December 7, 1989

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

FROM: Charles J. Haughney, Chief
Events Assessment Branch
Division of Operational Events Assessment

SUBJECT: THE OPERATING REACTORS EVENTS MEETING
December 6, 1989 - MEETING 89-43

On December 6, 1989, we conducted an Operating Reactors Events meeting (89-43) to brief senior managers from NRR, AEOD, ACRS, RES, Commission staff, and regional offices on selected events that occurred since our last meeting on November 29, 1989. Enclosure 1 lists the attendees.

Enclosure 2 presents the significant elements of the discussed events. Enclosure 3 contains a summary of reactor scrams for the week ending 12/03/89. Two significant events were identified for input into the NRC performance indicator program.

Original signed by:
Charles J. Haughney

Charles J. Haughney, Chief
Events Assessment Branch
Division of Operational Events Assessment

Enclosures:
As stated

cc w/Encl.:
See Next Page

DISTRIBUTION
Central File
EAB Reading File
Circulating Copy, EAB Staff
MLReardon, EAB
BBenedict, EAB
LKilgore, SECY
PDR

DF03

1/1

I DIR-5 OPERATING EXPERIENCES

8912200105 891207
PDR ORG NRRB PDC

FC	:EAB/DOEA	::C:EAB/DOEA	:	:	:	:	:
AME	:MLReardon	:CJHaughney	:	:	:	:	:
ATE	:12/ 6 /89	:12/ 6 /89	:	:	:	:	:

OFFICIAL RECORD COPY

NRC FILE CENTER COPY

cc:
T. Murley, NRR
F. Miraglia, NRR
J. Sniezek, NRR
J. Partlow, NRR
E. Jordan, AEOD
J. Taylor, EDO
E. BeckJord, RES
W. Russell, RI
S. Ebneter, RII
B. Davis, RIII
R.D. Martin, RIV
J.B. Martin, RV
W. Kane, RI
L. Reyes, RII
E. Greenman, RIII
J. Milhoan, RIV
R. Zimmerman, RV
S. Varga, NRR
B. Boger, NRR
G. Lainas, NRR
F. Congel, NRR
E. Weiss, AEOD
B. Clayton, EDO
J. Lieberman, OE
J. Guttmann, SECY
A. Thadani, NRR
J. Richardson, NRR
S. Rubin, AEOD
J. Forsyth, INPO
R. Barrett, NRR
M. Harper, AEOD
R. Newlin, GPA
J. Roe, NRR
H. Alderman, ACRS
S. Sands, NRR
G. Dick, NRR
F. Hebdon, NRR

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

December 7, 1989

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

FROM: Charles J. Haughney, Chief
Events Assessment Branch
Division of Operational Events Assessment

SUBJECT: THE OPERATING REACTORS EVENTS MEETING
December 6, 1989 - MEETING 89-43

On December 6, 1989, we conducted an Operating Reactors Events meeting (89-43) to brief senior managers from NRR, AEOD, ACRS, RES, Commission staff, and regional offices on selected events that occurred since our last meeting on November 29, 1989. Enclosure 1 lists the attendees.

Enclosure 2 presents the significant elements of the discussed events. Enclosure 3 contains a summary of reactor scrams for the week ending 12/03/89. Two significant events were identified for input into the NRC performance indicator program.

Charles J. Haughney, Chief
Events Assessment Branch
Division of Operational Events Assessment

Enclosures:
As stated

cc w/Encl.:
See Next Page

ENCLOSURE 1

LIST OF ATTENDEES

OPERATING REACTORS EVENTS BRIEFING (89-43)

December 6, 1989

NAME	ORGANIZATION	NAME	ORGANIZATION
T. Murley	NRR/DONRR	J. Partlow	NRR/ADP
V. Benaroya	AEOD/DSP	B. Grimes	NRR/DRIS
J. Zwolinski	NRR/ADR-III	W. Lanning	NRR/DRIS
P. Cortland	NRR/TVA	J. Wechselberger	NRR/DLPQ
W. Troskoski	OE	R. Perfetti	OE
G. Dick	NRR/PD-4	P. O'Connor	NRR/PD-4
E. Brach	NRR/RVIB	T. Ross	NRR/PD3-2
T. Gody, Jr.	NRR/LPEB	O. Chopra	NRR/SELB
W. Jensen	NRR/DOEA	H. Alderman	ACRS
A. Vietti-Cook	OCM/KC	K. Connaughton	OCM/JC
M. Peranich	NRR/ILPB	P. Bobe	AEOD/DSP
W. Haass	NRR/RVIB	J. Richardson	NRR/DET
F. Miraglia	NRR/ADT	C. Haughney	NRR/DOEA
P. Baranowsky	NRR/DOEA	G. Holahan	NRR/DRSP
W. Minners	RES/DSIR	E. Rossi	NRR/DOEA
M. Reardon	NRR/DOEA		

ENCLOSURE 2

OPERATING REACTORS EVENTS BRIEFING 89-43
EVENTS ASSESSMENT BRANCH
LOCATION: 16B-11, WHITE FLINT
WEDNESDAY, DECEMBER 6, 1989, 11:00 A.M.

