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MEMORANDUM FOR: Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

FROM: Wayne Lanning, Chief
Events Assessment Branch
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

SUBJECT: THE OPERATING REACTORS EVENTS MEETING
July 12, 1988 - MEETING 88-28

On July 12, 1988 an Operating Reactors Events meeting (88-28) was held to brief senior managers from NRR, OSP, AEOD, and Regional Offices on events which occurred since our last meeting on July 5, 1988. The list of attendees is included as Enclosure 1.

The events discussed and the significant elements of these events are presented in Enclosure 2. Enclosure 3 presents a summary of reactor scrams. One significant event was identified for input to NRC's Performance Indicator Program.

Original Signed by
Wayne D. Lanning

Wayne Lanning, Chief
Events Assessment Branch
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Enclosures:
As stated

cc w/Enclo.:
See Next Page

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LDTR-5-1
OPERATING EXPERIENCE

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ENCLOSURE 1

LIST OF ATTENDEES

OPERATING REACTORS EVENTS BRIEFING (88-28)

July 12, 1988

NAME	ORGANIZATION	NAME	ORGANIZATION
B.A. Boger	NRR/ADRI	W. Minners	RES/DRPS
D.C. Fischer	NRR/DOEA	W. Lanning	NRR/DOEA
R. Scholl, Jr.	NRR/DOEA	W. Hodges	NRR/DEST
J. Sniezek	NRR:DD	C.E. Rossi	NRR/DOEA
M.L. Reardon	NRR/DOEA	B.G. Grimes	NRR/DRIS
C.J. Haughney	NRR/DRIS	D. Tondi	NRR/SELB
S. Varga	NRR/DRP	K. Eccleston	NRR/DRP
P. Baranowsky	NRR/DOEA	K. Heitner	NRR/PD4
B.C. Buckley	NRR/PD2-1	T. Collins	NRR/SRXB
E.G. Adensam	NRR/DRP	G. Gears	OSP
M. Davis	NRR/PD5	J.E. Rosenthal	AEOD/ROAB
G. Lainas	NRR/DRP	T. Murley	NRR:D
F. Miraglia	NRR/ADP		

ENCLOSURE 2

OPERATING REACTORS EVENTS BRIEFING 88-28
EVENTS ASSESSMENT BRANCH
LOCATION: 12-B-11 WHITE FLINT

TUESDAY, JULY 12, 1988, 11:00 A.M.

PALO VERDE 1	AUXILIARY TRANSFORMER EXPLOSION
BRUNSWICK UNITS 1 & 2	HIGH PRESSURE COOLANT INJECTION PROBLEMS
FORT ST. VRAIN	CORE SUPPORT FLOOR INTERNAL PRESSURE

PALO VERDE 1
AUXILIARY TRANSFORMER EXPLOSION
JULY 6, 1988

PROBLEM

FAILURE OF PALO VERDE UNIT 1 AUXILIARY TRANSFORMER AND SUBSEQUENT FIRE LEAD TO A REACTOR TRIP AND LOSS OF FORCED CIRCULATION.

CAUSE

GROUND FAULT ON 13.8 KV NONVITAL BUSS.

SAFETY SIGNIFICANCE

LOSS OF FORCED CIRCULATION.

DISCUSSION

- UNIT AT 100% POWER PRIOR TO EVENT.
- AT APPROXIMATELY 12:07 (MST) ON JULY 6, 1988, UNIT AUXILIARY TRANSFORMER (AXFMR) FAILED CATASTROPHICALLY AND CAUGHT FIRE DUE TO GROUND FAULT ON ASSOCIATED NONVITAL BUSS.
- AXFMR SUPPLIES TWO 13.8 KV, NONVITAL BUSES WHICH PROVIDE POWER TO VARIOUS HOUSE LOADS, I.E., ALL REACTOR COOLANT PUMPS, INSTRUMENT AIR SYSTEM, COOLING WATER SYSTEMS.
- LETDOWN WAS ISOLATED DUE TO UNAVAILABILITY OF LETDOWN HEAT EXCHANGER ON LOSS OF NORMAL CHILL WATER.
- REACTOR TRIPPED ON LOSS OF FLOW.
- AUXILIARY FEEDWATER (AFW) ACTUATION ON LOSS OF MAIN FEEDWATER DUE TO LOW SUCTION PRESSURE.
- PLANT STABILIZED IN MODE 3 WITH DECAY HEAT REMOVAL THROUGH NATURAL CIRCULATION.
- UNCONTAINED OIL FROM THE AXFMR ACCUMULATED IN YARD DRAINS AND OTHER AREAS CAUSING SEVERAL FIRES.
- ALL FIRES WERE EXTINGUISHED BY 12:32 (MST).
- AT 13:02 (MST) LICENSEE ATTEMPTED TO RE-ENERGIZE THE FAULTED NONVITAL 13.8 KV BUS VIA THE UNIT 2 STARTUP TRANSFORMER.
- A SECOND FIRE ERUPTED INVOLVING THE FAULTED BUS.

