



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

NOV 28 1987

MEMORANDUM FOR: Charles E. Rossi, Director
Director of Operational Events Assessment

FROM: Wayne Lanning, Chief
Events Assessment Branch
Division of Operational Events Assessment

SUBJECT: THE OPERATING REACTORS EVENTS MEETING
NOVEMBER 17, 1987 - MEETING 87-40

On November 17, 1987 an Operating Reactors Events meeting (87-40) was held to brief senior managers from NRR, RES, AEOD and Regional Offices on events which occurred since our last meeting on November 10, 1987. The list of attendees is included as Enclosure 1.

The events discussed and the significant elements of these events are presented in Enclosure 2. The Enclosure 3 provides a summary of reactor scrams and a comparison of this week's statistics with industry averages. Two significant events were identified for input to NRC's performance indicator program.

Wayne Lanning, Chief
Events Assessment Branch
Division of Operational Events Assessment

Enclosures:
As stated

cc w/Encl.:
See Next Page

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PDR DPG NRRB PDR

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E. Weiss
S. Black
T. Martin
J. Stone
R. Hernan
H. Bailey
J. Guttmann
A. Thadani

J. Sniezek
G. Gears
J. Stang
J. Stefano
D. Wessmann
V. Rooney
M. Virgilio

ENCLOSURE 1

LIST OF ATTENDEES

OPERATING REACTORS EVENTS BRIEFING (87-40)

November 17, 1987

<u>NAME</u>	<u>ORGANIZATION</u>	<u>NAME</u>	<u>ORGANIZATION</u>
J. Sniezek	NRR/DONRR	R. Eckenrode	NRR/HFAB
C.E. Rossi	NRR/DOEA	R. Scholl	NRR/DOEA
R. Lobel	NRR/DOEA	L. Whitney	NRR/ILRB
M.L. Reardon	NRR/DOEA	W. Minners	RES/DRPS
J. Carter	NRR/DOEA	J. Stang	OSP
G. Gears	OSP	D. Notley	NRR/ECEB
T. Silko	AEOD	C. McCracken	NRR/ECEB
G. Holohan	NRR/DRSP	K. Manoly	NRR/DEST
J. Partlow	NRR/DRIS	W. Hodges	NRR/DEST
D. Crutchfield	NRR/DEST	A. Serkiz	RES/DRPS
A. Thadani	NRR/DEST		
F. Rosa	NRR/SELB		
R. Wescott	OSP/TVA		
M. Caruso	NRR/DRSP		
B. Clayton	DEDRO		
L. Plisco	NRR/DLPQ		
C. Schulten	NRR/DOEA		

SINGLE FAILURE CAUSES LOSS OF LPCI

FERMI UNIT - 2

SEPTEMBER 8, 1987

PROBLEM

LOSS OF LPCI INJECTION CAPABILITY IN SHUTDOWN WITH THE POTENTIAL LOSS DURING POWER OPERATION.

CAUSE

DESIGN DEFICIENCY.

SIGNIFICANCE

SINGLE FAILURE OF PREFERRED DC CONTROL POWER TO THE LPCI LOOP SELECTION VALVES CAUSED THE FAILURE OF THE REDUNDANT (SWING) BUS AND LOSS OF LOW PRESSURE COOLANT INJECTION SYSTEM.

DISCUSSION

- o IN PREPARATION FOR EECW PUMP MAINTENANCE AN OPERATOR WAS INSTRUCTED TO PULL THE WRONG FUSE.
- o OPERATOR ACTION CAUSED PREFERRED DIVISION I LPCI BUS (MCC 72CF) TO DE-ENERGIZE.
- o DUE TO THE FERMI DESIGN CONFIGURATION, POWER WAS LOST TO THE DC CONTROLLED FEEDER BREAKER PREVENTING TRANSFER TO DIVISION II POWER SOURCE.
- o MCC 72CF POWERS CONTROL LOGIC TO LPCI SUCTION VALVES, DISCHARGE VALVES, INJECTION VALVES AND SHUTDOWN COOLING ISOLATION VALVES OF BOTH TRAINS OF THE LOW PRESSURE COOLANT INJECTION SYSTEM.
- o ROOT CAUSE: SWITCH-OVER LOGIC WAS NOT SINGLE PROOF.
- o LICENSEE DID NOT CONSIDER SINGLE FAILURE OF DC CONTROL POWER.