SOUTH TEXAS UNIT 2	FAILURE OF DIESEL GENERATOR (UPDATE)
BRAIDWOOD UNIT 1	RCS LEAKAGE THROUGH RHR SUCTION RELIEF VALVE (AIT TO SITE)

SOUTH TEXAS UNIT 2
FAILURE OF DIESEL GENERATOR (UPDATE)
NOVEMBER 28, 1989

PROBLEM
FAILURE OF DIESEL GENERATOR.

CAUSE
HIGH CYCLE FATIGUE FAILURE OF THE MASTER CONNECTING ROD ASSEMBLY (BETWEEN THE ARTICULATED ROD PIN AND THE CRANKSHAFT ROD JOURNAL) BECAUSE OF IMPROPER MACHINING OF AN OIL PASSAGE HOLE.

SAFETY SIGNIFICANCE
FAILURE OF A DIESEL GENERATOR RESULTS IN THE LOSS OF CAPABILITY TO PROVIDE ONSITE EMERGENCY POWER TO ONE TRAIN OF ESF EQUIPMENT. THERE ARE THREE DIESEL GENERATORS PER UNIT AT SOUTH TEXAS. TWO OUT OF THE THREE DIESEL GENERATORS (AND THE ASSOCIATED ESF EQUIPMENT) ARE NEEDED TO MITIGATE THE CONSEQUENCES OF DESIGN BASIS ACCIDENTS.

DISCUSSION
- o ALL SIX DIESEL GENERATORS (DG) AT THE SOUTH TEXAS SITE ARE MODEL KSV-20 MANUFACTURED BY COOPER-BESSEMER.
- o THE NO. 22 DG HAD COMPLETED APPROXIMATELY 10 HRS OF A 24 HR FULL LOAD TEST (REQUIRED PER TECHNICAL SPECIFICATIONS) WHEN PERSONNEL IN THE AREA HEARD LOUD BANGING/KNOCKING NOISES AND SAW SMOKE COMING FROM THE DG ENGINE. THE DG STOPPED ON ITS OWN.
- o DG PARTS DEBRIS WAS FOUND ON THE FLOOR (PIECES OF BOTH NO. 4 PISTONS AND THE ARTICULATED ROD, AND OIL). SOME SMALL PIECES WERE FOUND IN NEARBY CABLE TRAYS AND ON THE CATWALK ABOVE THE DG ENGINE. BOTH BLOWOUT COVERS LOCATED IN THE INSPECTION PLATES AT EACH NO. 4 CYLINDER WERE FOUND SEPARATED FROM THE

CONTACT: R. KENDALL SIGEVENT: NO

REFERENCES: 10 CFR 50.72 # 17212, MORNING REPORTS 11/29 AND 11/30/89, AND PRELIMINARY NOTIFICATION PNO-IV-89-66

DISCUSSION (CONTINUED)

PLATES, AND ONE OF THE INSPECTION PLATES WAS FOUND DETACHED FROM THE DG.

- o NO EVIDENCE OF CRANKCASE EXPLOSION; MECHANICAL DAMAGE ONLY.
- o TEST READINGS TAKEN HOURLY PRIOR TO THE FAILURE INDICATED NORMAL DG OPERATION. NO ALARMS WERE RECEIVED IN THE CONTROL ROOM PRIOR TO THE FAILURE.
- o EXAMINATION OF THE FAILED PARTS SHOWED THAT AN OIL SUPPLY HOLE IN THE MASTER CONNECTING ROD BETWEEN THE MAIN ROD BEARING OIL GROOVE AND THE LATERAL OIL PASSAGE TO THE ARTICULATED ROD PIN WAS FOUND TO BE OVERBORED.
- o THE ROD DID NOT PASS VENDOR QA INSPECTION (APPROX 10 YEARS AGO). THE HOLE WAS SUBSEQUENTLY TAPPED AND PLUGGED, AND CONSIDERED ACCEPTABLE.
- o LABORATORY ANALYSIS CONFIRMED THAT THE ROOT CAUSE FOR FAILURE OF THE MASTER CONNECTING ROD BETWEEN THE LATERAL OIL PASSAGE AND THE ARTICULATED ROD PIN WAS HIGH CYCLE FATIGUE. IT APPEARS THAT THIS FAILURE LED TO LOSS OF LUBRICATION TO THE ARTICULATED ROD PIN AND SUBSEQUENT OVERHEATING AND GROSS FAILURE OF THE ROD. THE LICENSEE'S INVESTIGATION (METALLURGICAL ANALYSIS) IS CONTINUING.
- o ALL OTHER DG PARTS APPEAR TO HAVE RECEIVED ADEQUATE LUBRICATION.
- o INTERNAL DAMAGE TO THE DG WAS LESS THAN EXPECTED.
- o THE FAILED DG HAD APPROXIMATELY 640 HRS OF OPERATION. A 24 HR FULL LOAD TEST WAS SUCCESSFULLY COMPLETED IN DECEMBER 1988. ALL DGs AT SOUTH TEXAS SUCCESSFULLY COMPLETED 100 HR FULL LOAD TESTS PRIOR TO COMMERCIAL OPERATION.

