation or damage to the nuclear core because automatic systems functioned as designed and shut the plant down even though this was not instantly clear to operators in the control room.

Commenting on the accident, Mr. Rosenthal, the leader of the commission's investigative team, said: "It's never one thing. It's always multiple things."

Westchester Teacher Barred From Classroom After Trial

By JAMES FERON

Washington Post 07 J10-91

BUSINESS

FOOTBALL '91

Frederic caused $752.5 million worth of damage in 1979. Today, that amount of damage would cost well in excess of $1 billion to repair.

The fact that Bob struck a densely populated area was probably the major reason for its high cost, despite the fact that insurance experts saw no sign of widespread destruction of buildings, said Gary Kerney, claims consultant with American Insurance ... for flood damage.

In 1985, Hurricane Gloria, the last major storm to hit New England, caused $418.7 million in insured damage.

Jeff Palca, spokesman for the Insurance Information Institute in New York, said the industry as a whole has plenty of capital to absorb the damage claims.

Massachusetts, Maine and Rhode Island have applied for federal disaster relief.

Nuclear Plant's Backup Power Failed

N.Y. Reactor's Emergency Shutdown Investigated

Associated Press

Federal investigators are trying to determine why backup systems failed at a nuclear power plant in upstate New York during an Aug. 13 blackout, an official said yesterday.

A Nuclear Regulatory Commission investigative team issued a preliminary "sequence of events" late last week, which indicated that many more systems had failed than originally reported. Among them were those attached to "uninterruptible power supplies," so called because if everything else fails, these should operate off a bank of batteries. They did not.

"The transfer to the battery did not occur" at Nine Mile Point 2, said Michael Jordan, deputy leader of the investigative team. "That's what we're looking for."

The problems began shortly after 6 a.m. Aug. 13 when a huge, 25,000-volt transformer blacked out.

At the time of the emergency, Niagara Mohawk Power Corp., which operates the 3-year-old plant, said only that a power failure had knocked out warning lights and control room instruments, and that backup systems had failed.

But the 4½-page preliminary federal report shows that the plant also went into a "scram," or emergency shutdown. Because the backup power supplies did not work, plant operators couldn't immediately tell they were in an emergency shutdown or determine the condition of the reactor core. Plant operators had to turn on an emergency system to keep the core cool, according to the sequence of events.

The plant lost other systems, including its feedwater control, its radio and public address system, a host of computer systems and some lighting.

Jordan, speaking from the plant on the shore of Lake Ontario near Oswego, N.Y., said investigators were trying to determine if the plant's problems were "generic," meaning they could affect other similar plants.

The team will issue a final report on or about Oct. 1, he said.

... is away. Her column will resume upon her return.

NRC WHITE FLINT P137 AUG-27-'91 TUE 11:12 ID:NRC WHITE FLINT P137 TEL NO:301 492-1137 *USNRC* #470 P02

07.509.91

1.) Place the loads off UPS1A on maintenance power.

2.) Pull the P-6 block to CB-4

3.) Open CB-2, CB-1, A27-S1.

4.) Measure and record DC logic power - (this is battery voltage)

+20 VDC Batt.	+0.70 VDC
-20 VDC Batt.	-1.15 VDC

5.) Open A27-CB1.

6.) Install a variac on B-phase AC input to logic power supply as follows:

a.) Attach variac output ground lead to input side of A27-F3 (term #1).

b.) Attach variac input hot lead to input side of A27-F4 (term #1).

c.) Remove Fuse A27-F4.

d.) Attach variac output lead on the output side of A27-F4 (term #2).

7.) Measure voltage on A27-F4, term. #1 referenced to phase A, B and C of the maintenance supply:

A27-F4 to Phase A:	206 VAC
A27-F4 to Phase B:	0 VAC
A27-F4 to Phase C:	208 VAC

04

8.) Set variac for approximately 120 vac.

9.) Turn logic power on to UPS1A.

10.) Slowly decrease AC voltage to the DC logic power supplies.

120 VAC = 21.08 VDC

11.) Record when DC voltage starts to drop -

92.42 VAC	Logic trip	75.60 VAC
21.05 VDC	Pwr Supply failed	16.70 VDC

12.) Lower AC input to K-5 relay until relay drops out and pickup.

47 VAC drop out

52 VAC pickup

DO NOT PROCEED WITHOUT NRC APPROVAL Received 13:15 8/23/91

13.) Shutdown unit and remove variac as follows:

a.) Remove variac output ground lead to input side of A27-F3 (term #1).

b.) Remove variac input hot lead to input side of A27-F4 (term #1).

c.) Remove variac output lead on the output side of A27-F4 (term #2).

d.) REINSTALL Fuse A27-F4.

14.) Repair UPS1A. ** CHARGER SUPPLY REPAIR ONLY **

Troubleshot UPS1A - no problem found. Suspect weak breaker in 2VBB-PNL301 (Bkr #1) trips at time - WR #195051 written to replace

15.) Restart unit, as required, and put the load on UPS power.

16.) Open CB-1 on 2VBB-XD500 and verify that unit does not trip.

Unit did not ~~trop~~ trip
Voltage difference alarm
Maint out of limit alarm

17.) While on UPS power without maintenance available record the following:

UPS output voltage:	Phase A:	118.8 VAC
	Phase B:	123.0 VAC
	Phase C:	120.2 VAC

DC Link voltage: (as found) 135 VDC
(as left) 140.0 VDC

NOTE: WR #154535 written on 5/10/91 previous problem

UPS output Frequency: 59.85 Hz

18.) Close CB-1 on 2VBB-XD600.

19.) Transfer loads to Maintenance.

20.) Open P-6 block on CB-4.

21.) Shut down unit including logic power.

22.) Open AC input breaker, 2VBS-PNL301, 1.

23.) Measure each new battery prior to installing in UPS1A.

1.) 6.08 VDC
2.) 6.09 VDC
3.) 6.10 VDC
4.) 6.12 VDC
5.) 6.13 VDC
6.) 6.14 VDC

24.) Using a leads lifted log replace the control batteries in UPS1A.

25.) Measure battery voltage on each battery removed from UPS1A: No Load

1.)	6.31 VDC
2.)	5.29 VDC
3.)	4.92 VDC
4.)	2.64 VDC
5.)	6.46 VDC
6.)	5.54 VDC

26.) Lift motor operator on CB-4.

27.) Reistall P-6 block on CB-4.

28.) Turn logic power on to UPS1A.

29.) Reset motor operator on CB-4.

30.) Restart UPS1A and put load on UPS power, CB-3 closed.

Supply breaker did not trip.

NIAGARA MOHAWK NINE MILE POINT

WORK REQUEST

1. DATE 8/23/91

2. W.R. NO. 195012

3. DEPARTMENT TO DO WORK
- [X] ELECTRICAL MAINTENANCE
- [ ] MECHANICAL MAINTENANCE
- [ ] INSTRUMENTATION & CONTROL
- [ ] COMPUTER
- [ ] ISI
- [ ] SECURITY I & C
- [ ] FIRE
- [ ] METER & TEST
- [ ] OTHER

4. PRIORITY OF WORK 3/0/A
- 1 EMERGENCY
- 2 URGENT (<1 DAY)
- 3 NECESSARY (<7 DAYS)
- 4 AS TIME PERMITS (>7 DAYS)
- 5 NEXT UNIT OUTAGE
- 6 NEXT REFUELING OUTAGE

5. UNIT: ☐ 1 ☒ 2 ☐ SITE 0750991
6. SYSTEM CODE VBB
7. COMPONENT NUMBER 2VBB-UPS1C
8. BIP NUMBER 71.B09
18. SAFETY CLASS ☐ SR ☐ Q ☒ NSR
19. EQ ☐ YES ☒ NO
20. ASME COMPONENT ☐ YES ☒ NO
21. CLEANNESS CLASS

9. EQUIPMENT TITLE: UPS-1C

10. FAILURE DESCRIPTION AND LOCATION 11. NPRDS. SYMPTOM CODE ☐ DESCRIPTION

Perform SDC SC2-0273-91

12. ORIGINATOR Keeno LAMPMAN X4799 DATE 8/23/91

13. APPROVED [signatures] DATE 8/24/91

14. W.R. RECEIVED [signature] DATE 8/24/91

15. PROCEDURE NOS. 2E10465 ☐ NOT REQUIRED.

16. ☐ QA NOTIFIED BY SUPV. DATE TIME QA NAME

17. ACCOUNT

ACCOUNT	SUB LEDGER	ACTIVITY/ORDER	COST CENTER	BUD CAT	COST COMP	LOCATION	SUB. ACCT.	PROJ. COST ACCT. NO.
70650		9571	321252		200	0110		