FOLLOWUP

- o THIS IS A PLANT SPECIFIC EVENT WITH NO EVIDENCE OF GENERIC APPLICABILITY.

CONTACT: C. SCHULTEN

- o LICENSEE'S PROPOSED MODIFICATIONS HAVE BEEN ACCEPTED BY SELB.
 - MAGNETIC CONTACTORS ARE BEING ADDED IN SERIES WITH EXISTING CONTACTORS AND BREAKERS TO EACH POWER FEED.
 - A RELAY WILL BE ADDED TO ENABLE OPERATORS TO MONITOR THE DC POWER TO THE NORMAL FEEDER BREAKER AND MAGNETIC CONTACTORS.
 - A REDUNDANT UNDERVOLTAGE RELAY WILL BE ADDED TO TRIP THE NORMAL POWER FEEDER BREAKER.

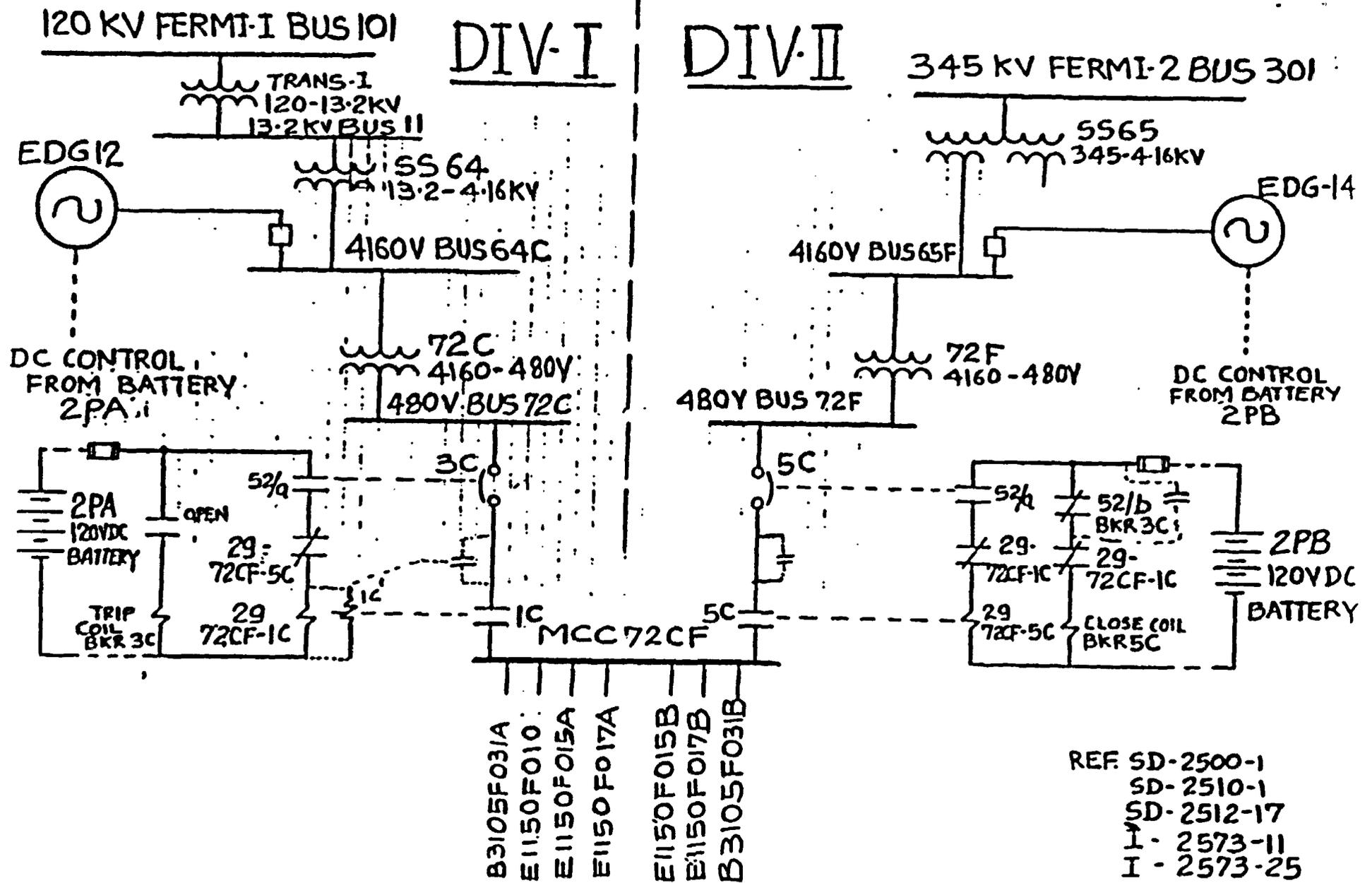


Fig. 1

LOSS OF OFFSITE POWER

PILGRIM - UNIT 1

NOVEMBER 12, 1987

PROBLEM

LOSS OF OFFSITE POWER WITH COMPLICATIONS

SIGNIFICANCE

NO OFFSITE POWER AVAILABLE FOR OVER 21 HOURS. ONE OF TWO EMERGENCY DIESELS OUT OF SERVICE.

DISCUSSION

- o OFFSITE POWER WAS LOST DURING A SEVERE WINTER SNOW STORM DUE TO A PROBLEM ASSOCIATED WITH THE HIGH VOLTAGE SIDE OF THE AUXILIARY STARTUP TRANSFORMER.
- o AT THE TIME OF THE EVENT THE MAIN GENERATOR DISCONNECT SWITCH WAS CLOSED, THE NONESSENTIAL 23KV LINE WAS OFFLINE FOR MAINTENANCE AND ONLY 1 OF 3 SAFETY AIR COMPRESSORS WAS AVAILABLE.
