

July 1, 1994

MEMORANDUM FOR: Brian K. Grimes, Director  
Division of Operating Reactor Support

FROM: Alfred E. Chaffee, Chief  
Events Assessment Branch  
Division of Operating Reactor Support

SUBJECT: OPERATING REACTORS EVENTS BRIEFING  
JUNE 29, 1994 - BRIEFING 94-22

On June 29, 1994, we conducted an Operating Reactors Events Briefing (94-22) to inform senior managers from offices of the Commission, SECY, NRR, OE and regional offices of selected events that occurred since our last briefing on June 22, 1994. Enclosure 1 lists the attendees. Enclosure 2 presents the significant elements of the discussed events.

Enclosure 3 contains reactor scram statistics for the week ending June 26, 1994. No significant events were identified for input into the NRC Performance Indicator Program.

ORIGINAL SIGNED BY:

Alfred E. Chaffee, Chief  
Events Assessment Branch  
Division of Operating  
Reactor Support

Enclosures: As stated

cc w/enclosures:  
See next page

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CC:

W. Russell, NRR (O-12G18)	T. Alexion (O-13A2)
F. Miraglia, NRR (O-12G18)	W. Beckner (O-13A2)
F. Gillespie, NRR (O-12G18)	M. Padovan (O-13E16)
R. Zimmerman, NRR (O-12G18)	T. Quay (O-13E16)
S. Varga, NRR (O-14E4)	
J. Calvo, NRR (O-14A4)	
G. Lainas, NRR (O-14H3)	
J. Roe, NRR (O-13E4)	
J. Zwolinski, NRR (O-13H24)	
E. Adensam, NRR (O-13E4)	
A. Thadani, NRR (O-12G18)	
B. Sheron, NRR (O-7D26)	
M. Virgilio, NRR (O-8E2)	
S. Rosenberg, NRR (O-10E4)	
C. Rossi, NRR (O-9A2)	
B. Boger, NRR (O-10H3)	
F. Congel, NRR (O-10E2)	
D. Crutchfield, NRR (O-11H21)	
W. Travers, NRR (O-11B19)	
D. Coe, ACRS (P-315)	
E. Jordan, AEOD (T-4D18)	
G. Holahan, AEOD (T-4A9)	
L. Spessard, AEOD (T-4D28)	
K. Brockman, AEOD (T-4A23)	
S. Rubin, AEOD (T-4D28)	
M. Harper, AEOD (T-4A9)	
V. McCree, EDO (O-17G21)	
F. Ingram, PA (O-2G5)	
E. Beckjord, RES (T-10F2)	
A. Bates, SECY (O-16G15)	
T. Martin, Region I	
R. Cooper, Region I	
S. Ebnetter, Region II	
E. Merschhoff, Region II	
S. Vias, Region II	
J. Martin, Region III	
E. Greenman, Region III	
L. Callan, Region IV	
A. Beach, Region IV	
K. Perkins, Region IV/WCFO	

bcc: Mr. Sam Newton, Manager  
Events Analysis Department  
Institute of Nuclear Power Operations  
700 Galleria Parkway  
Atlanta, GA 30339-5957



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

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A handwritten signature in cursive script, appearing to read "Alfred E. Chaffee", is positioned above the typed name.

Alfred E. Chaffee, Chief  
Events Assessment Branch  
Division of Operating  
Reactor Support

Enclosures: As stated

cc w/enclosures:  
See next page

ENCLOSURE 1

LIST OF ATTENDEES

OPERATING REACTORS EVENTS FULL BRIEFING (94-22)

JUNE 29, 1994

<u>NAME</u>	<u>OFFICE</u>	<u>NAME</u>	<u>OFFICE</u>
N. FIELDS	NRR	J. KING	NRR
T. GREENE	NRR	E. CHOPRA	NRR
K. GRAY	NRR	C. ROSSI	NRR
J. CARTER	NRR	C. BERLINGER	NRR
E. GOODWIN	NRR	B. GRIMES	NRR
A. CHAFFEE	NRR	R. JONES	NRR
N. HUNEMULLER	NRR	E. ADENSAM	NRR
T. FOLEY	NRR	C. LIANG	NRR
M. SLOSSON	NRR	M. PADOVAN	NRR
R. ECKENRODE	NRR	W. SCOTT	NRR
A. BRYANT	NRR	J. BEALL	OE
S. BLOOM	NRR	C. YATES	SECY
M. CHATTERTON	NRR	L. MILLER	OEDO
M. RUBIN	NRR	D. CHAMBERLAIN	OCM
M. MARKLEY	NRR		