22. QA REVIEW. QA [signature] DATE 8/25/91 23. INSPECTION REQUIRED ☐ YES ☐ NO INIT

ISI REVIEW BY E S Chiappone 8/25/91

24. STAGED BY DATE / / ☐ PARTS ☐ PROCEDURE ☐ DRWG ☐ MARKUP ☐ RWP ☐ NA INIT

ASSIGNED TO D. PARKER DATE 8/26/91

26. NOTIFICATIONS: QC DATE / / TIME ☐ NA QA INIT SSS DATE 8/25/91 TIME 2250

27. CORRECTIVE ACTION 28. NPRDS CORRECTIVE ACTION CODE AA DESCRIPTION ADJUST/CALIBRATE

PERFORMED SDC SC2-0273-91 to EDC 2E10465
WIRING MODIFICATION

29. CAUSE OF FAILURE 30. NPRDS FAILURE CODE AW DESCRIPTION INSTALLATION STATUS

REQUIRED WIRING CHANGE TO PERFORM FUNCTION AS DESIRED

31. ATTACHMENTS ☐ MATERIAL ISSUES ☐ PROCEDURE CHECKLISTS ☐ INSPECTION REPORTS ☐ LAS ☒ EDC 2E10465

32. MARK UP NO'S 2-91-50859 RWP NO'S / / QCIR NO'S N/A NCR NO'S

33. CORRECTIVE ACTION COMPLETED BY PARKER/DEAN DATE 8/26/91

34. SUPERVISOR REVIEW BY [signature] DATE 8/26/91 INIT

35. WORK ACCEPTED BY QA [signature] ☐ NA DATE 8/27/91 INIT

36. PMT REVIEW BY [signature] ☐ ASSS/SSS ☒ SUPV. DATE 8/26/91 INIT

37. PMT PROCEDURE NO'S. WIP ☐ PMT TEST REPORT ☐ NOT REQUIRED

PMT COMPLETE VERIFIED BY [signature] ☐ NA DATE 8/26/91 INIT

39. ACCEPTED BY ☐ SSS ☐ SUPV. DATE / / INIT

40. NPRDS ☐ NA SYSTEM CODE INIT. 41. INDEXED BY DOC. CONT. INIT. INIT

313-186 SYMBOL NUMBER 55-32-053 R09-85

Verify P-6 block open on CB-4
DHP

Verify logic power is off:

A27-CB1 open DHP
A27-S1 open DHP

DHP * CAUTION: RIGHT SIDE BUS CONNECTIONS ARE HOT INSTALL RUBBER BLANKETS.

Unplug the following plugs on A27:

1.) A27P3 DHP
2.) A27P4 DHP
3.) A27P6 DHP
4.) A27P1 DHP
5.) A27P2 DHP

Remove A27 pan from unit DHP

Modify A27-K5 relay wiring per EDC DHP

Reinstall following plugs: DHP
1.) A27P3
2.) A27P4
3.) A27P6
4.) A27P1
5.) A27P2

Close A27-S1 (Leave A27-CB1 open).
Verify mimic lights come on on the front panel. DHP
Alarm horn will come in. (Reset as necessary)

Push relay A27-K5 in AND HOLD. Verify that lights go out. DHP

Release relay A27-K5 and verify lights come on. DHP

~~Close A27-CB1.~~ 8/26/91

Lift motor operator on CB-4 DHP

Plug P-6 block in on CB-4 DHP

Reattach motor operator on CB-4 DHP
PULL P-6 BLOCK DHP
LIFT LEAD NO. ~~362~~ 200 AND ~~363~~ 201 FROM BATTERIES.
CLOSE A27-CB1 8/26/91 8/26/91
Re-energize the UPS ~~and put the loads on UPS power~~. DHP — UNIT TRIPPED MODULE TRIP INVERTER ALARM SCR SHUNT POWER SUPPLY FAIL
OPEN A27-CB1, RELAND WIRE #200 & 201. RECLOSE A27-S1 AND A27-CB1
8/26/91 ~~CLOSE A27-CB1.~~ 8/26/91 8/26/91
RE-ENERGIZE THE UPS — NO TRIP.
Visually verify that the A27-K5 relay is energized.
OPEN A27-CB1

Open the A27-S1 switch while monitoring A27-K5 and verify the following:

a.) The A27-K5 relay does not drop out. ✓
~~b.) No control battery discharge alarm comes in.~~ 8/26/91

Reclose the A27-S1 switch. AND A27-CB1
LIFT CB-4 OPERATOR
INSERT P-6 BLOCK
RESET CB-4 OPERATOR ON BREAKER, CLOSE CB-2
With the UPS feeding the loads open A27-CB1. ✓

Transfer loads to ~~maintenance~~ UPS power and verify mimic lights are still on. ✓ 8/26/91

MAINT. X 8/26/91

Transfer loads to ~~UPS~~ power and verify that mimic lights are still on. – TRIP TO MAINT.

– UNIT WILL TRIP WITHOUT BATTERY X 8/26/91

Place A27-CB1 on. ✓ X 8/26/91

RESTORE UNIT TO NORMAL, LOADS ON UPS

WORK IN PROGRESS DATA SHEET

PLANNER & TECHNICAL REVIEWER

☒ WR# 195012
☐ P#
☐ Other
☐ Not Applicable

DIV: ☐ I ☐ II ☐ III ☐ NA

2VBB - UPS1C
☒ Mark No.
☐ EPN
☐ Not Applicable

Procedure No. See attached plan ☐ NA

Estimated Duration:
(Equipment Out of Service)

Permissible Reactor Mode:
☐ All ☐ Hot Shutdown
☐ Run ☐ Cold Shutdown
☐ Start-up ☐ Refuel

Mark-up Required ☒ Yes ☐ No

EQUIPMENT IMPACT (LIST OUT OF SERVICE EQUIPMENT)

Unit on Maintenance Supply

PLANT IMPACT (REQUIRES OPERATION'S INPUT)

No loss of loads
Unit on maintenance supply with P-6 Block pulled

REFERENCE DRAWINGS: (LIST BELOW)

EE-1BH

COMMENTS

Prepared By (LAMPMAN) Date: 8/24/91 Tech. Reviewer Stephen C. Sack Date: 8/25/91

☐ This section N/A with No Plant Impact

Reviewed with Crew By: David H. Parker Supv/Chief Date: 8/26/91

Permission Requested to Start By: Date: 8/24/91 Time: 17:10

Permission Granted to Start By: SSS Date: 8/27/91 Time: 20:50 CSO Date: 8/26/91 Time: 6:37

Renotifications: ☐ ____ / ____ SSS ____ / ____ CSO ☐ ____ / ____ SSS ____ / ____ CSO ☐ ____ / ____ SSS ____ / ____ CSO

CONTINUED ON BACK

POST MAINTENENCE TESTS   PMT REQUIRED ☒ YES ~~☐ NO~~ *sco*

PLANNER AND TECHNICAL REVIEWER

TEST REQUIREMENTS

PROCEDURES

			Deferred	Sat	Performed By	Verified By
☐ No.______	Step No.'s______	☐NA	☐Yes ☐No	☐ Sat	____/____	____/____
☐ No.______	Step No.'s______	☐NA	☐Yes ☐No	☐ Sat	____/____	____/____
☐ No.______	Step No.'s______	☐NA	☐Yes ☐No	☐ Sat	____/____	____/____
☐ No.______	Step No.'s______	☐NA	☐Yes ☐No	☐ Sat	____/____	____/____

TESTS

Test	Acceptance Criteria	Deferred	Sat	Performed By	Verified By
☐ Test *see attached plan*	☐ ______	☐Yes ☐No	☐ Sat	*[signature]* *[illegible]*	*[signature]* *[illegible]*
☐ Test ______	☐ ______	☐Yes ☐No	☐ Sat	____/____	____/____
☐ Test ______	☐ ______	☐Yes ☐No	☐ Sat	____/____	____/____
☐ Test ______	☐ ______	☐Yes ☐No	☐ Sat	____/____	____/____

Prepared by: *[signature]* Date: *8/24/91*

Technical Reviewer: *Stephen C Sack* Date: *8/25/91*

Reviewed by: ______ ASSS/SSS Date: __/__/__

☐ Shaded section not used with WR/Document on WR

Remarks: ______

Note: The below signature, when signed, declares the equipment operable at the date and time specified.