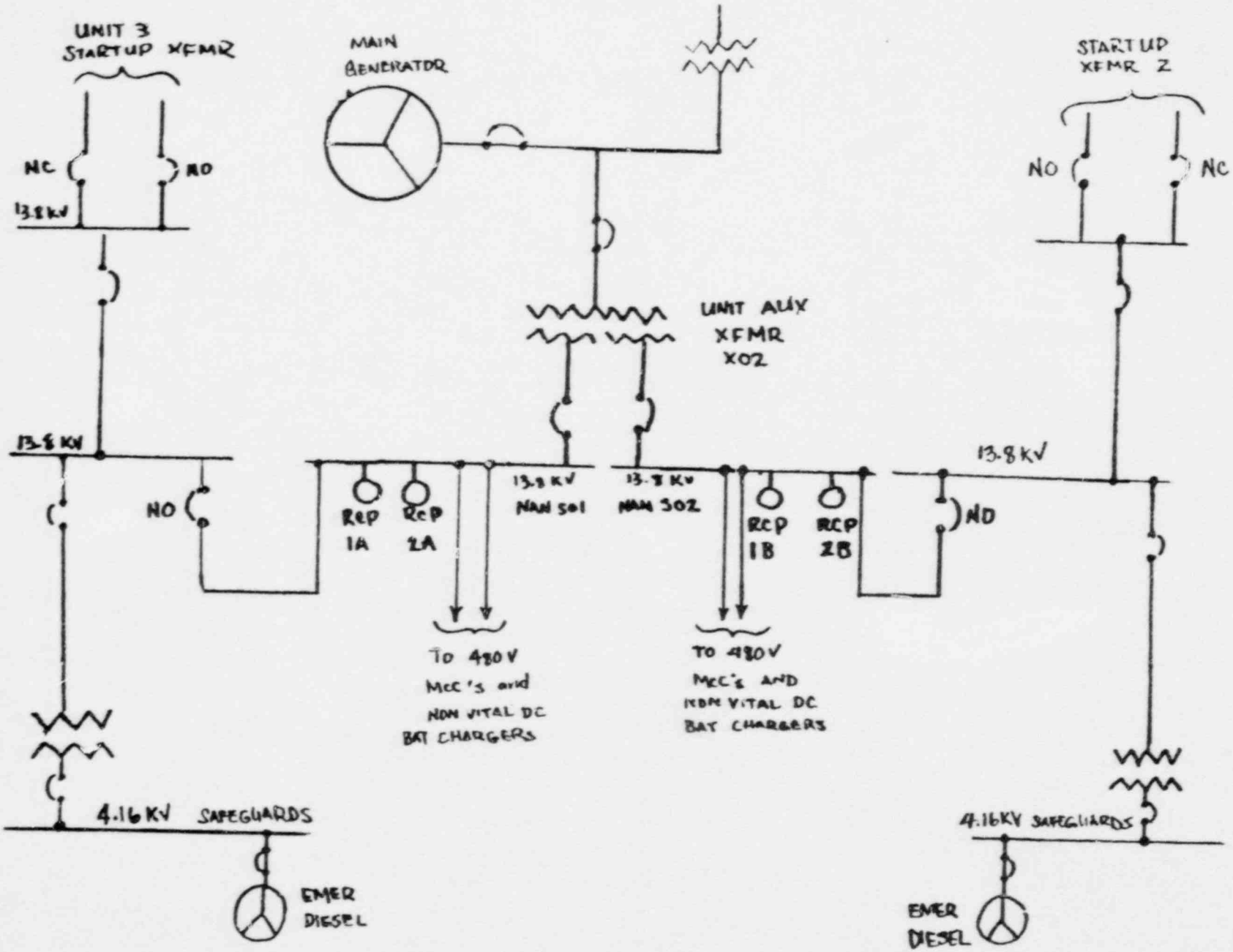
CONTACT: N. FIELDS

REFERENCE: 50.72 # 12727, 12733, PNO-V-88-41 (DATED 07/07/88 AND UPDATED 07/08/88), MORNING REPORT 07/07/88

- o THIS SECOND FIRE WAS MANUALLY EXTINGUISHED USING THE DELUGE SYSTEM; HOWEVER, THE BUS WAS DESTROYED.
- o AS A PRECAUTIONARY MEASURE, BOTH TRAINS OF SAFETY RELATED ELECTRICAL LOADS WERE PLACED ON THEIR RESPECTIVE EMERGENCY DIESEL GENERATORS (EDG) AND SEPARATED FROM THE OFFSITE POWER SOURCE.
- o COMPONENTS NEEDED TO MAINTAIN THE PLANT IN NATURAL CIRCULATION AND WHICH REQUIRE INSTRUMENT AIR HAVE BACKUP NITROGEN SUPPLIES.
- o FOLLOWING RESTORATION OF POWER TO UNAFFECTED NONVITAL BUS, LICENSEE UNSUCCESSFULLY ATTEMPTED TO CLOSE REACTOR COOLANT PUMP (RCP) CIRCUIT BREAKER.
- o DC CONTROL VOLTAGE TO AGASTAT RELAY (IN RCP CIRCUIT BREAKER CONTROL CIRCUITRY WAS INSUFFICIENT TO DEVELOP REQUIRED CLOSE PERMISSIVE.
- o DC BATTERY BECAME DISCHARGED TO APPROXIMATELY 48V FROM 120V WHILE SUPPLYING CONTROL POWER TO VARIOUS SYSTEMS OVER THE 6-8 HOUR PERIOD IN WHICH THE NONVITAL BUSS WAS SEPARATED FROM THE OFFSITE POWER SUPPLY.
- o BATTERY WAS DISCONNECTED FROM DC BUS WHICH ALLOW CHARGER TO DEVELOP SUFFICIENT VOLTAGE TO MAKE UP RELAY.