TELEPHONE ATTENDANCE  
(AT ROLL CALL)

Regions

Region I  
Region II  
Region IV

Resident Inspectors

D. Loveless (South Texas)  
R. Barr (WNP-2)

IIT/AIT Team Leaders

Misc.

OPERATING REACTORS EVENTS BRIEFING 94-22

LOCATION: O-10B11, WHITE FLINT  
WEDNESDAY, JUNE 29, 1994 11:00 A.M.

SOUTH TEXAS, UNIT 2

TURBINE TRIP/REACTOR TRIP  
AND NATURAL CIRCULATION  
COOLING

WASHINGTON NUCLEAR PROJECT,  
UNIT 2

LOSS OF FOREIGN MATERIAL  
INTO REACTOR VESSEL

PRESENTED BY: EVENTS ASSESSMENT BRANCH  
DIVISION OF OPERATING REACTOR  
SUPPORT, NRR

SOUTH TEXAS, UNIT 2  
TURBINE TRIP/REACTOR TRIP AND NATURAL CIRCULATION  
JUNE 25, 1994

PROBLEM:

TURBINE TRIP/REACTOR TRIP RESULTING IN UNIT 2 OPERATING IN NATURAL CIRCULATION FOR ABOUT 55 MINUTES.

CONDENSATE SYSTEM WATER HAMMER AND LOSS OF POWER TO BALANCE-OF-PLANT (BOP) LOADS.

CAUSE:

MAIN TRANSFORMER LOCKOUT CAUSED A UNIT 2 TURBINE TRIP. THE LOCKOUT WAS INITIATED BY A COMPONENT FAILURE IN THE POWER SUPPLY TO THE MAIN TRANSFORMER PILOT WIRE RELAY FIBER OPTICS CIRCUIT.

LOSS OF INSTRUMENT AIR INITIATED BOP HYDRAULIC TRANSIENT AND COMPLICATED RECOVERY.

SAFETY SIGNIFICANCE:

TURBINE TRIP/REACTOR TRIP WITH BOP COMPLICATIONS AND POTENTIAL HUMAN PERFORMANCE AND PLANT STAFFING ISSUES.

DISCUSSION:

- AT 1716 CDT, UNIT 2 MAIN TURBINE TRIPPED ON MAIN TRANSFORMER LOCKOUT. ALL REACTOR COOLANT PUMPS LOST POWER AND THE REACTOR TRIPPED FROM 47 PERCENT POWER.

CONTACT:	N. FIELDS, NRR/DORS/EAB	AIT: <u>NO</u>
REFERENCES:	10 CFR 50.72 #27328, #27329, PNO-I-94-036	SIGEVENT: <u>TBD</u>