Accepted By: ______ SSS Date: __/__/__ Time: __:__

OPS ACCEPTANCE

07-50891

UPS1D EFFICIENCY CALCULATIONS:

(8/91)

		Input:	Output:
Volts:	Phase A:	620	121
	Phase B:	610	119
	Phase C:	605	121
Amps:	Phase A:	74	135
	Phase B:	70	155
	Phase C:	70	140

$$KW_{IN} = \frac{I_{AVG} \times E \times 1.73 \times p.f.}{1000}$$ ($p.f._{IN}$ = .8 @ full load)

$$KW_{OUT} = \frac{(I \times E)_A + (I \times E)_B + (I \times E)_C \times p.f.}{1000}$$ ($p.f._{OUT}$ = approx 1.0)

$$EFF = \frac{KW_{OUT}}{KW_{IN}}$$

$$KW_{IN} = \frac{71.3 \times 612 \times 1.73 \times .8}{1000} = 60.39 \text{ KW}$$

$$KW_{OUT} = \frac{(135 \times 121) + (155 \times 119) + (140 \times 121) \times 1.0}{1000} = \boxed{51.73 \text{ KW}}$$

$$EFF = \frac{51.73}{60.39} = \underline{\underline{85.66\ \%}}$$

Expected Eff: 82 % @ 1/2 load
84 % @ full load

03

[illegible]

UPS1B EFFICIENCY CALCULATIONS:

(8/91)

		Input:	Output:
Volts:	Phase A:	620	120.5
	Phase B:	610	122
	Phase C:	600	121
Amps:	Phase A:	48	95
	Phase B:	44	75
	Phase C:	46	90

$$KW_{IN} = \frac{I_{AVG} \times E \times 1.73 \times p.f.}{1000}$$ (p.f. $_{IN}$ = .8 @ full load)

$$KW_{OUT} = \frac{(I \times E)_A + (I \times E)_B + (I \times E)_C \times p.f.}{1000}$$ (p.f. $_{OUT}$ = approx 1.0)

$$EFF = \frac{KW_{OUT}}{KW_{IN}}$$

$$KW_{IN} = \frac{46 \times 610 \times 1.73 \times .8}{1000} = 38.84 \text{ KW}$$

$$KW_{OUT} = \frac{(95 \times 120.5) + (75 \times 122) + (90 \times 121) \times 1.0}{1000} = 31.49 \text{ KW}$$

$$EFF = \frac{31.49}{38.84} = \underline{\underline{81.11\ \%}}$$

Expected Eff: 82 % @ 1/2 load
84 % @ full load

UPS1C EFFICIENCY CALCULATIONS:

(8/91)

		Input:	Output:
Volts:	Phase A:	605	119
	Phase B:	600	120
	Phase C:	600	122
Amps:	Phase A:	90	180
	Phase B:	84	160
	Phase C:	86	165

$$KW_{IN} = \frac{I_{AVG} \times E \times 1.73 \times p.f.}{1000}$$ ($p.f._{IN}$ = .8 @ full load)

$$KW_{OUT} = \frac{(I \times E)_A + (I \times E)_B + (I \times E)_C \times p.f.}{1000}$$ ($p.f._{OUT}$ = approx 1.0)

$$EFF = \frac{KW_{OUT}}{KW_{IN}}$$

$$KW_{IN} = \frac{86.6 \times 602 \times 1.73 \times .8}{1000} = 72.15 \text{ KW}$$

$$KW_{OUT} = \frac{(180 \times 119) + (160 \times 120) + (165 \times 122) \times 1.0}{1000} = \boxed{60.75 \text{ KW}}$$

Note: Overload Here!!!

$$EFF = \frac{60.75}{72.15} = \underline{\underline{84.29\ \%}}$$

Expected Eff: 82 % @ 1/2 load
84 % @ full load

07-508-91

UPS1A EFFICIENCY CALCULATIONS:

(8/91)

		Input:	Output:
Volts:	Phase A:	600	120
	Phase B:	600	124
	Phase C:	600	122
Amps:	Phase A:	40	100
	Phase B:	36	50
	Phase C:	36	90

$$KW_{IN} = \frac{I_{AVG} \times E \times 1.73 \times p.f.}{1000}$$ ($p.f._{IN}$ = .8 @ full load)

$$KW_{OUT} = \frac{(I \times E)_A + (I \times E)_B + (I \times E)_C \times p.f.}{1000}$$ ($p.f._{OUT}$ = approx 1.0)

$$EFF = \frac{KW_{OUT}}{KW_{IN}}$$

$$KW_{IN} = \frac{37.3 \times 600 \times 1.73 \times .8}{1000} = 30.97 \text{ KW}$$

$$KW_{OUT} = \frac{(100 \times 120) + (50 \times 124) + (90 \times 122) \times 1.0}{1000} = \boxed{29.18 \text{ KW}}$$

$$EFF = \frac{29.18}{30.97} = \underline{94.2\ \%}$$

Expected Eff: 82 % @ 1/2 load
84 % @ full load

07·507·91

2VBB-UPS1C TEST SUMMARY

Purpose: To prove that the DC logic power for the Exide UPS is powered from the B-phase maintenance supply and that if a transient occurs on the maintenance supply it can effect the DC logic such that it will trip the unit. This test is done with the old internal logic batteries and then repeated with new ones. Each of the inverter trips will be tested to verify that each circuit is still intact except DCOV. An AC input transient to UPS will be simulated to verify that the unit can "ride out" a normal AC input transient without tripping. The K-5 relay pick up and drop out voltages and the DC trip-point of the DC logic will be recorded.

Results Summary:

1.) It was verified that the DC logic power supplies are fed from the B-phase maintenance supply.

2.) A rapid open and closing of the upstream normal AC input breaker to the UPS was done and the unit did not trip or go on battery. No noticeable effect was seen on the UPS output.

3.) Each inverter trip circuit except DCOV was tested and each functioned as designed.

4.) Fast transient tests:

With the old batteries still installed a voltage interruption of 100 - 150 msec duration was given to the AC input to the DC logic of UPS1C. The DC logic was initially at 19.86 VDC. The unit tripped 3 out of 4 times. This was done first with the loads on maintenance supply and then also with the loads on UPS power.

With the new batteries installed there was no trip when the fast transient test was performed 25 successive times. There were no trips but a repeated SCR short alarm occurred which is indicative of noise spikes within the unit.

02

5.) The K-5 relay drop out was recorded and was found to be below the trip point of the DC logic power.

6.) Normal transfers were done, UPS to maintenance and maintenance to UPS, with dead batteries and there were no trips of the UPS. The maintenance supply was opened with the UPS feeding the loads and no UPS trips occurred.

CONCLUSION

This test proves that the DC logic power is fed by the B phase maintenance power and that it is susceptible to voltage transients on the maintenance supply. It may be susceptible to other transients as well because it is directly tied to maintenance supply. The test DOES NOT prove the level of susceptibility, that is, it does not prove that the transient was of any set voltage or duration. The test implies that the batteries may have mitigated the trip but is not conclusive.

Each trip circuit was tested successfully so no failure to any of these occurred that caused the trip.

The fast open/close of the normal AC input breaker proves that the unit would withstand an AC input transient without failure or without going on battery power.

Numerical Results:

1.) Fast Transient Tests -

a.) With existing batteries -

1.) With loads on maintenance:
At 19.86 VDC (90.0 VAC) - trip (150 msec.)
At 19.86 VDC (120 VAC) - trip (150 msec.)

2.) With loads on UPS power:
2 Tries, 1 trip (200 msec.)

b.) With new batteries -

1.) Approx. 20.0 VDC - 25 times,
no trip. (100 msec.)

2.) The DC logic trips at < 16.9 VDC. (with 84.59 VAC on input).

3.) K-5 relay drop out - 45 VAC
K-5 relay pick up - ** not recorded

4.) The following trips tests were done:

a.) OV/UV
b.) ACUV
c.) ACOV
d.) DCUV
e.) Frequency fail
f.) Logic Failure
g.) Power supply failure
h.) Clock failure

5.) The internal battery voltage was measured:

Positive - +0.6
Negative - +0.04

5.) Individual cell voltages:

	Old Battery Voltage	New Battery Voltage
1.)	1.19	6.10
2.)	2.48	6.07
3.)	2.24	6.10
4.)	0.17	6.09
5.)	0.79	6.10
6.)	1.78	6.12

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2VBB-UPS1D TEST SUMMARY

Purpose: To prove that the DC logic power for the Exide UPS is powered from the B-phase maintenance supply and that if a transient occurs on the maintenance supply it can effect the DC logic such that it will trip the unit. This test is done with the old internal logic batteries and then repeated with new ones. The K-5 pickup and drop out voltages and the DC trip-point of the DC logic will be recorded.

Results Summary:

1.) It was verified that the DC logic power supplies are fed from the B-phase maintenance supply.

2.) Fast transient tests:

With the old batteries still installed a voltage interruption of 100 - 150 msec duration was given to the AC input to the DC logic of UPS1D. The DC logic was at 20.9 VDC. The unit would not trip. The AC input voltage to the DC logic was then reduced such that the DC logic was at 20.0 volts. When the test was performed with the DC logic power at 20.0 VDC the unit tripped. This was done first with the loads on maintenance supply and then also with the loads on UPS power.

With the new batteries installed there was no trip when the fast transient test was performed though there was significant hits shown on the DC logic power bus as seen by the oscilloscope.

3.) The K-5 relay drop out and pick up voltages were recorded and they were found to be below the trip point of the DC logic power.

4.) Normal transfers were done, UPS to maintenance and maintenance to UPS, with dead batteries and there were no trips of the UPS. The maintenance supply was opened with the UPS feeding the loads and no UPS trips occurred.

CONCLUSION

This test proves that the DC logic power is fed by the B phase maintenance power and that it is susceptible to voltage transients on the maintenance supply. It may be susceptible to other transients as well because it is directly tied to maintenance supply. The test DOES NOT prove the level of susceptibility, that is, it does not prove that the transient was of any set voltage or duration. The test implies that the batteries may have mitigated the trip but that is not conclusive.