- o AT 12:35 A.M. (PST) ON JULY 7, 1988 THE LICENSEE STARTED ONE RCP AND A CONTROLLED COOLDOWN WAS THEN COMMENCED USING FORCED CIRCULATION.

FOLLOWUP

- o LICENSEE HAS 50-60 DAY PROGRAM TO REPLACE DAMAGED EQUIPMENT AND MAKE ROOT CAUSE ANALYSIS.
- o LICENSEE TO REVIEW ADEQUACY OF RELAY AND BREAKER COORDINATION AS PART OF THEIR FOLLOWUP EFFORT.
- o LICENSEE CONSIDERING THE INSTALLATION OF ADDITIONAL BATTERY CHARGER TO BE POWERED FROM AN ALTERNATE SOURCE.



PALO VERDE UNIT 1

BRUNSWICK UNITS 1 & 2
HIGH PRESSURE COOLANT INJECTION PROBLEMS
APRIL 1 THROUGH JULY 12, 1988

PROBLEM

- RECENT TREND OF LARGE NUMBERS OF REPORTABLE EVENTS.
- MANY OF THESE REPORTS INCLUDE SAFETY SYSTEMS.
- 50.72s LARGELY DOMINATED BY HIGH PRESSURE COOLANT INJECTION (HPCI) SYSTEM FAILURES AND INOPERABILITIES.

CAUSE

- POSSIBILITY OF INADEQUATE HPCI DESIGN (NOT GE STANDARD).
- PROBLEMS ASSOCIATED WITH AGING, MOV START CIRCUITRY, AND TEST AND MAINTENANCE PROGRAMS.

SAFETY SIGNIFICANCE

LOW HPCI AVAILABILITY DUE TO FAILURES AND INOPERABILITIES PUTS THE UNITS AT A HIGHER VULNERABILITY IN THE EVENT OF AN ACCIDENT OR TRANSIENT SITUATION.