- EMERGENCY DIESEL GENERATOR 21 STARTED AND SUPPLIED POWER TO EMERGENCY BUS E2A AS EXPECTED. THE NORMAL POWER SUPPLY FOR THE OTHER TWO EMERGENCY BUSES WAS UNAFFECTED DURING THE EVENT. (FIGURE 1)
- ONE PRESSURIZER POWER-OPERATED RELIEF VALVE (PORV) LIFTED TWICE AND PROPERLY RESEATED EARLY IN THE EVENT. ALL AUXILIARY FEEDWATER PUMPS STARTED AS EXPECTED.
- REACTOR COOLANT SYSTEM TEMPERATURE DECREASED 27°F IN 15 MINUTES, FROM 575°-580°F TO 554°F.
- CONTROL ROOM OPERATORS MANUALLY SHUT ALL MAIN STEAM ISOLATION VALVES TO CONTROL COOLDOWN, TURBINE-DRIVEN AUXILIARY FEED PUMP WAS SECURED AND AUXILIARY FEEDWATER FLOW WAS MANUALLY THROTTLED.
- ALIGNED AUXILIARY SPRAY TO PRESSURIZER AND VERIFIED NATURAL CIRCULATION. HEAT REMOVED THROUGH STEAM GENERATOR PORVS. EMERGENCY BORATED FOR 10 MINUTES.
- EVEN THOUGH COMPRESSOR WAS POWERED BY BOP DIESEL, UNABLE TO RECOVER INSTRUMENT AIR DUE TO PROBLEMS WITH THE INSTRUMENT AIR COMPRESSOR EMERGENCY COOLING PUMP.
- LOSS OF INSTRUMENT AIR INTERFERED WITH OPERATING AUXILIARY SPRAY AND REQUIRED MANUAL OPERATION OF MANY SECONDARY VALVES.
- THREE EXTRA AUXILIARY OPERATORS FROM UNIT 1 WERE BROUGHT IN TO MANUALLY MANIPULATE VALVES IN DARKENED TURBINE BUILDING.



- CONDENSATE SYSTEM RECIRCULATION VALVE FAILED OPEN ON LOSS OF INSTRUMENT AIR INITIATING A WATER HAMMER THAT CAUSED DAMAGE TO BOP EQUIPMENT.
- HYDRAULIC TRANSIENT CAUSED HIGH PRESSURE FEEDWATER HEATER RELIEF VALVE TO LIFT WETTING DOWN NON-SAFETY 4 KV SWITCH GEAR.
- A REACTOR COOLANT PUMP WAS STARTED AFTER BALANCE OF PLANT POWER WAS RESTORED 55 MINUTES INTO EVENT. LICENSEE EVALUATING THE ADEQUACY OF POWER SUPPLY RESTORATION PROCEDURE.
- LOCKOUT INITIATED BY A SHORTED CAPACITOR ON A CIRCUIT BOARD IN MAIN TRANSFORMER PILOT WIRE RELAY CIRCUIT. ABOUT 90 MINUTES BEFORE THE EVENT OCCURRED, A MAIN TRANSFORMER PILOT WIRE TROUBLE ALARM WAS RECEIVED IN THE CONTROL ROOM. LICENSEE'S TRANSMISSION AND DISTRIBUTION DEPARTMENT INITIATED TROUBLE SHOOTING THE ROOT CAUSE OF THE ALARM BUT TRIP OCCURRED WHILE INVESTIGATING.

FOLLOWUP:

- THE LICENSEE DETERMINED THAT NO ACTUAL ELECTRICAL FAULT EXISTED IN THE MAIN TRANSFORMER.
- THE LICENSEE ESTABLISHED A TASK FORCE TO EVALUATE THE CAUSE OF THE EVENT; OPERATOR RESPONSE, INCLUDING PROCEDURAL ADEQUACY; AND REPAIRS NEEDED TO RETURN THE SECONDARY SYSTEM TO SERVICE.



- TELEPHONE CONFERENCE CALLS WERE HELD BETWEEN HEADQUARTERS AND THE REGION AND BETWEEN HEADQUARTERS, THE REGION, AND THE LICENSEE.
- NRR IS PLANNING A REVIEW OF HUMAN PERFORMANCE DURING THIS EVENT.



**Figure 3.10-3. South Texas Station Electric Power System**

WASHINGTON NUCLEAR PROJECT, UNIT 2  
LOSS OF FOREIGN MATERIAL  
INTO REACTOR VESSEL  
JUNE 22, 1994

PROBLEM

TWO UNDERWATER LIGHTS FELL INTO THE ANNULUS AREA OF THE REACTOR VESSEL.

CAUSE

THE CAUSE WAS FAILURE OF THE LICENSEE TO PROVIDE ADEQUATE PROCEDURES TO PREVENT THE LIGHTS FROM FALLING INTO THE REACTOR VESSEL.

SAFETY SIGNIFICANCE

FOREIGN MATERIAL IN THE REACTOR SYSTEM CAN CAUSE DAMAGE TO REACTOR VESSEL INTERNALS AND EQUIPMENT.