- o BOTH EMERGENCY DIESEL GENERATORS STARTED AND LOADED.
- o DECAY HEAT REMOVAL WAS LOST BUT THE REACTOR COOLANT TEMPERATURE STABILIZED TO 170 F BECAUSE THE REACTOR HAS BEEN SHUTDOWN FOR 18 MONTHS.
- o EVENTUALLY THE MAIN TRANSFORMER DISCONNECT LINK WAS REMOVED AND POWER WAS RESTORED BY BACKFEEDING FROM THE 345KV RINGBUS THROUGH THE UNIT AUXILIARY TRANSFORMER.
- o EQUIPMENT PROBLEMS COMPLICATED THE EVENT:
 - SOME INSTRUMENT INDICATION PROBLEMS (SW) AND INABILITY TO RESET SCRAM VALVES, SDIV VALVES AND VALVES ON SUMP DRAINS BECAUSE OF STATION AIR PROBLEMS.
 - LOW AIR HEADER PRESSURE; OPERABLE ESF AIR COMPRESSOR LIMITED TO SUPPLYING INSTRUMENT AIR PRESSURE UP TO 60 PSI.
 - SWITCHYARD OPERATIONS TO REMOVE SNOW & SALT SPRAY DELAYED WHEN HIGH PRESSURE SPRAY EQUIPMENT FAILED.
 - 10 HOURS INTO THE EVENT THE "B" DIESEL GENERATOR WAS SHUTDOWN DUE TO THE "C" PHASE AMPERAGE AND VOLTAGE READING ZERO.

CONTACT: C. SCHULTEN

- PARALLEL EFFORT UNDERTAKEN TO CONNECT THE UNIT AUXILIARY TRANSFORMER TO THE 345KV RINGBUS.
- 13 HOURS INTO THE EVENT TRYING TO CONNECT AN OFFSITE DIESEL AIR COMPRESSOR TO STATION AIR TO GET BACK OPERATION OF ISOLATED EQUIPMENT SUMPS AND DRAINS.