DISCUSSION

- BOTH UNITS IN 14 DAY LCO WITH HPCI OUT OF SERVICE.
- MOST RECENT EVENTS INVOLVE THE INOPERABILITY OF THE DC MOV's E41-F006A (HPCI INJECTION VALVES) ON BOTH UNITS, FAILURE OF STEAM SUPPLY VALVE E41-F001 (UNIT 1) AND NON-CONSERVATIVE SETPOINTS FOR THE STEAM LINE ISOLATION INSTRUMENTS ON ON BOTH UNITS.
- SINCE 04/01/88 45% OF ALL BRUNSWICK's HAVE BEEN HPCI RELATED.
- ON 06/06/88 HPCI/RCIC INOPERABLE ON BOTH UNITS SIMULTANEOUSLY.
- SETPOINT PROBLEMS ARE RELATED TO DATA USED IN STARTUP TESTING, ALSO HAD PRESSURE TRANSMITTER PIPING TAPS REVERSED.
- REPLACED BARTON PRESSURE TRANSMITTER WITH ROSEMONT PRESSURE TRANSMITTER WITHOUT POST-MAINTENANCE TESTING.
- DC VALVE OPERATOR MOTORS AT SITE HAVE A NORMALLY ENERGIZED SHUNT FIELD - WHEN ISOLATED BY BREAKER, ENERGY DOES NOT HAVE A DISSIPATION PATH WHICH LEADS TO MOTOR DEGRADATION.
- MANY VALVE PROBLEMS FOUND.

CONTACT: J. RALEIGH

REFERENCES: 50.72 #s 12697, 12721 AND MORNING REPORT 07/05/88

- ° 1 VALVE FAILED ON THERMAL BINDING WHERE MORE TORQUE THAN DESIGN WAS NECESSARY AFTER BEING REFURBISHED TWICE.
- ° REDUCED VOLTAGE DUE TO STARTING RESISTORS STALLING THE LIMITORQUE "HAMMER-BLOWS" WHICH UNSEATS VALVE.

o LICENSEE HAS BYPASSED THE START RESISTORS, ENLARGED CABLE RUNS (TO REDUCE LOSSES) AND INCREASED ACTUATOR GEAR RATIOS TO DELIVER MORE TORQUE TO VALVES - IN POST-MAINTENANCE TESTING PHASE.

FOLLOWUP

o REGION WILL PURSUE ACTION ON THE J.C.O.
o REGIONAL INSPECTION TEAM AT SITE.
o ENFORCEMENT CONFERENCE 07/20/88 ON HPCI PROBLEMS.

BRUNSWICK UNIT 1
SHORT TERM OPERATING HISTORY
BETWEEN 04/01/88 - 07/12/88

HPCI RELATED 50.72 REPORTABLE EVENTS:

- 04/20/88 - HPCI DECLARED INOPERABLE BECAUSE OUTBOARD SUPPRESSION POOL SUCTION VALVE DID NOT OPEN UPON DEMAND.
- 05/28/88 - HPCI TURBINE STEAM SUPPLY VALVE FAILED TO OPERATE FOR UNKNOWN REASONS, THUS RENDERING HPCI INOPERABLE.
- 06/06/88 - RCIC STEAM LINE HIGH FLOW ISOLATION SETPOINTS WERE LESS CONSERVATIVE THAN THE TECHNICAL SPECIFICATION REQUIREMENTS. RCIC WAS DECLARED INOPERABLE AND WITH HPCI OUT-OF-SERVICE FOR VALVE REPAIRS A REACTOR SHUTDOWN WAS COMMENCED.
- 06/30/88 - HPCI WAS ISOLATED AN DECLARED INOPERABLE WHEN IT WAS DETERMINED THAT THE SETPOINTS FOR THE 300% STEAM LINE ISOLATION SETPOINTS WERE SET NONCONSERVATIVELY.
- 07/01/88 - HPCI TURBINE STEAM SUPPLY VALVE FAILED TO OPEN AND ITS ASSOCIATED BREAKER TRIPPED FOR UNKNOWN REASONS.
- 07/05/88 - OPERABILITY OF THE HPCI INJECTION VALVES (DC MOV'S) IS QUESTIONABLE IN A SEVERELY DEGRADED DC VOLTAGE CONDITION DUE TO THE TORQUE REQUIREMENTS EXCEEDING THE CAPACITY OF THE STARTING MOTOR IN SUCH CONDITIONS.