DISCUSSION

- ON JUNE 22, 1994, THE LICENSEE WAS REASSEMBLING THE REACTOR VESSEL FOLLOWING THE REFUELING OUTAGE.
- TO FACILITATE THE ATTACHMENT OF THE STEAM SEPARATOR TO THE TOP OF THE REACTOR CORE, ELECTRIC UNDERWATER LIGHTS WERE USED AT VARIOUS POSITIONS AROUND THE REACTOR CAVITY.
- EACH UNDERWATER LIGHT WAS SUPPORTED ONLY BY ITS POWER CORD. NO SEPARATE LANYARD OR OTHER ATTACHMENT WAS USED.

CONTACT: T. GREENE, NRR/DORS/EAB  
REFERENCE: PNO-IV-94-034

AIT: NO  
SIGEVENT: TBD

- WHEN SECURING THE STEAM SEPARATOR, ON THURSDAY, JUNE 23, TWO UNDERWATER LIGHTS' POWER CORDS WERE SHEARED BY THE MOVEABLE SERVICE PLATFORM. THE LIGHTS FELL INTO THE ANNULUS REGION OF THE REACTOR VESSEL.
- THE LICENSEE WAS SUCCESSFUL IN RETRIEVING ONE LIGHT, BUT THE OTHER FELL FARTHER INTO THE REACTOR VESSEL NEAR THE SUCTION TO REACTOR RECIRCULATION PUMP "A".
- THE LICENSEE REMOVED THE STEAM SEPARATOR AND USED A SMALL REMOTE SUBMERSIBLE CAMERA TO TRY TO LOCATE THE LIGHT.
- THE LICENSEE PERFORMED A LOOSE PART ANALYSIS THAT SHOWED THAT THE LIGHT WOULD NOT DAMAGE THE REACTOR VESSEL. THE LICENSEE BELIEVED THE LIGHT WAS EITHER IN THE RECIRCULATION LOOP OR IN THE RESIDUAL HEAT REMOVAL (RHR) SYSTEM.
- WHEN THE RHR PUMP WAS STARTED, AN OPERATOR IN THE PUMP ROOM REPORTED THE PUMP VIBRATED MORE THAN USUAL AND MADE A NOISE. A FEW MINUTES LATER, ANOTHER OPERATOR REPORTED NOISE IN THE RHR PIPING.
- LICENSEE DISASSEMBLED THE RHR PUMP AND LOCATED THE LIGHT JUST BEFORE THE FIRST STAGE OF THE PUMP IMPELLER.
- THE LIGHT WAS VIRTUALLY INTACT, EXCEPT FOR A MISSING TRIANGULAR SHAPE PIECE OF PLEXIGLASS (ABOUT 18 SQ. IN.). THE LICENSEE REASSEMBLED THE RHR PUMP WITHOUT FINDING THE MISSING PLEXIGLASS.

#### FOLLOWUP

- REGION IS REVIEWING THE LICENSEE ACTIONS.