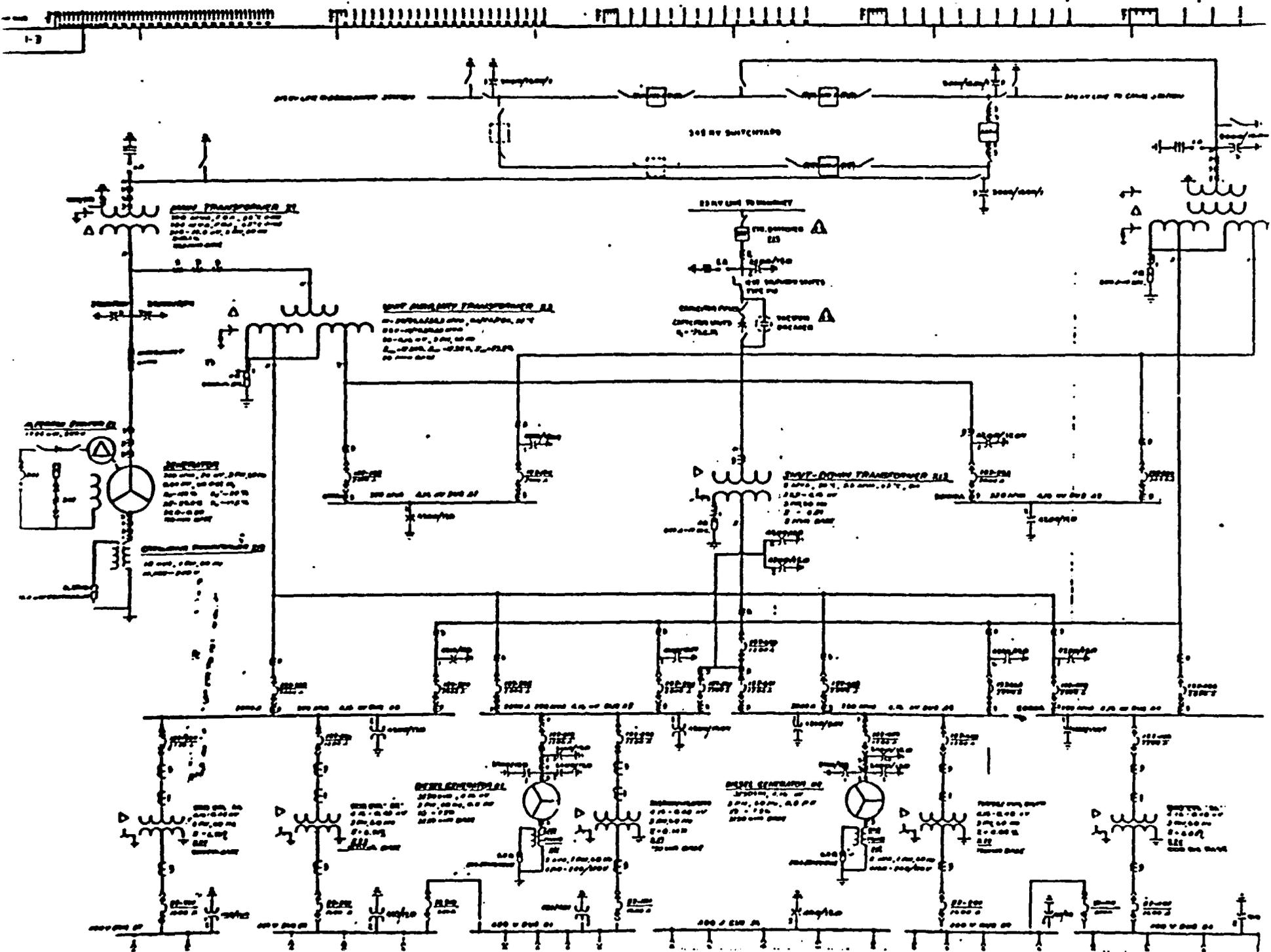
FOLLOWUP

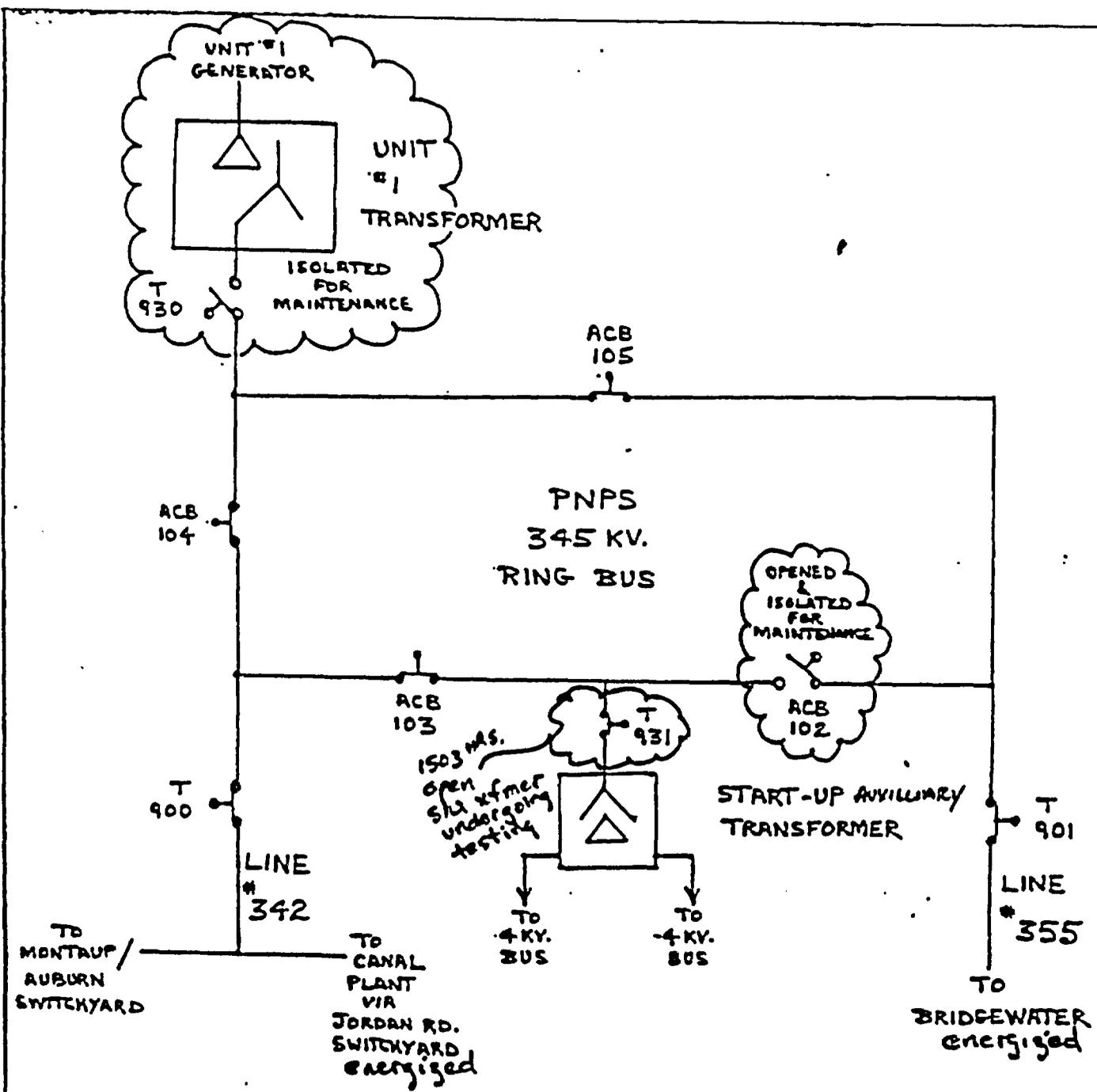
- o AIT IS ONSITE - NRR AND REGION I PARTICIPATION.
- o AIT CHARTER.
 - ESTABLISH THE SEQUENCE OF EVENTS DURING THE LOOP.
 - INVESTIGATE THE CIRCUMSTANCES THAT CONTRIBUTED TO THE EVENT.
 - INVESTIGATE THE COMPLICATING FACTORS.
- o PROPOSED STATION BLACKOUT RULE DOES NOT CONSIDER SHUTDOWN CONDITIONS.

OTHER PILGRIM LOSS OF OFFSITE POWER EVENTS

- o 15 EVENTS FROM 1974 - 1986; EVENTS IN 1977 (2:40), 1978 (8:54) WERE TOTAL LOSSES OF OFFSITE POWER; ALSO 7 SALT & SNOW EVENTS AND 3 LIGHTNING EVENTS.
- o MARCH 1987 PARTIAL LOOP DUE TO SNOW & SALT.

PILGRIM UNIT 1





PILGRIM NUCLEAR STATION 345 KV. TRANSMISSION SYSTEM.