GENERIC IMPLICATIONS

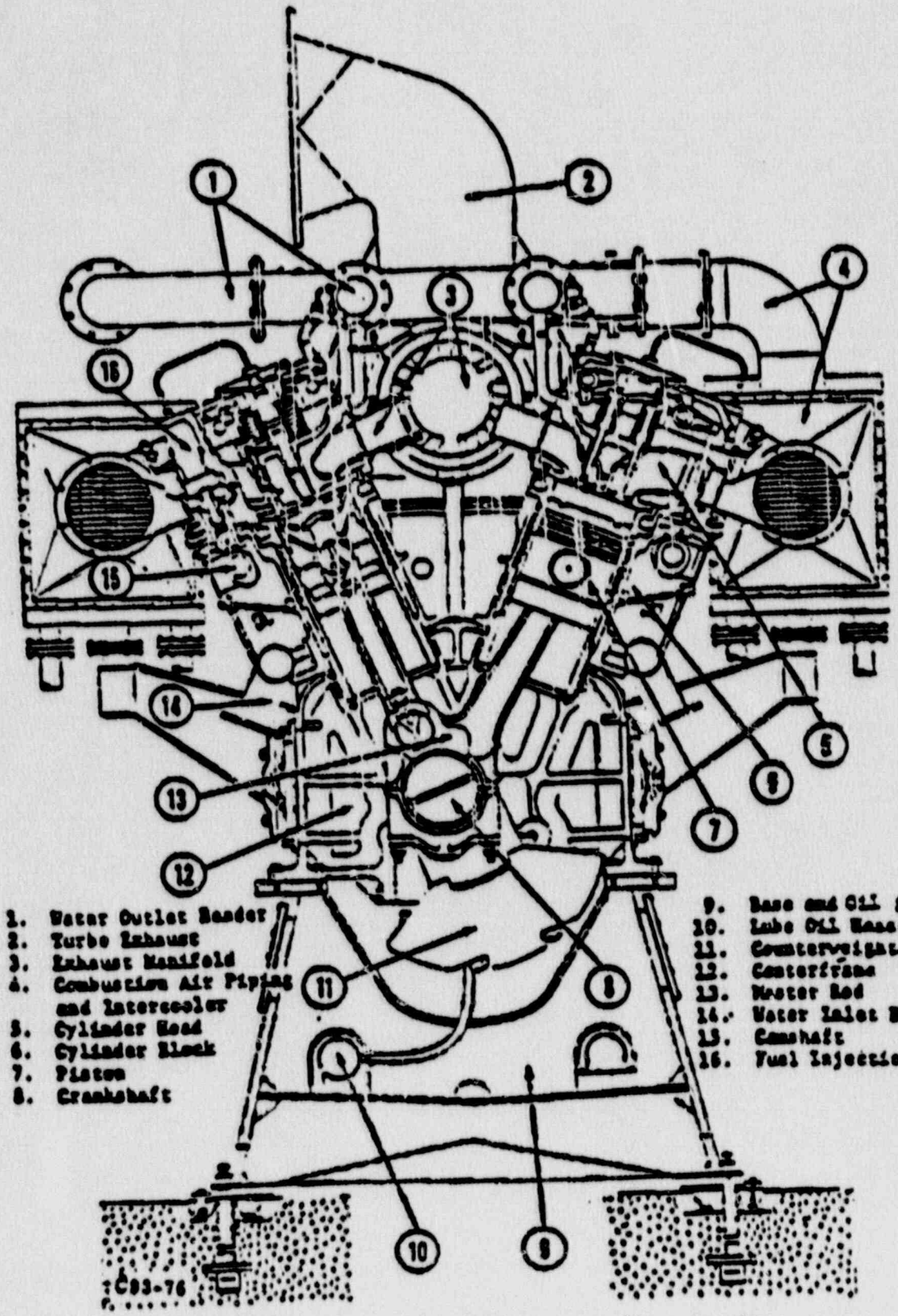
STILL UNDER INVESTIGATION. VENDOR RECORDS INDICATE THE FIX (I.E., TAP HOLE AND INSERT PLUG) TO BE UNIQUE TO THE FAILED PART. HOWEVER, OTHER RODS HAVE BEEN IDENTIFIED WITH OVERBORED HOLES THAT ARE NOT DOCUMENTED IN THE VENDOR RECORDS. THE VENDOR IS ANALYZING THE EFFECT OF OVERBORED HOLES ON PART PERFORMANCE. COOPER-BESSEMER DGs ARE INSTALLED AT 16 REACTOR UNITS (36 ENGINES, 330 RODS).