BRUNSWICK UNIT 2
SHORT TERM OPERATING HISTORY
BETWEEN 04/01/88 - 07/12/88

HPCI RELATED 50.72 REPORTABLE EVENTS

- 04/29/88 - HPCI WAS DECLARED INOPERABLE AND ISOLATED IN ORDER TO MAINTAIN CONTAINMENT INTEGRITY DUE TO A PERSONNEL ERROR WHILE INSTALLING INSULATION.
- 05/13/88 - HPCI DECLARED INOPERABLE BECAUSE THE MINIMUM FLOW VALVE STROKE TIME DID NOT MEET FSAR REQUIREMENTS.
- 06/06/88 - RCIC STEAM LINE HIGH FLOW ISOLATION SETPOINTS WERE LESS CONSERVATIVE THAN THE TECHNICAL SPECIFICATION REQUIREMENTS. RCIC WAS DECLARED INOPERABLE AND WITH HPCI OUT-OF-SERVICE FOR VALVE REPAIRS A REACTOR SHUTDOWN WAS COMMENCED.
- 06/24/88 - HPCI DECLARED INOPERABLE AFTER DISCOVERING THAT ONE HPCI STEAM LINE DIFFERENTIAL PRESSURE TRANSMITTER HAS HAD ITS HIGH AND LOW PRESSURE LINE REVERSED SINCE CONSTRUCTION.
- 06/26/88 - HPCI INBOARD STEAM SUPPLY VALVE FAILED TO OPEN BECAUSE THE BREAKER WAS TRIPPING ON THERMAL OVERLOAD; THEREFORE, HPCI WAS DECLARED INOPERABLE.
- 06/30/88 - HPCI WAS ISOLATED AND DECLARED INOPERABLE WHEN IT WAS DETERMINED THAT THE SETPOINTS FOR THE 300% STEAM LINE ISOLATION SETPOINTS WERE SET NONCONSERVATIVELY. THE 2A CORE SPRAY SYSTEM WAS OUT-OF-SERVICE FOR MAINTENANCE BUT WAS RESTORED WITHIN 30 MINUTES.
- 07/05/88 - OPERABILITY OF THE HPCI INJECTION VALVES (DC MOV'S) IS QUESTIONABLE IN A SEVERELY DEGRADED DC VOLTAGE CONDITION DUE TO THE TORQUE REQUIREMENTS EXCEEDING THE CAPACITY OF THE STARTING MOTOR IN SUCH CONDITIONS.

FORT ST. VRAIN
CORE SUPPORT FLOOR INTERNAL PRESSURE
JULY 12, 1988

PROBLEM

VALVE IN CORE SUPPORT FLOOR (CSF) VENT SYSTEM WAS FOUND IN MID-POSITION WHICH WOULD HAVE PREVENTED CSF PRESSURE CONTROLLER FROM CONTROLLING PRESSURE WITHIN CSF.

CAUSE

PROBABLY HUMAN ERROR.

SAFETY SIGNIFICANCE

- DEFORMATION OF CSF STEEL CASING COULD CAUSE SIDEWALL LINER TO SIGNIFICANTLY RESTRICT THE PRIMARY COOLANT FLOW PATH.
- TOP LINER COULD BUCKLE CAUSING POSSIBLE CORE DISARRAY.

DISCUSSION

- NON-SAFETY VENT SYSTEM MAINTAINS CSF PRESSURE LESS THAN 50 PSIG.
- DURING NORMAL OPERATION PRIMARY COOLANT PRESSURE IS 700 PSIG.
- WITH VENT VALVE CLOSED, CSF PRESSURE COULD COME IN EQUILIBRIUM WITH PRIMARY SYSTEM PRESSURE.
- FOLLOWING RAPID DEPRESSURIZATION OF PRIMARY COOLANT, A 700 PSID COULD BE EXERTED ACROSS CSF CASING.
- SAME SYSTEM BRIEFED APRIL 12, 1988 (BRIEFING 88-15).

FOLLOWUP

REGION IV IS FOLLOWING UP.