Numerical Results:

1.) Fast Transient Tests -

a.) With existing batteries -

1.) With loads on maintenance:
At 20.9 VDC - five tries, no trips.
At 20.7 VDC - one try, one trip. (150 msec.)

2.) With loads on UPS power:
At 20.06 VDC - one trip. (100 msec.)

b.) With new batteries -

1.) At 20.05 VDC - Five tries, no trips.
- noticeable DC hit on each transient.

2.) The DC logic trips at <17.3 VDC. (with 84.5 VAC on input).

3.) K-5 relay drop out - 42 ~~VDC~~ Vac
K-5 relay pick up - 55 ~~VDC~~ Vac

4.) The internal battery voltage was measured:

Positive - +0.6
Negative - +0.14 - (the negative battery set was actually slightly positive).

5.) Individual cell voltages:

	Old Battery Voltage	New Battery Voltage
1.)	.254	6.10
2.)	.570	6.06
3.)	1.03	6.10
4.)	.07	6.10
5.)	1.17	6.13

6.) 1.39 6.09

2VBB-UPS1A, 1B, 1G TEST SUMMARY

Purpose: To prove that the DC logic power for the Exide UPS is powered from the B-phase maintenance supply. The K-5 pickup and drop out voltages and the DC trip-point of the DC logic will be recorded for UPS1A, not for UPS1B and UPS1G. The internal batteries will be tested and replaced.

Results Summary:

1.) On UPS1A, UPS1B and UPS1G, it was verified that the DC logic power supplies are fed from the B-phase maintenance supply.

2.) The K-5 relay drop out and pick up voltages were recorded for UPS1A and they were found to be below the trip point of the DC logic power.

3.) On UPS1A, UPS1B, UPS1G, the maintenance supply was opened with the UPS feeding the loads and no UPS trips occurred.

4.) On UPS1A, UPS1B and UPS1G, the batteries were replaced.

CONCLUSION

This test proves that the DC logic power is fed by the B phase maintenance power. It proves that the internal batteries were effectively dead. For UPS1A it proves that on a slow transient that the DC logic power will drop out before the K-5 relay will transfer to UPS power.

Numerical Results:

1.) The UPS1A DC logic trips at <16.7 VDC. (with 75.6 VAC on input).

2.) UPS1A: K-5 relay drop out - 47 VDC
K-5 relay pick up - 52 VDC

4.) The internal battery voltage was measured:

UPS1A:	Positive -	0.7
	Negative -	1.1
UPS1B:	Positive -	0.54
	Negative -	6.2
UPS1G:	Positive -	18.3
	Negative -	0.69

07-506-91

INTERNAL CORRESPONDENCE
FORM 112-2 R 02-80 55-01-013

NIAGARA MOHAWK

FROM R. Smith RS

TO OEA Committee

DISTRICT Nine Mile Point Unit 2

DATE January 15, 1991 FILE CODE QA91-U2-058

SUBJECT Revised Response (IN 88-05)

3-5-91

SUBJECT:

Revision to Information Notice 88-05 Response, Titled "Fire In Annunciator Control Cabinets"

SUMMARY:

At the request of Operations Department Unit II, Electrical Design has provided an alternative to corrective action for OE Information Notice 88-05. The alternative consists of replacing the 12k ohms, 1 watt resistor with a 12k ohms, 5 watt resistor. Based on the new finding an EDC 2E10358 was issued to remedy the resistor decomposition and overheating problems. The alternative action replaces Modification PN2Y88MX182 and satisfies the concern of Information Notice 88-05.

The original response to Information Notice 88-05 (NMPC 61522), approved by the OEA Committee on 12/19/90 and A. Julka letter dated January 3, 1991 are included for information.

Listed below are the new Corrective Actions Taken and Recommended Corrective Actions for Information Notice 88-05.

CORRECTIVE ACTION TAKEN:

Issued EDC 2E10358 to Replace Modification PN2Y88MX182.

RECOMMENDED CORRECTIVE ACTION:

1. Revise procedure N2-OP-91A to contain an off normal procedure for loss of all annunciators. **REMAIN AS WRITTEN**

2. Revise procedure N2-OP-71 to include an additional alarm response corrective action for annunciators 601141 and 842101. **REMAIN AS WRITTEN**

3. I & C Department implement EDC 2E10358.

I have forwarded this package to you for review and/or additional comments.

RS/als

For Biblio:

"Internal Correspondence in Response to NRC Information Notice No. 88-05, ~~undated~~

RJConte

INTERNAL CORRESPONDENCE
FORM 112-2 R 02-80 55-01-013

NIAGARA MOHAWK

FROM A. Julka

TO R.B. Abbott

DISTRICT Nuclear Division

DATE Jan. 3, 1991

FILE CODE SM2-E90-0258

SUBJECT Information Notice 88-05
Modification PN2Y88MX182

Route:
VP
LD
CW

SUBJECT

NRC Information Notice 88-05
Modification PN2Y88MX182

Electrical Design has reevaluated the continued failure of resistors associated with the annunciator computer point alarm circuits. The intent of this memo is to inform individuals of actions taken to resolve this issue.

BACKGROUND

Resistors to the annunciator computer input auxiliary relays have been failing due to heat degradation. The resistors are located in panels 2CEC-PNL858 and 2CEC-PNL630. These 12KΩ, 1 watt carbon composition resistors serve as a voltage dropping resistor for the auxiliary relays of the RA-856 modules. Analysis shows that the resistors are marginally sized, operating at about their published wattage ratings. The resistors degrade to a point in which an overvoltage condition occurs at the auxiliary relays and the relays burnout. When this happens, computer point identification of alarm initiations to multiple input annunciators are lost.

Information Notice 88-05 informed licensees of three occurrences of electrical fires in annunciator control panels supplied by Electro Devices, Inc. Engineering performed an evaluation of the annunciator and computer point circuitry of RIS supplied annunciators. As a result of this evaluation, MRF N2-88-182 was generated to install new resistors or fuse links to eliminate resistor degradation.

DISCUSSION

Due to Modification PN2Y88MX182 being currently scheduled for implementation during the fourth refueling outage, Operations requested Engineering to reassess the resistor failure situation. Electrical Design did so, the result being the issue of EDC 2E10358 to remedy this condition. EDC 2E10358 revises vendor drawings to allow substitution with a 12KΩ,5 watt wirewound resistor. The 12KΩ,5 watt resistor is of sufficient rating to resolve resistor degradation and subsequent auxiliary relay failure.

RECEIVED
JAN - 4 1991
C. G. BECKHAM

CONCLUSION

With mechanisms established to substitute and eventually replace the 12KΩ, 1 watt resistors, Engineering recommends cancellation of modification PN2Y88MX182. The new resistors will be installed by I&C Technicians during component outages in accordance with the EDC 2E10358 which provides the alternate acceptable resistor. By copy of this letter, OEA is requested to review NMPC response to IN 88-05 and make changes accordingly.

A.K. Julka
Supervisor, Elec. Design U2

AKJ:drw
000217SS

xc: K. Ward
F. Romeo
C. Beckham
D. Anthony
U. Buiva
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A. Denny
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J. Dockum
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M. Ritzner
P.J. Ganey
K. Peake
P. Francisco

INTERNAL CORRESPONDENCE
FORM 112-2 R 02-80 55-01-013

NIAGARA MOHAWK

FROM P.J. Ganey P.J.G.

TO OEA Committee

DISTRICT Nine Mile Point Unit 2

DATE November 29, 1990 FILE CODE NMP61522

SUBJECT IN 88-05

IN 88-05: FIRE IN ANNUNCIATOR CONTROL CABINETS

SUMMARY:

Several fires have occurred in remote cabinets containing multiple circuit cards for control room annunciator circuits. In all cases, the annunciator systems were provided by Electro Devices, Inc.

EVALUATION:

The Notice does not contain recommendations. The NRC has, however, identified four similarities that are common to each event. For purposes of clarification, a response to each similarity is provided.

- o The annunciator systems were provided by the same manufacturer.

Response:

The NMP2 annunciator system was provided by Rochester Instrument System (RIS). As a result of a review of this Notice, an engineering evaluation of the RIS circuitry was performed. The review has generated a modification (number PN2Y88MX182) which will install new resistors or fuse links to limit current from reaching a magnitude exceeding wattage requirements. This will serve to prevent resistor decomposition and overheating, thus reducing the potential for fire. (Note: Modification PN2Y88MX182 is currently scheduled for implementation during the fourth refueling outage.)

- o Common to each event was the licensee's lack of specific emergency procedures to address complete loss of the annunciator system.

Response:

The NMP2 Operations Department is revising procedure N2-OP-91A, "Process Computer", to include steps under section "H", Off Normal Procedure, to address the loss of all annunciators. The revision will include:

1) classifying the event per procedure S-EAP-2, "Classification of Emergency Conditions",

2) notifying the NRC, the Operations Superintendent, and the Plant Superintendent,

3) calling in additional plant operators to be used to increase the frequency of monitoring equipment in the control room and the plant, and

4) writing an emergency Work Request to obtain I&C assistance in determining the cause of the loss of annunciators.