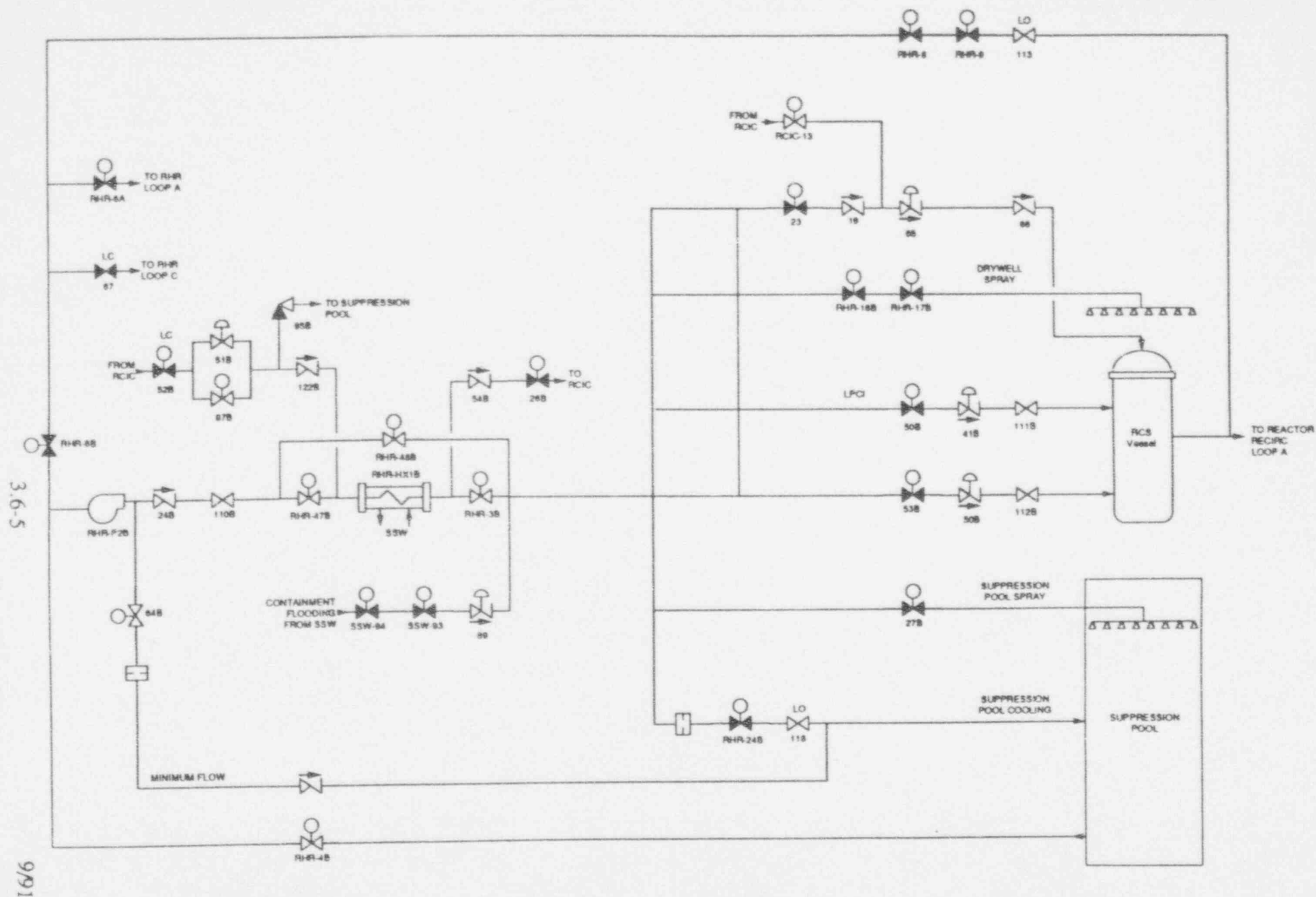