ONE LINE SKETCH

CONDITIONS AT TIME OF EVENT.

NOTE: DISCONNECTS ON EACH ACB NOT SHOWN.

UPDATE ON BROWNS FERRY UNIT 2
FIRE INSIDE OF CONTAINMENT
NOVEMBER 2, 1987

PROBLEM

ON THE MORNING SHIFT, A FIRE STARTED IN THE TOP CABLE TRAY OF A CLOSELY SPACED TIER, NEAR A FLOOR, INSIDE OF CONTAINMENT.

CAUSE

THE CAUSE IS UNDETERMINED. CAUSE MAY HAVE BEEN AN ELECTRICAL SHORT CIRCUIT IN ONE OR BOTH OF TWO UNTERMINATED ELECTRICAL CABLES SPLICED IN THE TRAY, UNTERMINATED ELECTRICAL PENETRATION PIGTAILS, POOR SPLICES IN TEMPORARY WIRING, OR WELDING ABOVE TRAYS.

SIGNIFICANCE

THIS FIRE CHALLENGES SEVERAL GENERIC ASSUMPTIONS ABOUT POWER PLANT DESIGN, CONSTRUCTION, AND MODIFICATION ACTIVITIES (E.G., NO FIRE WATCH WAS POSTED AT CABLE TRAYS FILLED WITH HIGHLY FLAMMABLE CABLES WHEN THEIR COVERS WERE REMOVED AND TEMPORARY CONNECTIONS WERE BEING MADE IN THE TRAYS INSTEAD OF JUNCTION BOXES).

DISCUSSION

- o FIRE WAS SELF-SUSTAINING AND SELF PROPAGATING IN NON-383 CABLES.
- o THE FIRE SPREAD FROM THE TOP TRAY DOWN.
- o FIRE TOOK 33 MINUTES TO EXTINGUISH. ATTEMPTS TO USE CO₂ FAILED AND WATER WAS USED.
- o SPURIOUS ACTUATIONS TOOK PLACE SUCH AS:
 - * HIGH-HIGH FLUX ON APRM "A", "D", AND "F" WITH SCRAM.
 - * CLOSURE OF RECIRCULATION PUMP DISCHARGE VALVES LEADING TO POSSIBLE PUMP SEAL DAMAGE.
- o ELECTRICAL FAULT PROTECTION MAY HAVE BEEN INADEQUATE TO PREVENT A FIRE.
- o TVA AND REGION II ARE INVESTIGATING THE CAUSE OF THE FIRE.
- o NRR, AEOD, OSP AND THE VENDOR INSPECTION BRANCH ARE INVESTIGATING THE FACTS OF THE EVENT TO MAKE RECOMMENDATIONS FOR FUTURE REGULATORY ACTIONS.

CONTACT: R. SCHOLL

- o THE REGION HAS DETERMINED THAT AN AIT IS NOT REQUIRED BUT AIT PROCEDURES ARE BEING FOLLOWED. REGION II HAS NOT REQUESTED NPR SUPPORT. DRAFT INSPECTION REPORT DUE 11/25/87.

REACTOR SCRAM SUMMARY
WEEK ENDING 11/15/87

ENCLOSURE 3

I. PLANT SPECIFIC DATA

DATE	SITE	UNIT	POWER	SIGNAL	CAUSE	COMPLI- CATIONS	YTD	YTD	YTD
							ABOVE 15%	BELOW 15%	TOTAL
11/09/87	BIG ROCK POINT	1	0	A	UNKNOWN	NO	0	4	4
11/10/87	BEAVER VALLEY	2	11	A	EQUIP/MECH.	NO	11	5	16
11/11/87	VESTLE	1	100	A	PERSONNEL	NO	16	11	27
11/11/87	CALVERT CLIFFS	1	100	A	EQUIP/ELECT.	NO	6	0	6
11/14/87	ARKANSAS	2	100	A	EQUIPMENT	NO	2	1	3
11/14/87	ARKANSAS	2	0	A	PERSONNEL	NO	2	2	4