Additionally, procedure N2-OP-71, "13.8KV/4160V/600V A.C. Power Distribution", will be revised to include an additional corrective action for the alarm response to annunciator 601141 (Panel 630 Annunciator Power Supply Trouble) and annunciator 842102 (Panel 858 Annunciator Power Supply Trouble). The additional corrective action will be a referral to the off normal procedure for loss of all annunciators contained in N2-OP-91A.

o None of the licensees have provisions for monitoring ambient temperatures in the control cabinets.

Response:

Ambient temperature in the NMP2 safety related control room panels was monitored as part of a commitment to the NRC to resolve concerns about panel mounted electronic equipment reliability. Monitoring equipment was installed by temporary modification PN2Y86MX124, "Category I PGCC Panels Internal Temperature Monitoring". Temperatures were monitored and trended in order to confirm that at a control room ambient temperature of 90°F the panel internal temperature would meet the design criterion (120°F). Design temperatures were not exceeded. Modification PN2Y86MX124 was closed and temperature monitoring of safety related PGCC panels was ceased.

In order to enhance the internal cooling capacity of the annunciator panels, a modification was requested and implemented. Modification PN2Y87MX217 installed additional louvers on the cabinet front panels.

In the event that fire does occur, NMP2 Power Generation Control Center (PGCC) cabinets have smoke detection capability as part of the Fire Protection System. The smoke detectors provide control room alarm and indication. The control room is equipped with portable fire extinguishers. Halon injection is provided into the PGCC sub floor.

- In the events at Calvert Cliffs and Rancho Seco, the fire teams experienced nausea and dizziness, apparently as a result of inadequate oxygen in the area in which the fire occurred. Licensees thus may wish to review their procedures for fighting small fires in confined areas to determine the adequacy of personnel protection and the need to specify the use of breathing apparatus.

Response:

The Emergency Plan Implementing Procedure EPP-2, "Fire Fighting" requires Nine Mile Point Fire Department personnel to pick up both protective clothing and a Self Contained Breathing Apparatus (SCBA) when responding to all fires. The procedure specifies that personnel entering smoky areas, fighting fires, or responding to fire announcements shall use the SCBA.

The completed preventive measures and action taken in regard to this Notice were reviewed and commented on by NRC Senior Resident Inspector William Cook during a Formal Exit Meeting for the periods of February 1 to March 31, 1988. The Inspector was pleased with both the corrective actions taken and the plant awareness. A summary of the inspection is contained in NRC Inspection Report 50-410/88-02.

CORRECTIVE ACTION TAKEN:

Modification Number PN2Y88MX182 was initiated to install new resistors or fuse links in panel H13-P858.

RECOMMENDED CORRECTIVE ACTION:

Revise procedure N2-OP-91A to contain an off normal procedure for loss of all annunciators.

Revise procedure N2-OP-71 to include an additional alarm response corrective action for annunciators 601141 and 842101.

REFERENCES:

NRC Inspection Report 50-410/88-02

Internal Correspondence, J.R. Bunyon to T.J. Syrell, August 25, 1988, File Code NMP39319

Modification PN2Y88MX182, Change Resistors For Aux Relays In PNL H13-P858

<u>REFERENCES:</u> Cont.

Modification PN2Y87MX217, Annunciator Panel Louver Addition

Temporary Modification PN2Y86MX124, Category I PGCC Panels Internal Temperature Monitoring

Internal Correspondence, R. Jenkins To Distribution, July 14, 1988, File Code NMP37805

Internal Correspondence, A.R. Andersen to R. Jenkins, July 26, 1988, File Code NMP34576

Internal Correspondence, A. Pinter/T. Eagan to Licensing File, April 15, 1988, File Code NMP33837

Internal Correspondence, D.T. Goodney to P. Toohey, November 22, 1988, File Code MOD-88392

Internal Correspondence, A. Pinter to Unit 2 Licensing File, February 27, 1988, File Code NMP32566

Emergency Plan Implementing Procedure EPP-2, Fire Fighting

Emergency Action Procedure S-EAP-2, Classification Of Emergency Conditions

N2-OP-91A, Process Computer

N2-OP-71, 13.8KV/4160V/600V A.C. Power Distribution

N2-OP-46, Fire Protection - Halon

Internal Correspondence, A.K. Gwal to J.K. Jirousek, June 16, 1988, File Code NMP36978

Niagara Mohawk Correspondence, C.V. Mangan to NRC, October 24, 1986, File Code NMP2L0925

Internal Correspondence, M. McCrobie to J.R. Bunyan, April 19, 1988, File Code NMP21569

Interoffice Correspondence, A. Dellagreca to J. Bunyan, January 19, 1987

Interoffice Correspondence, A. Dellagreca to A. Gwal, April 27, 1988

Interview:

Al Denny, Operations, November 16, 1990

PJG/ls

OEA COMMITTEE APPROVED
DATE: 12/19/90 #90-22

NCTS COMMITMENT IDENTIFICATION FORM

1. Commitment Number......... ________ - ________ 3. Type...... I

4. Unit Number............... 2

5. Agency.................... NMPC

6. Source Doc Type........... OEA

7. Source Doc Subtype........ MEMO

8. Source Doc Number......... NMP-61522

9. Source Doc Date............ ________

10. Commitment Description.... In accordance with IN 88-05 evaluation: Revise procedures N2-OP-91A and procedure N2-OP-71.

11. Commitment Due Date....... ________

12. Commitment Comments....... ________

13. Priority Code............. ____

14. Commitment Cross Ref...... IN 88-05

15. Responsible Group......... Operations

16. Responsible Manager....... M. Colomb

PREPARED BY		CONCURRED BY	
Name Philip J. Ganey		Name	
Sig. Philip J. Ganey	Date 11/19/90	Sig.	Date

NCTS TASK IDENTIFICATION FORM

Commitment Number.........	________ - _______	3. Task No...	1
2. Task Description..........	Revise procedure N2-OP-91A to contain an off normal procedure for loss of all annunciators.		
3. Responsible Group.........		4. Manager......	
5: Responsible Lead..........		6. Individual...	
7. Estimated Target Date.....		8. Status.......	
9. Task Comments.............	Revision should include steps as described in NMP61522		
10. Completion Date...........		Completed By:	

Commitment Number.........	________ - _______	3. Task No...	2
2. Task Description..........	Revise procedure N2-OP-71 to contain an additional alarm response corrective action for annunciators 601141 and 842101.		
3. Responsible Group.........		4. Manager......	
5. Responsible Lead..........		6. Individual...	
7. Estimated Target Date.....		8. Status.......	
9. Task Comments.............	Revision should include steps as described in NMP61522.		
10. Completion Date...........		Completed By:	

INTERNAL CORRESPONDENCE
FORM 112-2 R 02-80 55-01-013

NIAGARA MOHAWK

FROM T. J. Syrell
TO R. Jenkins

DISTRICT Nine Mile Point Unit 2
DATE July 12, 1988 FILE CODE
SUBJECT NRC Information Notice No. 88-05

TITLE: Fire in Annunciator Control Cabinets

EXECUTIVE SUMMARY

PROBLEM STATEMENT

Between January 28, 1988 and February 8, 1988 three separate events occurred involving fires in annunciator systems at three separate nuclear plants. All three annunciator systems were manufactured by Electro-Devices, Inc.

CONCLUSION

NRC Information Notice addresses the potential for Electrical Fires in Remote Annunciator Cabinets which has resulted in loss of control room annunciation. Nine Mile Point Unit 2 has Rochester Instrument Systems annunciators which have not experienced failures that resulted in fires or loss of control room annunciators. The Nine Mile Point Unit 2 Fire Protection System monitors these panels with smoke detectors. The existing Site Emergency Procedures already in place at NMP2 assure the safety of the plant and personnel in this type of failure.

ACTION RECOMMENDED

The recommendations in the NRC Information Notice have been addressed and no further action is required.

DETAILED DISCUSSION

BACKGROUND

Remote annunciator cabinets containing circuit boards for the control of control room annunciator functions, have failed on three separate occasions, in three separate nuclear power plants. In all three instances, complete control room annunciator failure occurred. In addition, all failures were attributed to fires in the remote cabinets. The root causes of the fires are still under investigation.

The annunciator system for each of the three power plants experiencing the annunciator panel fires was manufactured by Electro-Devices, Inc.

Lack of specific emergency procedures was common to each licensee's ability to address the complete loss of the annunciator system.

None of the licensees had provisions for monitoring ambient temperatures in the control cabinets.

During two of the events, fire fighters experienced nausea and dizziness while fighting the fires. This was attributed to inadequate oxygen in the fire area as a result of inadequate procedures.

INFORMATION ONLY

DETAILED EVALUATION

1. NRC Information Notice 88-05, Recommendation #1

   RECOMMENDATION: Review annunciator system manufacturer to ascertain the potential for fires in installed annunciator equipment.

   NMPC RESPONSE: The Nine Mile Point Unit 2 annunciator system was provided by Rochester Instrument System, not Electro-Devices Inc., which have experienced these troubles.