FOLLOWUP

- o THE LICENSEE AND THE DIESEL GENERATOR VENDOR ARE CONTINUING TO INVESTIGATE. NRC HEADQUARTERS AND REGIONAL PERSONNEL HAVE BEEN SENT TO THE SITE TO MONITOR THE INVESTIGATION.
- o COOPER-BESSEMER IS PREPARING A PART 21 NOTIFICATION.
- o RVIB IS PLANNING AN INSPECTION AT THE COOPER-BESSEMER FACILITY IN GROVE CITY, PA.

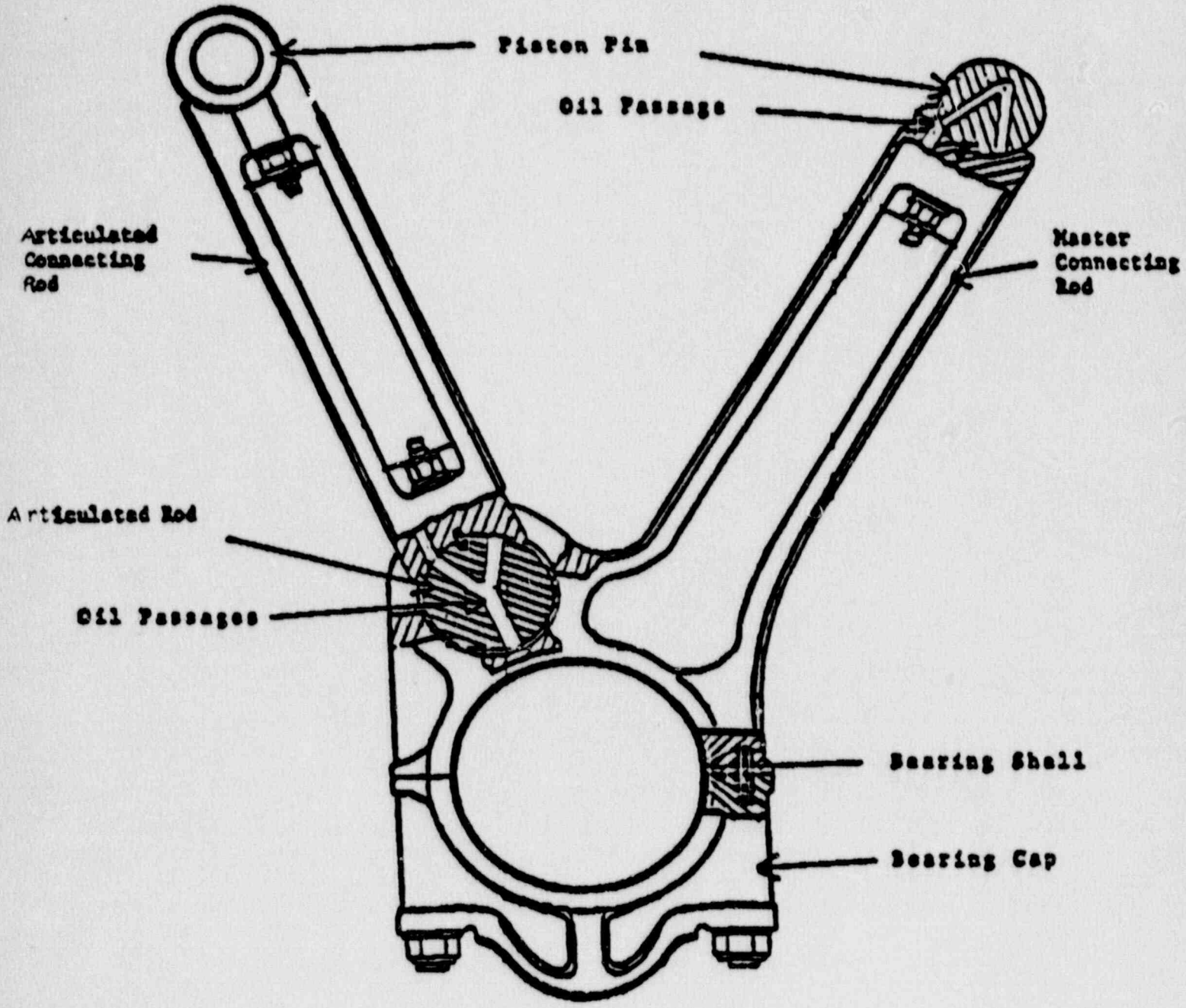
NUCLEAR PLANTS USING COOPER-BESSEMER DIESEL GENERATORS