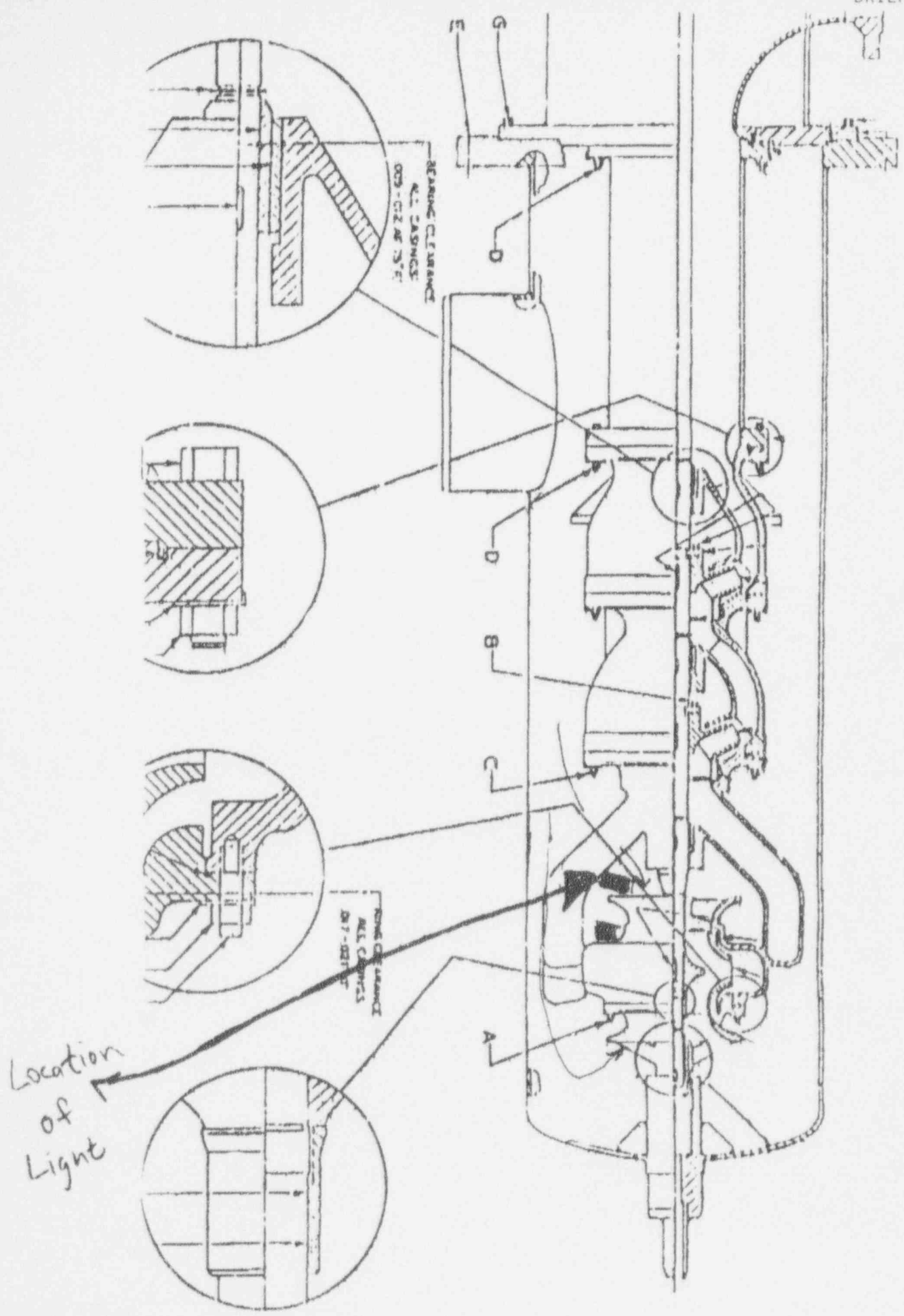