   CONCLUSION: No action required.

2. NRC Information Notice 88-05, Recommendation #2

   RECOMMENDATION: Review emergency procedures for specific instruction on actions for complete loss of annunciator systems.

   NMPC RESPONSE: Nine Mile Point Nuclear Station Emergency Action Procedure EAP-2, Classification of Emergency Conditions, classifies loss of all control room alarms (annunciators) as an "ALERT" condition. Loss of indicators or alarms on process or effluent parameters not functional in the control room requires shutdown by Technical Specification requirements for "Channel Operability".

   CONCLUSION: No action required.

3. NRC Information Notice 88-05, Recommendation #3

   RECOMMENDATION: Review plant provisions for monitoring ambient temperatures in the annunciator control cabinets.

   NMPC RESPONSE: NMP2 does not provide a means for monitoring ambient temperatures in the annunciator control cabinets. Instead, Nine Mile Point Unit 2 has smoke detection provided in all Power Generation Control Center (PGCC) panels. The annunciator control panels are part of the PGCC installation. The smoke detection capability is part of the Fire Protection System which provides alarms and indication in the control room of all fires.

   CONCLUSION: No action required.

4. NRC Information Notice 88-05, Recommendation #4

   RECOMMENDATION: Reivew fire fighting procedures for fighting small fires in confined areas to determine the adequacy of personnel protection and the use of breathing apparatus.

   NMPC RESPONSE: Nine Mile Point Nuclear Station Emergency Plan Implementing Procedures, EPP-2 Fire Fighting, requires the use of self-contained breathing apparatus when: entering smokey areas, fighting fires and responding to fire alarms.

   CONCLUSIONS: No action required.

REFERENCES

1. Specification P800A, Power Generation Control Center.
2. Technical Specification, Nine Mile Point Nuclear Station, Unit 2.
3. EPP-2, Fire Fighting
4. EAP-2, Classification of Emergency Conditions.

DISTRIBUTION

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

February 12, 1988

NRC INFORMATION NOTICE NO. 88-05: FIRE IN ANNUNCIATOR CONTROL CABINETS

Addressees:

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose:

This information notice is being provided to inform addressees of three occurrences of electrical fires in annunciator control panels supplied by Electro Devices, Inc. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

Recently, electrical fires have occurred in remote cabinets containing multiple circuit cards for the control of visual and audible annunciator functions in the main control rooms at three nuclear power plants. The annunciator systems for the three plants were provided by Electro Devices, Inc. of St. Louis, Missouri.

On January 28, 1988, while Beaver Valley 2 was in cold shutdown, all control room annunciator alarms were lost. A small fire was detected in a remote annunciator control cabinet, and it was immediately extinguished by the two operators who had been dispatched to investigate. Plant parameters were available throughout the event from other control room instruments and the safety parameter display system. Because of the sustained loss of the annunciators, the licensee declared an alert in accordance with the plant emergency plan. Damaged solid state cards were removed, annunciator capability was restored, and the alert was terminated. The root cause of the fire is under investigation.

On February 1, 1988, while Calvert Cliffs Unit 2 was operating at 100% power, an alert was declared because all control room annunciator alarms were lost. The complete loss of the annunciator system resulted from a fire in a remote control cabinet that provides audible and visual alarm functions for the main control room. The operators were alerted to the fire by the actuation of the automatic fire protection system. The visual indication function of all control room annunciator panels was out of service for 2 hours, and the audible function was not restored for two days. The root cause of the fire is under investigation; however the licensee intends to review the adequacy of circuit protection

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(sub-fusing of branch circuits within the annunciator system) to determine if this contributed to the occurrence of the fire. The unit remained at 100% power throughout the event.

On February 8, 1988, while Rancho Seco was in cold shutdown, all control room annunciator alarms were lost because of a fire in a remote control cabinet that provides audible and visual control functions to the annunciator system. The fire is believed to have originated from a failed subcomponent on a solid state circuit card. The root cause of the fire is under investigation.

Although the NRC's investigation of these events is not yet complete, the following similarities among the events are noteworthy:

- The annunciator systems were provided by the same manufacturer.

- Common to each event was the licensee's lack of specific emergency procedures to address complete loss of the annunciator system.

- None of the licensees have provisions for monitoring ambient temperatures in the control cabinets.

- In the events at Calvert Cliffs and Rancho Seco, the fire teams experienced nausea and dizziness, apparently as a result of inadequate oxygen in the area in which the fire occurred. Licensees thus may wish to review their procedures for fighting small fires in confined areas to determine the adequacy of personnel protection and the need to specify the use of breathing apparatus.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the technical contact listed below or the Regional Administrator of the appropriate regional office.

Charles E. Rossi

Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contact: V. D. Thomas, NRR
(301) 492-0786

E. N. Fields, NRR
(301) 492-1173

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
88-04	Inadequate Qualification and Documentation of Fire Barrier Penetration Seals	2/5/88	All holders of OLs or CPs for nuclear power reactors.
88-03	Cracks in Shroud Support Access Hole Cover Welds	2/2/88	All holders of OLs or CPs for BWRs.
88-02	Lost or Stolen Gauges	2/2/88	All NRC licensees authorized to possess gauges under a specific or general license.
88-01	Safety Injection Pipe Failure	1/27/88	All holders of OLs or CPs for nuclear power reactors.
86-81, Supp. 1	Broken External Closure Springs on Atwood & Morrill Main Steam Isolation Valves	1/11/88	All holders of OLs or CPs for nuclear power reactors.
87-67	Lessons Learned from Regional Inspections of Licensee Actions in Response to IE Bulletin 80-11	12/31/87	All holders of OLs or CPs for nuclear power reactors.
87-66	Inappropriate Application of Commercial-Grade Components	12/31/87	All holders of OLs or CPs for nuclear power reactors.
87-28, Supp. 1	Air Systems Problems at U.S. Light Water Reactors	12/28/87	All holders of OLs or CPs for nuclear power reactors.
87-65	Plant Operation Beyond Analyzed Conditions	12/23/87	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
CP = Construction Permit

07-506-91

INTERNAL CORRESPONDENCE
FORM 112-2 R 02-80 55-01-013

NIAGARA MOHAWK

FROM R. Smith RS

TO OEA Committee

DISTRICT Nine Mile Point Unit 2

DATE January 15, 1991 **FILE CODE** QA91-U2-058

SUBJECT Revised Response (IN 88-05)

DATE 3-5-91

SUBJECT:

Revision to Information Notice 88-05 Response, Titled "Fire In Annunciator Control Cabinets"

SUMMARY:

At the request of Operations Department Unit II, Electrical Design has provided an alternative to corrective action for OE Information Notice 88-05. The alternative consists of replacing the 12k ohms, 1 watt resistor with a 12k ohms, 5 watt resistor. Based on the new finding an EDC 2E10358 was issued to remedy the resistor decomposition and overheating problems. The alternative action replaces Modification PN2Y88MX182 and satisfies the concern of Information Notice 88-05.

The original response to Information Notice 88-05 (NMPC 61522), approved by the OEA Committee on 12/19/90 and A. Julka letter dated January 3, 1991 are included for information.

Listed below are the new Corrective Actions Taken and Recommended Corrective Actions for Information Notice 88-05.

CORRECTIVE ACTION TAKEN:

Issued EDC 2E10358 to Replace Modification PN2Y88MX182.

RECOMMENDED CORRECTIVE ACTION:

1. Revise procedure N2-OP-91A to contain an off normal procedure for loss of all annunciators. **REMAIN AS WRITTEN**

2. Revise procedure N2-OP-71 to include an additional alarm response corrective action for annunciators 601141 and 842101. **REMAIN AS WRITTEN**

3. I & C Department implement EDC 2E10358.

I have forwarded this package to you for review and/or additional comments.

RS/als

INTERNAL CORRESPONDENCE
FORM 112-2 R 02-80 55-01-013

NIAGARA MOHAWK

FROM A. Julka

TO R.B. Abbott

DISTRICT Nuclear Division

DATE Jan. 3, 1991

FILE CODE SM2-E90-0258

SUBJECT Information Notice 88-05
Modification PN2Y88MX182

Route:
VP
LD
CW

SUBJECT

NRC Information Notice 88-05
Modification PN2Y88MX182

Electrical Design has reevaluated the continued failure of resistors associated with the annunciator computer point alarm circuits. The intent of this memo is to inform individuals of actions taken to resolve this issue.

BACKGROUND

Resistors to the annunciator computer input auxiliary relays have been failing due to heat degradation. The resistors are located in panels 2CEC-PNL858 and 2CEC-PNL630. These 12KΩ, 1 watt carbon composition resistors serve as a voltage dropping resistor for the auxiliary relays of the RA-856 modules. Analysis shows that the resistors are marginally sized, operating at about their published wattage ratings. The resistors degrade to a point in which an overvoltage condition occurs at the auxiliary relays and the relays burnout. When this happens, computer point identification of alarm initiations to multiple input annunciators are lost.