CONTACT: T. GREENE
REFERENCE: 50.72 # 12730

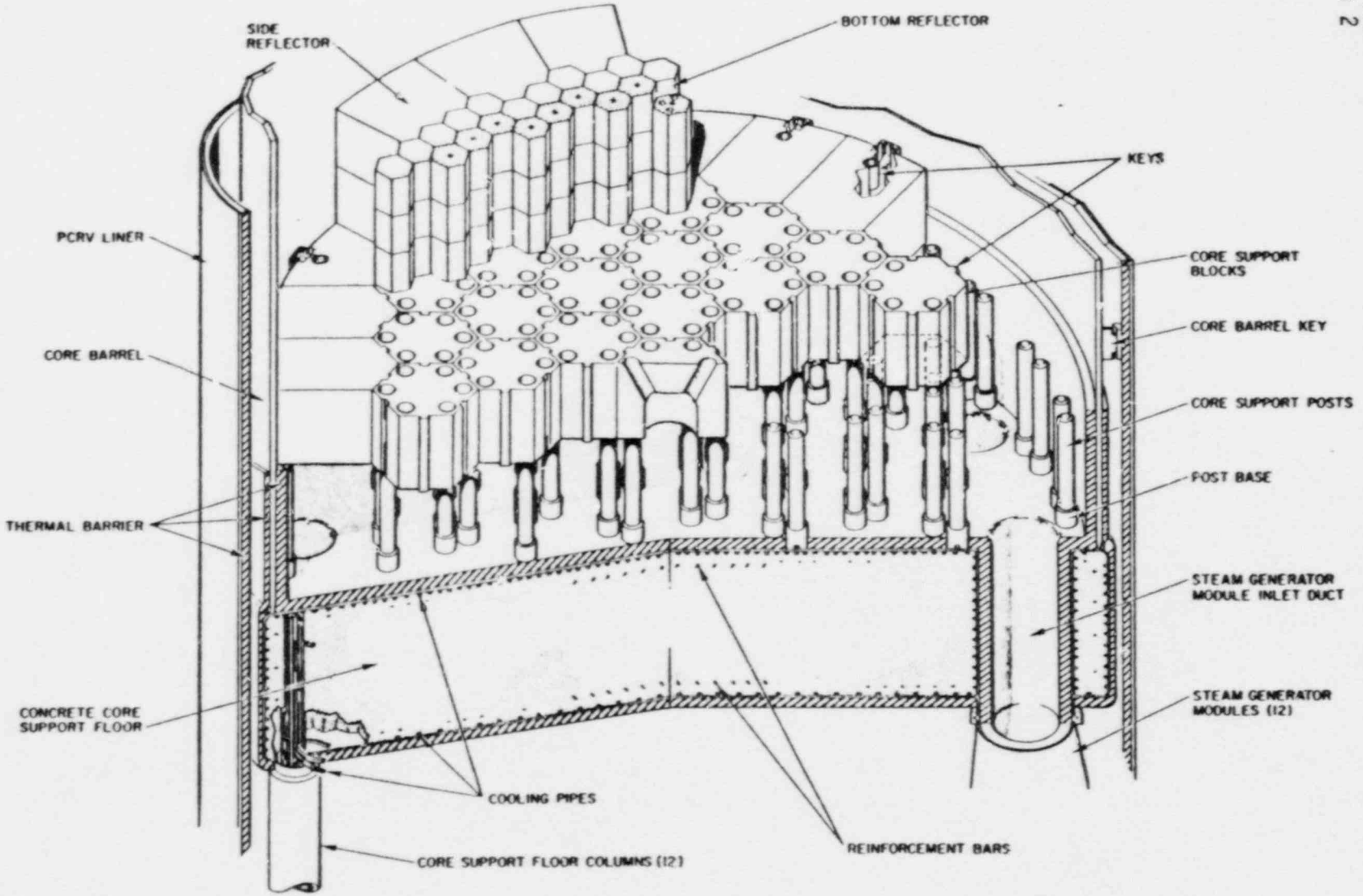
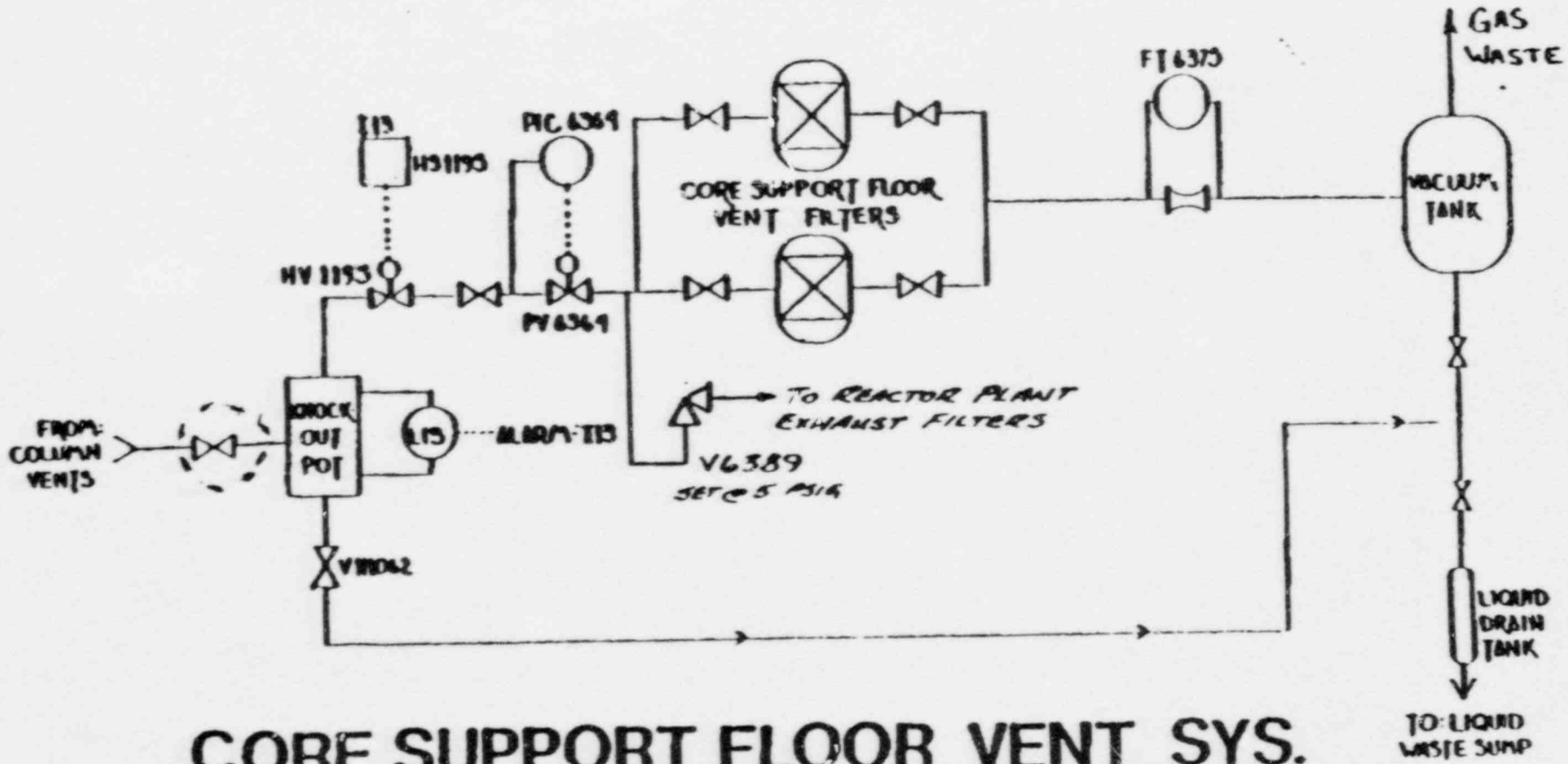