Figure 3.6-3. WNP-2 Residual Heat Removal System, Train B



## REACTOR SCRAM

Reporting Period: 06/20/94 to 06/26/94

<u>DATE</u>	<u>PLANT &amp; UNIT</u>	<u>POWER</u>	<u>TYPE</u>	<u>CAUSE</u>	<u>COMPLICATIONS</u>	<u>YTD ABOVE 15%</u>	<u>YTD BELOW 15%</u>	<u>YTD TOTAL</u>
06/21/94	QUAD CITIES 2	100	SM	Equipment Failure	NO	1	0	1
06/21/94	LASALLE 2	100	SA	Equipment Failure	NO	1	1	2
06/25/94	SOUTH TEXAS 2	47	SA	Equipment Failure	YES	1	0	1

## DESCRIPTION OF COMPLICATION(S) 06/20/94 TO 06/26/94

<u>SITE</u>	<u>UNIT</u>	<u>COMPLICATIONS</u>
SOUTH TEXAS	2	LOSS OF POWER TO BALANCE OF PLANT REQUIRED ADDITIONAL STAFFING TO MANIPULATE EQUIPMENT.

Note: Year To Date (YTD) Totals Include Events Within The Calendar Year Indicated By The End Date Of The Specified Reporting Period



## COMPARISON OF WEEKLY SCRAM STATISTICS WITH INDUSTRY AVERAGES

PERIOD ENDING  
06/26/94

SCRAM CAUSE	NUMBER OF SCRAMS	1994 WEEKLY AVERAGE (YTD)	1993 WEEKLY AVERAGE	1992 WEEKLY AVERAGE	1991* WEEKLY AVERAGE	1990* WEEKLY AVERAGE
POWER GREATER THAN OR EQUAL TO 15%						
EQUIPMENT FAILURE*	3	1.50	1.83	2.62	2.88	3.38
DESIGN/INSTALLATION ERROR*	0	0.08	0.04	-	-	-
OPERATING ERROR*	0	0.24	0.27	0.23	0.58	0.48
MAINTENANCE ERROR*	0	0.36	0.52	0.40	-	-
EXTERNAL*	0	0.16	0.13	-	-	-
OTHER*	0	0.00	0.02	0.23	-	-
Subtotal	3	2.34	2.81	3.48	3.46	3.86
POWER LESS THAN 15%						
EQUIPMENT FAILURE*	0	0.28	0.38	0.40	0.29	0.40
DESIGN/INSTALLATION ERROR*	0	0.04	-	-	-	-
OPERATING ERROR*	0	0.12	0.13	0.13	0.15	0.08
MAINTENANCE ERROR*	0	0.00	0.02	0.06	-	-
EXTERNAL*	0	0.00	0.04	-	-	-
OTHER*	0	0.00	-	0.06	-	-
Subtotal	0	0.44	0.57	0.65	0.44	0.48
TOTAL	3	2.78	3.38	4.13	3.90	4.34

SCRAM TYPE	NO. OF SCRAMS	1994 WEEKLY AVERAGE (YTD)	1993 WEEKLY AVERAGE	1992 WEEKLY AVERAGE	1991 WEEKLY AVERAGE	1990 WEEKLY AVERAGE
TOTAL AUTOMATIC SCRAMS	2	2.14	2.44	3.06	3.25	3.21
TOTAL MANUAL SCRAMS	1	0.63	0.94	1.02	0.65	1.19

TOTALS MAY DIFFER BECAUSE OF ROUNDING OFF

\* Detailed breakdown not in database for 1991 and earlier

- EXTERNAL cause included in EQUIPMENT FAILURE
- MAINTENANCE ERROR and DESIGN/INSTALLATION ERROR causes included in OPERATING ERROR
- OTHER cause included in EQUIPMENT FAILURE 1991 and 1990

## NOTES

1. PLANT SPECIFIC DATA BASED ON INITIAL REVIEW OF 50.72 REPORTS FOR THE WEEK OF INTEREST. PERIOD IS MIDNIGHT SUNDAY THROUGH MIDNIGHT SUNDAY. SCRAMS ARE DEFINED AS REACTOR PROTECTIVE ACTUATIONS WHICH RESULT IN ROD MOTION, AND EXCLUDE PLANNED TESTS OR SCRAMS AS PART OF PLANNED SHUTDOWN IN ACCORDANCE WITH A PLANT PROCEDURE. THERE ARE 111 REACTORS HOLDING AN OPERATING LICENSE.
2. PERSONNEL RELATED PROBLEMS INCLUDE HUMAN ERROR, PROCEDURAL DEFICIENCIES, AND MANUAL STEAM GENERATOR LEVEL CONTROL PROBLEMS.
3. COMPLICATIONS: RECOVERY COMPLICATED BY EQUIPMENT FAILURES OR PERSONNEL ERRORS UNRELATED TO CAUSE OF SCRAM.
4. "OTHER" INCLUDES AUTOMATIC SCRAMS ATTRIBUTED TO ENVIRONMENTAL CAUSES (LIGHTNING), SYSTEM DESIGN, OR UNKNOWN CAUSE.

### OEAB SCRAM DATA

Manual and Automatic Scrams for 1987	-----	435
Manual and Automatic Scrams for 1988	-----	291
Manual and Automatic Scrams for 1989	-----	252
Manual and Automatic Scrams for 1990	-----	226
Manual and Automatic Scrams for 1991	-----	206
Manual and Automatic Scrams for 1992	-----	212
Manual and Automatic Scrams for 1993	-----	175
Manual and Automatic Scrams for 1994	--(YTD 06/26/94)--	70