BRAIDWOOD UNITS 1 & 2
BYRON UNITS 1 & 2
COOPER
NINE MILE POINT UNIT 2
PALO VERDE UNITS 1, 2, & 3
SOUTH TEXAS UNITS 1 & 2
SUSQUEHANNA UNITS 1 & 2
WATERFORD UNIT 3
ZION UNITS 1 & 2

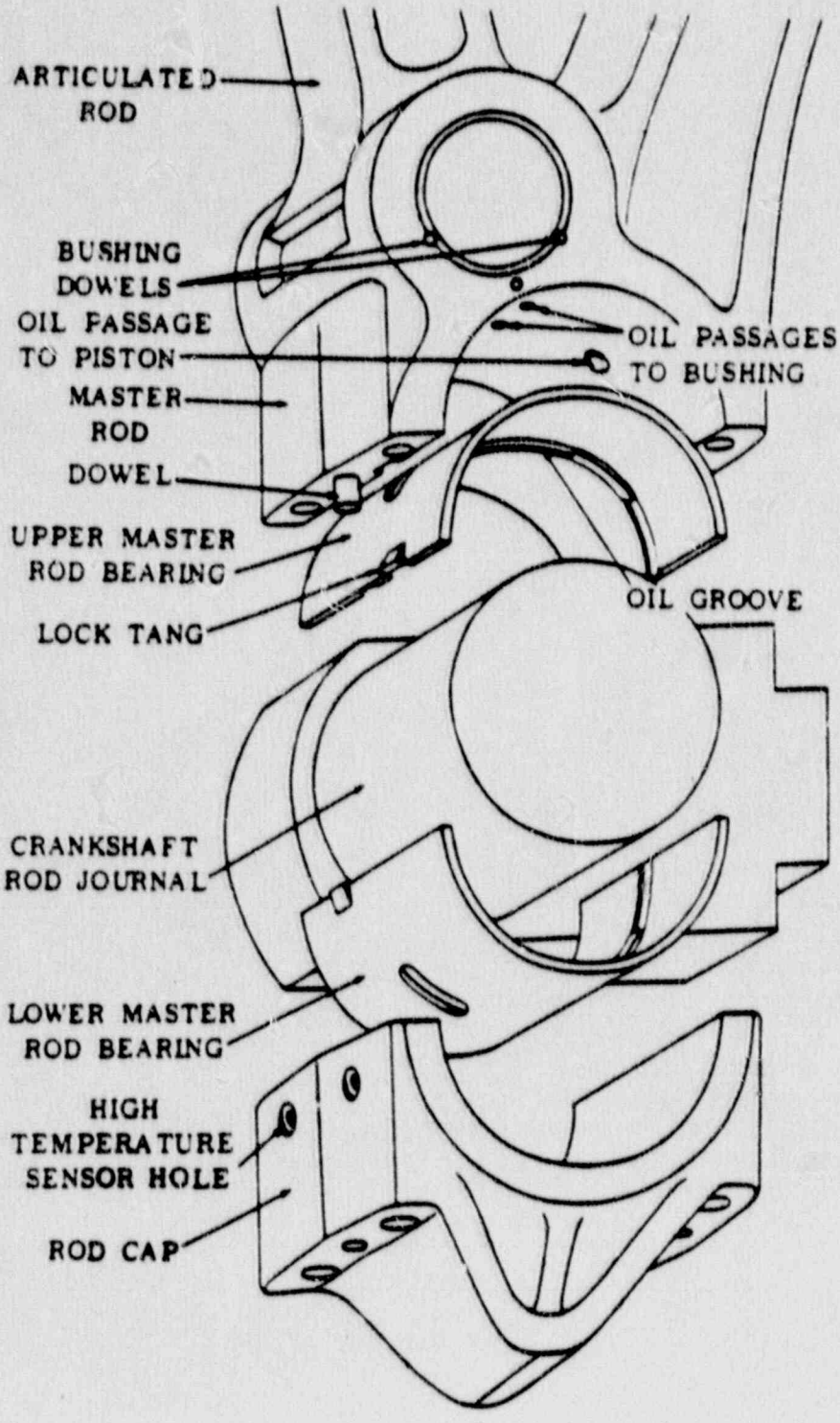


EMV Diesel Engine for Nuclear Power Plant Service

CONNECTING ROD



SOUTH TEXAS UNIT 2



Connecting Rod and Bearing

BRAIDWOOD UNIT 1

RCS LEAKAGE THROUGH RHR SUCTION RELIEF VALVE (AIT TO SITE)