II. COMPARISON OF WEEKLY STATISTICS WITH INDUSTRY AVERAGES

SCRAMS FOR WEEK ENDING
11/15/87

SCRAM CAUSE	POWER	NUMBER OF SCRAMS (5)	1987 WEEKLY AVERAGE YTD	1986 WEEKLY AVERAGE (3) (4)	1985 WEEKLY AVERAGE (8) (9)
** POWER >15%					
EQUIP. RELATED	>15%	2	4.1	4.7	5.4
PEPS. RELATED (6)	>15%	1	1.3	1.8	2.0
OTHER (7)	>15%	0	1.2	0.4	0.6
** Subtotal: **		3	6.6	6.9	8.0
** POWER <15%					
EQUIP. RELATED	<15%	1	1.2	1.2	1.7
PEPS. RELATED	<15%	1	0.7	0.7	0.9
OTHER	<15%	1	0.7	0.2	0.2
** Subtotal: **		3	2.2	2.4	2.4
*** Total: ***		6	8.8	9.3	10.4

MANUAL VS AUTO SCRAMS

TYPE	NUMBER OF SCRAMS	1987 WEEKLY AVERAGE YTD	1986 WEEKLY AVERAGE	1985 WEEKLY AVERAGE
MANUAL SCRAMS	0	1.2	1.0	1.0
AUTOMATIC SCRAMS	6	7.6	7.9	9.4

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.
2. RECOVERY COMPLICATED BY EQUIPMENT FAILURES OR PERSONNEL ERRORS UNRELATED TO CAUSE OF SCRAM.
3. 1986 INFORMATION DERIVED FROM ORAS STUDY OF UNPLANNED REACTOR TRIPS IN 1986. WEEKLY DATA DETERMINED BY TAKING TOTAL TRIPS IN A GIVEN CATEGORY AND DIVIDING BY 52 WEEKS/YEAR.
4. IN 1986, THERE WERE AN ESTIMATED TOTAL OF 461 AUTOMATIC AND MANUAL UNPLANNED REACTOR TRIPS AT 104 REACTORS (HOLDING OPERATING LICENSES). THIS YIELDS AN AVERAGE RATE OF 4.4 TRIPS PER REACTOR PER YEAR AND AN AVERAGE RATE OF 8.8 TRIPS PER WEEK FOR ALL REACTORS.
5. BASED ON 107 REACTORS HOLDING AN OPERATING LICENSE.
6. PERSONNEL RELATED PROBLEMS INCLUDE HUMAN ERROR, PROCEDURAL DEFICIENCIES, AND MANUAL STEAM GENERATOR LEVEL CONTROL PROBLEMS.
7. "OTHER" INCLUDES AUTOMATIC SCRAMS ATTRIBUTED TO ENVIRONMENTAL CAUSES (LIGHTNING), SYSTEM DESIGN, OR UNKNOWN CAUSE.
8. 1985 INFORMATION DERIVED FROM AN ORAS STUDY OF UNPLANNED REACTOR TRIPS IN 1985. WEEKLY DATA DETERMINED BY TAKING TOTAL TRIPS IN A GIVEN CATEGORY AND DIVIDING BY 52 WEEKS/YEAR.
9. IN 1985, THERE WERE AN ESTIMATED TOTAL OF 541 AUTOMATIC AND MANUAL UNPLANNED REACTOR TRIPS AT 93 REACTORS (HOLDING FULL POWER LICENSES). THIS YIELDS AN AVERAGE RATE OF 5.8 TRIPS PER REACTOR YEAR AND AN AVERAGE RATE OF 10.4 TRIPS PER WEEK FOR ALL REACTORS.

PERFORMANCE INDICATORS SIGNIFICANT EVENTS

PLANT NAME	EVENT DATE	EVENT DESCRIPTION	QTR SIGNIFICANCE
FERMI 1	09/28/87	SINGLE FAILURE OF DIVISION 1 DC CONTROL POWER RESULTED IN LOSS OF ALL LFCI	1 POTENTIAL FOR OR ACTUAL DEGRADATION OF SAFETY-RELATED EQUIPMENT
FERMI 1	10/12/87	ENCL STORM CAUSED TOTAL LOSS OF OFFSITE POWER WHILE 33 KV LINE OUT FOR MAINTENANCE , AUX TRANSFORMER NOT AVAILABLE FOR QUICK RECOVERY	1 LOSS OF OFFSITE POWER