Information Notice 88-05 informed licensees of three occurrences of electrical fires in annunciator control panels supplied by Electro Devices, Inc. Engineering performed an evaluation of the annunciator and computer point circuitry of RIS supplied annunciators. As a result of this evaluation, MRF N2-88-182 was generated to install new resistors or fuse links to eliminate resistor degradation.

DISCUSSION

Due to Modification PN2Y88MX182 being currently scheduled for implementation during the fourth refueling outage, Operations requested Engineering to reassess the resistor failure situation. Electrical Design did so, the result being the issue of EDC 2E10358 to remedy this condition. EDC 2E10358 revises vendor drawings to allow substitution with a 12KΩ,5 watt wirewound resistor. The 12KΩ,5 watt resistor is of sufficient rating to resolve resistor degradation and subsequent auxiliary relay failure.

CONCLUSION

With mechanisms established to substitute and eventually replace the 12KΩ, 1 watt resistors, Engineering recommends cancellation of modification PN2Y88MX182. The new resistors will be installed by I&C Technicians during component outages in accordance with the EDC 2E10358 which provides the alternate acceptable resistor. By copy of this letter, OEA is requested to review NMPC response to IN 88-05 and make changes accordingly.

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Supervisor, Elec. Design U2

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INTERNAL CORRESPONDENCE
FORM 112-2 R 02-80 55-01-013

NIAGARA MOHAWK

FROM P.J. Ganey

TO OEA Committee

DISTRICT Nine Mile Point Unit 2

DATE November 29, 1990 FILE CODE NMP61522

SUBJECT IN 88-05

IN 88-05: FIRE IN ANNUNCIATOR CONTROL CABINETS

SUMMARY:

Several fires have occurred in remote cabinets containing multiple circuit cards for control room annunciator circuits. In all cases, the annunciator systems were provided by Electro Devices, Inc.

EVALUATION:

The Notice does not contain recommendations. The NRC has, however, identified four similarities that are common to each event. For purposes of clarification, a response to each similarity is provided.

- o The annunciator systems were provided by the same manufacturer.

Response:

The NMP2 annunciator system was provided by Rochester Instrument System (RIS). As a result of a review of this Notice, an engineering evaluation of the RIS circuitry was performed. The review has generated a modification (number PN2Y88MX182) which will install new resistors or fuse links to limit current from reaching a magnitude exceeding wattage requirements. This will serve to prevent resistor decomposition and overheating, thus reducing the potential for fire. (Note: Modification PN2Y88MX182 is currently scheduled for implementation during the fourth refueling outage.)

- o Common to each event was the licensee's lack of specific emergency procedures to address complete loss of the annunciator system.

Response:

The NMP2 Operations Department is revising procedure N2-OP-91A, "Process Computer", to include steps under section "H", Off Normal Procedure, to address the loss of all annunciators. The revision will include:

1) classifying the event per procedure S-EAP-2, "Classification of Emergency Conditions",

2) notifying the NRC, the Operations Superintendent, and the Plant Superintendent,

3) calling in additional plant operators to be used to increase the frequency of monitoring equipment in the control room and the plant, and

4) writing an emergency Work Request to obtain I&C assistance in determining the cause of the loss of annunciators.

Additionally, procedure N2-OP-71, "13.8KV/4160V/600V A.C. Power Distribution", will be revised to include an additional corrective action for the alarm response to annunciator 601141 (Panel 630 Annunciator Power Supply Trouble) and annunciator 842102 (Panel 858 Annunciator Power Supply Trouble). The additional corrective action will be a referral to the off normal procedure for loss of all annunciators contained in N2-OP-91A.

- None of the licensees have provisions for monitoring ambient temperatures in the control cabinets.

Response:

Ambient temperature in the NMP2 safety related control room panels was monitored as part of a commitment to the NRC to resolve concerns about panel mounted electronic equipment reliability. Monitoring equipment was installed by temporary modification PN2Y86MX124, "Category I PGCC Panels Internal Temperature Monitoring". Temperatures were monitored and trended in order to confirm that at a control room ambient temperature of 90°F the panel internal temperature would meet the design criterion (120°F). Design temperatures were not exceeded. Modification PN2Y86MX124 was closed and temperature monitoring of safety related PGCC panels was ceased.

In order to enhance the internal cooling capacity of the annunciator panels, a modification was requested and implemented. Modification PN2Y87MX217 installed additional louvers on the cabinet front panels.

In the event that fire does occur, NMP2 Power Generation Control Center (PGCC) cabinets have smoke detection capability as part of the Fire Protection System. The smoke detectors provide control room alarm and indication. The control room is equipped with portable fire extinguishers. Halon injection is provided into the PGCC sub floor.

- In the events at Calvert Cliffs and Rancho Seco, the fire teams experienced nausea and dizziness, apparently as a result of inadequate oxygen in the area in which the fire occurred. Licensees thus may wish to review their procedures for fighting small fires in confined areas to determine the adequacy of personnel protection and the need to specify the use of breathing apparatus.

Response:

The Emergency Plan Implementing Procedure EPP-2, "Fire Fighting" requires Nine Mile Point Fire Department personnel to pick up both protective clothing and a Self Contained Breathing Apparatus (SCBA) when responding to all fires. The procedure specifies that personnel entering smoky areas, fighting fires, or responding to fire announcements shall use the SCBA.

The completed preventive measures and action taken in regard to this Notice were reviewed and commented on by NRC Senior Resident Inspector William Cook during a Formal Exit Meeting for the periods of February 1 to March 31, 1988. The Inspector was pleased with both the corrective actions taken and the plant awareness. A summary of the inspection is contained in NRC Inspection Report 50-410/88-02.

<u>CORRECTIVE ACTION TAKEN:</u>

Modification Number PN2Y88MX182 was initiated to install new resistors or fuse links in panel H13-P858.

<u>RECOMMENDED CORRECTIVE ACTION:</u>

Revise procedure N2-OP-91A to contain an off normal procedure for loss of all annunciators.

Revise procedure N2-OP-71 to include an additional alarm response corrective action for annunciators 601141 and 842101.

<u>REFERENCES:</u>

NRC Inspection Report 50-410/88-02

Internal Correspondence, J.R. Bunyon to T.J. Syrell, August 25, 1988, File Code NMP39319

Modification PN2Y88MX182, Change Resistors For Aux Relays In PNL H13-P858

REFERENCES: Cont.

Modification PN2Y87MX217, Annunciator Panel Louver Addition

Temporary Modification PN2Y86MX124, Category I PGCC Panels Internal Temperature Monitoring

Internal Correspondence, R. Jenkins To Distribution, July 14, 1988, File Code NMP37805

Internal Correspondence, A.R. Andersen to R. Jenkins, July 26, 1988, File Code NMP34576

Internal Correspondence, A. Pinter/T. Eagan to Licensing File, April 15, 1988, File Code NMP33837

Internal Correspondence, D.T. Goodney to P. Toohey, November 22, 1988, File Code MOD-88392

Internal Correspondence, A. Pinter to Unit 2 Licensing File, February 27, 1988, File Code NMP32566

Emergency Plan Implementing Procedure EPP-2, Fire Fighting

Emergency Action Procedure S-EAP-2, Classification Of Emergency Conditions

N2-OP-91A, Process Computer

N2-OP-71, 13.8KV/4160V/600V A.C. Power Distribution

N2-OP-46, Fire Protection - Halon

Internal Correspondence, A.K. Gwal to J.K. Jirousek, June 16, 1988, File Code NMP36978

Niagara Mohawk Correspondence, C.V. Mangan to NRC, October 24, 1986, File Code NMP2L0925

Internal Correspondence, M. McCrobie to J.R. Bunyan, April 19, 1988, File Code NMP21569

Interoffice Correspondence, A. Dellagreca to J. Bunyan, January 19, 1987

Interoffice Correspondence, A. Dellagreca to A. Gwal, April 27, 1988

Interview:

Al Denny, Operations, November 16, 1990

PJG/ls

OEA COMMITTEE APPROVED
DATE: 12/19/90 #90-22

NCTS COMMITMENT IDENTIFICATION FORM

1. Commitment Number......... ________ - ________ 3. Type...... I
4. Unit Number............... 2
5. Agency.................... NMPC
6. Source Doc Type........... OEA
7. Source Doc Subtype........ MEMO
8. Source Doc Number......... NMP-61522
9. Source Doc Date...........
10. Commitment Description.... In accordance with IN 88-05 evaluation: Revise procedures N2-OP-91A and procedure N2-OP-71.
11. Commitment Due Date.......
12. Commitment Comments.......
13. Priority Code.............
14. Commitment Cross Ref...... IN 88-05
15. Responsible Group......... Operations
16. Responsible Manager....... M. Colomb

PREPARED BY		CONCURRED BY	
Name Philip J. Ganey		Name	
Sig. Philip J. Ganey	Date 11/19/90	Sig.	Date

NCTS TASK IDENTIFICATION FORM

Commitment Number......... ________ - ________ 3. Task No... 1

2. Task Description.......... Revise procedure N2-OP-91A to contain an off normal procedure for loss of all annunciators.