DECEMBER 1, 1989

PROBLEM

68,000 GALLONS OF RCS WATER DISCHARGED THROUGH THE SUCTION RELIEF VALVE ON THE "B" TRAIN OF THE RHR SYSTEM TO THE RECYCLE HOLDUP TANKS.

CAUSE

THE RELIEF VALVE ON THE SUCTION OF THE "B" TRAIN OF THE RHR SYSTEM PREMATURELY OPENED AND FAILED TO RESEAT.

SAFETY SIGNIFICANCE

EVENT UNDERSCORES NEED FOR EOPs IN MODES OTHER THAN 1, 2, OR 3.

DISCUSSION

- o ON DECEMBER 1, 1989, AN ALERT WAS DECLARED AT BRAIDWOOD 1 DUE TO 68,000 GALLONS OF WATER HAVING DISCHARGED THROUGH THE RHR SUCTION RELIEF VALVE TO THE RECYCLE HOLDUP TANK.
- o PLANT CONDITIONS WERE AS FOLLOWS:
  - UNIT IN REFUELING OUTAGE SINCE SEPTEMBER 2, 1989.
  - LICENSEE HAD COMPLETED TESTING OF SI ACCUMULATOR CHECK VALVES IN PREPARATION FOR HEATUP.
  - PLANT WAS SOLID WITH RCS TEMPERATURE AND PRESSURE AT 175 DEGREES AND 350 PSI, RESPECTIVELY.
  - PRESSURIZER HEATERS ON.
  - "A" TRAIN OF RHR IN OPERATION WITH "B" TRAIN AVAILABLE.
  - "A" CHARGING PUMP BEING THROTTLED, LETDOWN INCREASED TO MAXIMUM IN PREPARATION FOR DRAWING A BUBBLE.
- o SEQUENCE OF EVENTS:
  - 1:42 AM CST, WHILE DRAWING A PRESSURIZER BUBBLE, RCS PRESSURE INCREASED TO 416 PSI WHEN A RAPID LOSS OF PRESSURIZER LEVEL OCCURRED WITH APPROXIMATELY 14,000 GALS OF WATER BEING RELIEVED TO THE RECYCLE HOLDUP TANK. RCS PRESSURE DROPPED FROM 416 PSI TO 272 PSI.

AIT: YES

CONTACT: N. FIELDS

SIGEVENT: YES

REFERENCES: 10 CFR 50.72 # 17235 (AND UPDATES), MORNING REPORTS OF 12/01 AND 12/04/89, AND PRELIMINARY NOTIFICATIONS PNO-III-89-78 AND PNO-III-89-78A

DISCUSSION (CONTINUED)

- 1:55 AM CST, "B" TRAIN OF RHR PLACED IN SERVICE AND "A" TRAIN WAS ISOLATED. LETDOWN WAS ISOLATED. CHARGING PUMP SUCTION SWITCHED FROM VCT TO RWST.
- 1:59 AM CST, SHUTDOWN ONE RCP BECAUSE OF SHAFT SEAL CONCERNS.
- 2:35 AM CST, WITH THE "A" CHARGING PUMP ALREADY RUNNING, THE "B" PUMP WAS STARTED. PRZ SURGE LINE TEMP DROPPED AND RCS PRESSURE INCREASED SLIGHTLY.
- 2:45 AM CST, STOPPED "B" CHARGING PUMP. FAILED TO REGAIN PRESSURIZER LEVEL.
- 2:53 AM CST, RESTARTED "B" CHARGING PUMP.
- 3:49 AM CST, RHR TRAIN "A" WAS RESTARTED AND TRAIN "B" WAS ISOLATED.
- 3:53 AM CST, PRESSURIZER LEVEL WAS RECOVERED IN A CONTROLLED MANNER. APPROXIMATELY 54,000 GALS OF WATER WERE PUMPED FROM THE RWST DURING THE EVENT.
- 5:06 AM CST, THE UNIT WAS STABILIZED AT 360 PSI AND 175 F.

o THE TRAIN "B" RHR SUCTION RELIEF VALVE WAS FOUND TO HAVE FAILED OPEN, CAUSE OF FAILURE UNDER INVESTIGATION.

o ABOUT 30 TO 50 GALLONS OF WATER WERE RELEASED TO THE AUX BUILDING VIA A LEAK ON THE RELIEF VALVE OF THE RAD WASTE EVAPORATOR LINE CONNECTED TO THE RHR RELIEF VALVE DISCHARGE HEADER. NO PERSONNEL WERE CONTAMINATED.

o THROUGHOUT THE EVENT, VESSEL LEVEL WAS MAINTAINED AT 100 PERCENT WITH THE CHARGING PUMPS. THERE WERE NO INDICATIONS OF VOIDING IN THE VESSEL.