Figure 3.3-2 Core Support Arrangement

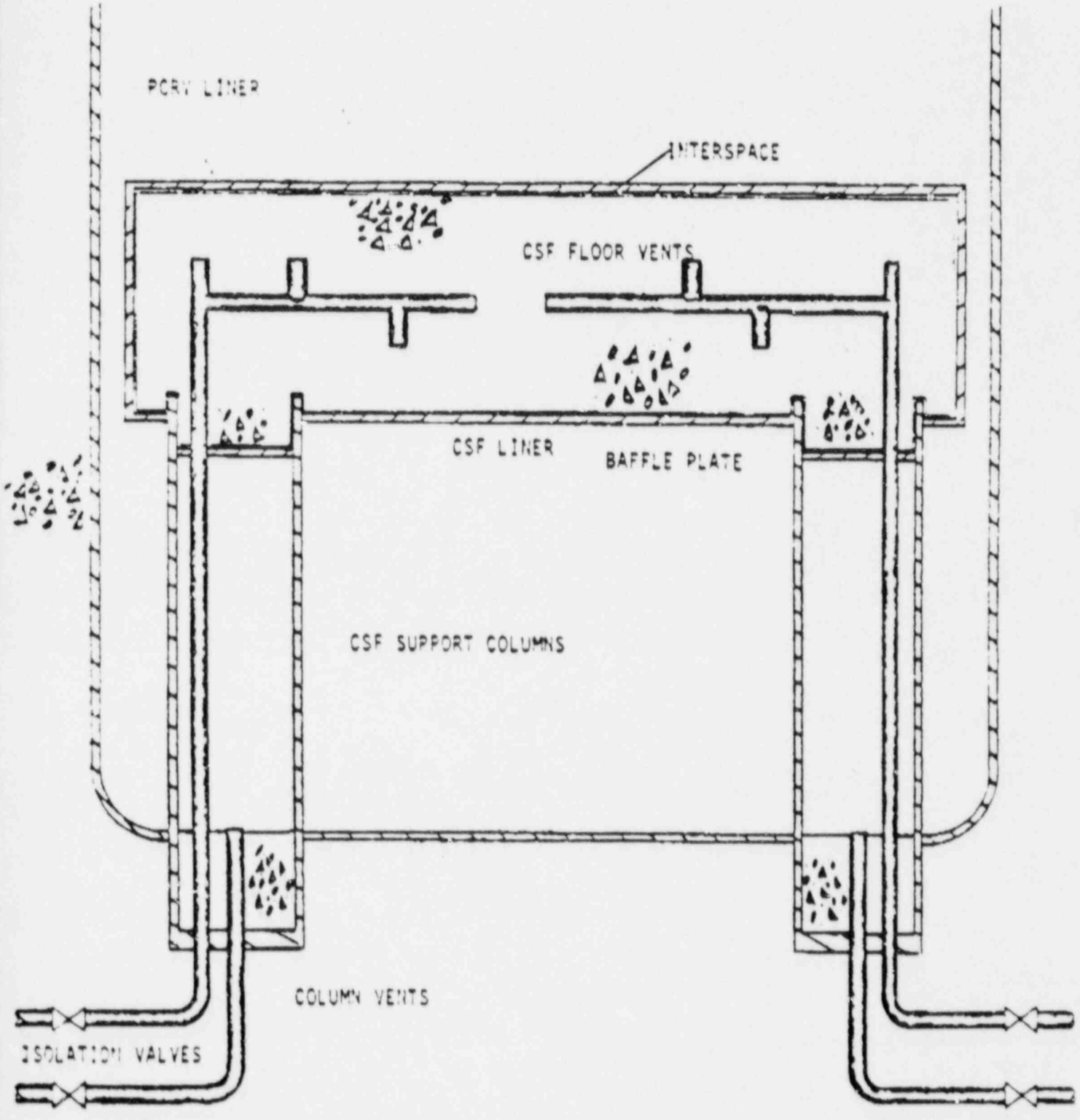
FORT ST VRAIN



CORE SUPPORT FLOOR VENT SYS.

FORT ST VRAIN

CORE SUPPORT FLOOR/COLUMN VENT SYSTEM



ENCLOSURE 3

REACTOR SCRAM SUMMARY
WEEK ENDING 07/10/88

I. PLANT SPECIFIC DATA

DATE	SITE	UNIT	POWER	SIGNAL	CAUSE	COMPLI-CATIONS	YTD ABOVE 15%	YTD BELOW 15%	YTD TOTAL
07/05/88	OCONEE	1	100	A	PERSONNEL	NO	1	0	1
07/06/88	PALO VERDE	1	100	A	EQUIPMENT	NO	3	1	4
07/10/88	DIABLO CANYON	1	0	A	UNKNOWN	NO	1	1	2

PERFORMANCE INDICATORS SIGNIFICANT EVENTS

PLANT NAME	EVENT DATE	EVENT DESCRIPTION	QTR SIGNIFICANCE
PALO VERDE 1	07/06/88	FAILURES OF AUXILIARY TRANSFORMER AND NONVITAL 13.8KV BUS DUE TO GROUND FAULT.	0 SCRAM WITH COMPLICATIONS