3. Responsible Group......... ________ 4. Manager......________

5. Responsible Lead.......... ________ 6. Individual...________

7. Estimated Target Daté..... ________ 8. Status.......________

9. Task Comments............. Revision should include steps as described in NMP61522

10. Completion Date........... ________ Completed By:________

Commitment Number......... ________ - ________ 3. Task No... 2

2. Task Description.......... Revise procedure N2-OP-71 to contain an additional alarm response corrective action for annunciators 601141 and 842101.

3. Responsible Group......... ________ 4. Manager......________

5. Responsible Lead.......... ________ 6. Individual...________

7. Estimated Target Date..... ________ 8. Status.......________

9. Task Comments............. Revision should include steps as described in NMP61522.

10. Completion Date........... ________ Completed By:________

INTERNAL CORRESPONDENCE
FORM 112-2 R 02-80 55-01-013

NIAGARA MOHAWK

FROM T. J. Syrell
TO R. Jenkins

DISTRICT Nine Mile Point Unit 2
DATE July 12, 1988 FILE CODE
SUBJECT NRC Information Notice No. 88-05

TITLE: Fire in Annunciator Control Cabinets

EXECUTIVE SUMMARY

PROBLEM STATEMENT

Between January 28, 1988 and February 8, 1988 three separate events occurred involving fires in annunciator systems at three separate nuclear plants. All three annunciator systems were manufactured by Electro-Devices, Inc.

CONCLUSION

NRC Information Notice addresses the potential for Electrical Fires in Remote Annunciator Cabinets which has resulted in loss of control room annunciation. Nine Mile Point Unit 2 has Rochester Instrument Systems annunciators which have not experienced failures that resulted in fires or loss of control room annunciators. The Nine Mile Point Unit 2 Fire Protection System monitors these panels with smoke detectors. The existing Site Emergency Procedures already in place at NMP2 assure the safety of the plant and personnel in this type of failure.

ACTION RECOMMENDED

The recommendations in the NRC Information Notice have been addressed and no further action is required.

DETAILED DISCUSSION

BACKGROUND

Remote annunciator cabinets containing circuit boards for the control of control room annunciator functions, have failed on three separate occasions, in three separate nuclear power plants. In all three instances, complete control room annunciator failure occurred. In addition, all failures were attributed to fires in the remote cabinets. The root causes of the fires are still under investigation.

The annunciator system for each of the three power plants experiencing the annunciator panel fires was manufactured by Electro-Devices, Inc.

Lack of specific emergency procedures was common to each licensee's ability to address the complete loss of the annunciator system.

None of the licensees had provisions for monitoring ambient temperatures in the control cabinets.

During two of the events, fire fighters experienced nausea and dizziness while fighting the fires. This was attributed to inadequate oxygen in the fire area as a result of inadequate procedures.

INFORMATION ONLY

DETAILED EVALUATION

1. NRC Information Notice 88-05, Recommendation #1

RECOMMENDATION: Review annunciator system manufacturer to ascertain the potential for fires in installed annunciator equipment.

NMPC RESPONSE: The Nine Mile Point Unit 2 annunciator system was provided by Rochester Instrument System, not Electro-Devices Inc., which have experienced these troubles.

CONCLUSION: No action required.

2. NRC Information Notice 88-05, Recommendation #2

RECOMMENDATION: Review emergency procedures for specific instruction on actions for complete loss of annunciator systems.

NMPC RESPONSE: Nine Mile Point Nuclear Station Emergency Action Procedure EAP-2, Classification of Emergency Conditions, classifies loss of all control room alarms (annunciators) as an "ALERT" condition. Loss of indicators or alarms on process or effluent parameters not functional in the control room requires shutdown by Technical Specification requirements for "Channel Operability".

CONCLUSION: No action required.

3. NRC Information Notice 88-05, Recommendation #3

RECOMMENDATION: Review plant provisions for monitoring ambient temperatures in the annunciator control cabinets.

NMPC RESPONSE: NMP2 does not provide a means for monitoring ambient temperatures in the annunciator control cabinets. Instead, Nine Mile Point Unit 2 has smoke detection provided in all Power Generation Control Center (PGCC) panels. The annunciator control panels are part of the PGCC installation. The smoke detection capability is part of the Fire Protection System which provides alarms and indication in the control room of all fires.

CONCLUSION: No action required.

4. NRC Information Notice 88-05, Recommendation #4

RECOMMENDATION: Reivew fire fighting procedures for fighting small fires in confined areas to determine the adequacy of personnel protection and the use of breathing apparatus.

NMPC RESPONSE: Nine Mile Point Nuclear Station Emergency Plan Implementing Procedures, EPP-2 Fire Fighting, requires the use of self-contained breathing apparatus when: entering smokey areas, fighting fires and responding to fire alarms.

CONCLUSIONS: No action required.

REFERENCES

1. Specification P800A, Power Generation Control Center.
2. Technical Specification, Nine Mile Point Nuclear Station, Unit 2.
3. EPP-2, Fire Fighting
4. EAP-2, Classification of Emergency Conditions.

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OPERATIONS
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

February 12, 1988

NRC INFORMATION NOTICE NO. 88-05: FIRE IN ANNUNCIATOR CONTROL CABINETS

Addressees:

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose:

This information notice is being provided to inform addressees of three occurrences of electrical fires in annunciator control panels supplied by Electro Devices, Inc. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

Recently, electrical fires have occurred in remote cabinets containing multiple circuit cards for the control of visual and audible annunciator functions in the main control rooms at three nuclear power plants. The annunciator systems for the three plants were provided by Electro Devices, Inc. of St. Louis, Missouri.

On January 28, 1988, while Beaver Valley 2 was in cold shutdown, all control room annunciator alarms were lost. A small fire was detected in a remote annunciator control cabinet, and it was immediately extinguished by the two operators who had been dispatched to investigate. Plant parameters were available throughout the event from other control room instruments and the safety parameter display system. Because of the sustained loss of the annunciators, the licensee declared an alert in accordance with the plant emergency plan. Damaged solid state cards were removed, annunciator capability was restored, and the alert was terminated. The root cause of the fire is under investigation.

On February 1, 1988, while Calvert Cliffs Unit 2 was operating at 100% power, an alert was declared because all control room annunciator alarms were lost. The complete loss of the annunciator system resulted from a fire in a remote control cabinet that provides audible and visual alarm functions for the main control room. The operators were alerted to the fire by the actuation of the automatic fire protection system. The visual indication function of all control room annunciator panels was out of service for 2 hours, and the audible function was not restored for two days. The root cause of the fire is under investigation; however the licensee intends to review the adequacy of circuit protection

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(sub-fusing of branch circuits within the annunciator system) to determine if this contributed to the occurrence of the fire. The unit remained at 100% power throughout the event.

On February 8, 1988, while Rancho Seco was in cold shutdown, all control room annunciator alarms were lost because of a fire in a remote control cabinet that provides audible and visual control functions to the annunciator system. The fire is believed to have originated from a failed subcomponent on a solid state circuit card. The root cause of the fire is under investigation.

Although the NRC's investigation of these events is not yet complete, the following similarities among the events are noteworthy:

- The annunciator systems were provided by the same manufacturer.

- Common to each event was the licensee's lack of specific emergency procedures to address complete loss of the annunciator system.

- None of the licensees have provisions for monitoring ambient temperatures in the control cabinets.

- In the events at Calvert Cliffs and Rancho Seco, the fire teams experienced nausea and dizziness, apparently as a result of inadequate oxygen in the area in which the fire occurred. Licensees thus may wish to review their procedures for fighting small fires in confined areas to determine the adequacy of personnel protection and the need to specify the use of breathing apparatus.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the technical contact listed below or the Regional Administrator of the appropriate regional office.

Charles E. Rossi

Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contact: V. D. Thomas, NRR
(301) 492-0786

E. N. Fields, NRR
(301) 492-1173

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
88-04	Inadequate Qualification and Documentation of Fire Barrier Penetration Seals	2/5/88	All holders of OLs or CPs for nuclear power reactors.
88-03	Cracks in Shroud Support Access Hole Cover Welds	2/2/88	All holders of OLs or CPs for BWRs.
88-02	Lost or Stolen Gauges	2/2/88	All NRC licensees authorized to possess gauges under a specific or general license.
88-01	Safety Injection Pipe Failure	1/27/88	All holders of OLs or CPs for nuclear power reactors.
86-81, Supp. 1	Broken External Closure Springs on Atwood & Morrill Main Steam Isolation Valves	1/11/88	All holders of OLs or CPs for nuclear power reactors.
87-67	Lessons Learned from Regional Inspections of Licensee Actions in Response to IE Bulletin 80-11	12/31/87	All holders of OLs or CPs for nuclear power reactors.
87-66	Inappropriate Application of Commercial-Grade Components	12/31/87	All holders of OLs or CPs for nuclear power reactors.
87-28, Supp. 1	Air Systems Problems at U.S. Light Water Reactors	12/28/87	All holders of OLs or CPs for nuclear power reactors.
87-65	Plant Operation Beyond Analyzed Conditions	12/23/87	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
CP = Construction Permit