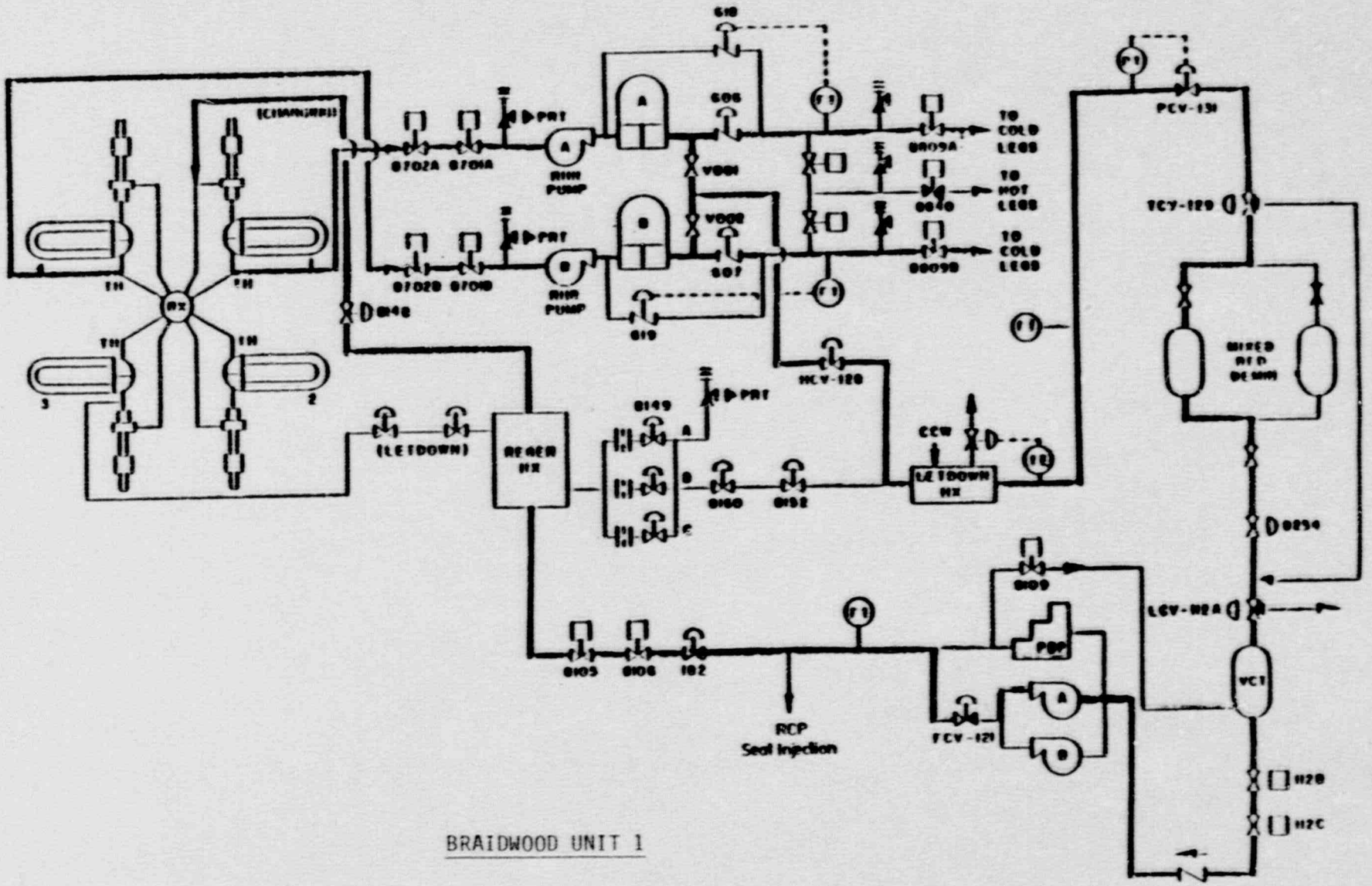
FOLLOWUP

o AN AIT WAS DISPATCHED TO THE SITE.

o A FIVE PERSON INPO INSPECTION TEAM WAS DISPATCHED TO THE SITE. INPO IS PREPARING AN SOER ON CROSBY VALVES FAILURES.

o REGIONAL AND HEADQUARTERS PERSONNEL ARE FOLLOWING LICENSEES' ACTION.

o A CROSBY VALVE AND GAGE COMPANY REPRESENTATIVE IS AT THE SITE.



BRAIDWOOD UNIT 1

ENCLOSURE 3

PERFORMANCE INDICATORS SIGNIFICANT EVENTS

PLANT NAME	EVENT DATE	EVENT DESCRIPTION	QTR SIGNIFICANCE
BRAIDWOOD 1	12/01/89	68,000 GALLONS OF RCS WATER LEAKED THROUGH THE SUCTION RELIEF VALVE ON THE "B" TRAIN OF THE RHR SYSTEM.	1 POTENTIAL FOR OR ACTUAL DEGRADATION OF CONTAINMENT OR SAFETY-RELATED EQUIPMENT.
PALISADES	11/21/89	A PRESSURIZER PORV (TARGET ROCK BRAND) OPENED WHEN THE BLOCK VALVE WAS OPENED. THE BLOCK VALVE COULD NOT BE CLOSED TO ISOLATE THE OPEN PORV. AIT TO SITE. ALSO MORNING REPORTS 11/24/89 AND 11/27/89.	1 POTENTIAL FOR OR ACTUAL DEGRADATION OF PRIMARY COOLANT PRESSURE BOUNDARY.

REACTOR SCRAM SUMMARY
WEEK ENDING 12/03/89

I. PLANT SPECIFIC DATA

DATE	SITE	UNIT	POWER	SIGNAL	CAUSE	COMPLI-CATIONS	YTD ABOVE 15%	YTD BELOW 15%	YTD TOTAL
11/29/89	THREE MILE ISLAND	1	100	A	EQUIPMENT	NO	1	0	1
12/01/89	RIVER BEND	1	97	A	EQUIPMENT	NO	2	1	3
12/01/89	NINE MILE POINT	2	97	A	EQUIPMENT	NO	5	1	6

II. COMPARISON OF WEEKLY STATISTICS WITH INDUSTRY AVERAGES

SCRAMS FOR WEEK ENDING
12/03/89

SCRAM CAUSE	POWER	NUMBER OF SCRAMS(5)	1989 WEEKLY AVERAGE YTD	1988 WEEKLY AVERAGE	1987 WEEKLY AVERAGE	1986 WEEKLY AVERAGE (3)(4)	1985 WEEKLY AVERAGE (8)(9)
** POWER >15%							
EQUIP. RELATED	>15%	3	2.9	3.1	3.9	4.3	5.4
PERS. RELATED(6)	>15%	0	1.0	1.0	1.3	1.8	2.0
OTHER(7)	>15%	0	0.1	0.5	1.2	0.4	0.6
** Subtotal **		3	4.0	4.6	6.4	6.5	8.0
** POWER <15%							
EQUIP. RELATED	<15%	0	0.4	0.5	1.2	1.4	1.3
PERS. RELATED	<15%	0	0.3	0.3	0.6	0.8	0.9
OTHER	<15%	0	0.0	0.1	0.3	0.2	0.2
** Subtotal **		0	0.7	0.9	2.1	2.4	2.4
*** Total ***		3	4.7	5.5	8.5	8.9	10.4

MANUAL VS AUTO SCRAMS

TYPE	NUMBER OF SCRAMS	1989 WEEKLY AVERAGE YTD	1988 WEEKLY AVERAGE	1987 WEEKLY AVERAGE	1986 WEEKLY AVERAGE	1985 WEEKLY AVERAGE
MANUAL SCRAMS	0	0.9	1.0	1.4	1.0	1.0
AUTOMATIC SCRAMS	3	3.8	4.5	7.0	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. THERE ARE 111 REACTORS HOLDING AN OPERATING LICENSE.

2. COMPLICATIONS: RECOVERY COMPLICATED BY EQUIPMENT FAILURES OR PERSONNEL ERRORS UNRELATED TO CAUSE OF SCRAM.

3. PERSONNEL RELATED PROBLEMS INCLUDE HUMAN ERROR, PROCEDURAL DEFICIENCIES, AND MANUAL STEAM GENERATOR LEVEL CONTROL PROBLEMS.

4. "OTHER" INCLUDES AUTOMATIC SCRAMS ATTRIBUTED TO ENVIRONMENTAL CAUSES (LIGHTNING), SYSTEM DESIGN, OR UNKNOWN CAUSE.