REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

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FACIL: 50-250 Turkey Point Plant, Unit 3, Florida Power and Light C 05000250
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RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 87-017-00: on 870528, 29 & 0603 normal & emergency boration flow paths were lost. Caused by damaged inboard mechanical seal on 4B boric acid transfer pumps. Mechanical seal repaired. W/870626 ltr.

DISTRIBUTION CODE: IE22D COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 6
TITLE: 50.73 Licensee Event Report (LER), Incident Rpt, etc.

NOTES:

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	AEOD/DSP/TPAB	1	1	DEDRO	1	1
	NRR/DEST/ADE	1	0	NRR/DEST/ADS	1	0
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	NRR/PMAS/PTSB	1	1	REG FILE 02	1	1
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EXTERNAL:	EG&G GROH, M	5	5	H ST LOBBY WARD	1	1
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NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Turkey Point Unit 3	0 5 0 0 0 2 5 0	1 OF 0 5

TITLE (4) Loss of Boric Acid Flowpath Due to Failed Mechanical Seal Which Allowed Nitrogen to Enter and Bind Up the Pumps

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
0 5	2 8	8 7	8 7	— 0 1 7	— 0 0	0 6	2 9	8 7	Turkey Point Unit 4	0 5 0 0 0 2 5 1
										0 5 0 0 0

OPERATING MODE (9)	6	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	0 0 0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
Randall D. Hart, Licensing Engineer	3 0 5 — 2 4 6 - 6 5 5 9

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
X	C B	S E A L	D 2 7 2	N					

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On May 28, 1987, the normal and emergency boration flow paths were lost on Unit 4 which exceeded the requirements of Technical Specification (TS) 3.6.a. An alternate flow path was established later and trouble-shooting was commenced on the initial problem. On May 29, 1987, the normal and emergency boration flow paths for Unit 3 were lost. At this time CORE ALTERATIONS were halted on Unit 3 until a boration flow path was re-established within 5 hours. Trouble shooting of the problem was begun and additional attempts were made on June 1 and 2 to establish a boric acid flow path from the Unit 4 BATPs which were unsuccessful. On June 3, 1987, the normal and emergency boration flow paths were again lost on Unit 3. An investigation into the cause of these events discovered that a mechnical seal was damaged on the 4B boric acid transfer pump which allowed a nitrogen cover gas on the cooling water for the seal to enter the pump causing it to be gas bound. The Unit 3 and Unit 4 boric acid systems were cross-tied during these events which allowed the nitrogen from Unit 4 to enter the Unit 3 pumps. The 4B pump was isolated and the mechanical seal was repaired. Administrative controls were established to isolate the nitrogen supply and regulate its use. A training brief has been issued describing this event and the procedure changes that have resulted.

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Turkey Point Unit 3	0 5 0 0 0 2 5 0	8 7	— 0 1 7	— 0 0	0 2 OF 0 5

TEXT (If more space is required, use additional NRC Form 366A's) (17)

EVENT:

On May 28, 1987, while unit 4 was in mode 5 (cold shutdown), the normal and emergency boric acid flow path required by Technical Specification (TS) 3.6.a were lost. At 2100, an attempt was made to add water to the Unit 4 volume control tank (VCT) from the 4A and 4B boric acid transfer pumps (BATPs) through the normal and emergency flow paths. The operators did not obtain any flow indication and attempted to obtain flow from the refueling water storage tank (RWST), but this was not successful either. At this time the 3B BATP was operable and aligned to Unit 3. The boric acid system is designed such that both unit's BATPs can be aligned to either unit. At 2208, the 3B BATP was also aligned to Unit 4 and a flow path for boron injection was verified to unit 4. A charging pump was vented and a flow path from the RWST was verified. The 4A and 4B BATPs were declared out of service and plant work orders were written to have them repaired.

At 0145 on May 29, 1987, Operations attempted to add borated water to the reactor coolant system (RCS), but they were unable to obtain any flow. At this time the 3B BATP had been aligned to the C boric acid storage tank (BAST). This had been done during trouble shooting of the earlier problems on the 4A and 4B BATPs. These pumps had been aligned to the C BAST when they had developed flow problems. The 3B BATP was realigned to the B BAST, however, no indication of flow could be obtained. At 0230, CORE ALTERATIONS were halted on Unit 3. At 0535, a boration flow path was established for unit 3 from the 3B BATP. At this time, it was thought that a loss of suction occurred to the 3B BATP because it was aligned to the C BAST. PWO's were written to the mechanical and electrical maintenance departments to check heat tracing circuits and possible flow path blockage on the C BAST outlet line.

At 0330 on June 1, 1987, Operations attempted to establish boric acid flow to Unit 4 from the 4A and 4B BATPs but was unsuccessful. A boration flow path from the Unit 4 RWST was verified via control valve (CV) CV-4-115B. A boric acid flow path for Unit 3 was verified from the B BAST via the 3B BATP. Trouble shooting of heat tracing circuits continued. As a result of this trouble shooting, at 0130 on June 2, 1987, the 4A BATP suction was aligned to the batch tank and the pump discharge to the C BAST but the Operators were not able to obtain any flow. Then the 4B BATP suction was aligned to the batch tank and the pump discharge to the C BAST but again not flow was obtained. Trouble shooting was continued.

At 0158 on June 3, 1987, Operations attempted to establish a boric acid flow path with the 4B BATP from the C BAST but were unable to obtain flow. At 0215, an attempt was made to obtain boric acid flow with the 4A BATP from the B BAST but again no flow was obtained. This flow path was attempted again at 0315 but again no flow was obtained. At 0505, Operations attempted to verify the boric acid flow path for Unit 3 and again could not establish flow. At 0600, the primary water source was isolated on a clearance to the plant supervisor - nuclear (PSN). An event response team (ERT) was formed to evaluate the root cause and provide for corrective actions.

The ERT determined that the mechanical seal on the 4B BATP could be damaged. This would drain the water from the seal tank and allow the nitrogen cover gas to enter into the system and bind the pumps. Based on this the cross-tie valve was closed, the 3B BATP was vented and a boric acid flow path was established for Unit 3 at 0940 on June 3, 1987. The 4B BATP was isolated, the 4A BATP was vented and the normal boric acid flow path was established for Unit 4 at 1030 on June 3, 1987.

CAUSE OF EVENT:

The BATPs' mechanical seal design utilizes a tank of primary water that is pressurized for cooling requirements. A 40 psig supply of nitrogen is constantly applied to the tank. The level of cooling water can be checked by a "bullet" type sight glass. The investigation by the ERT determined that a damaged inboard mechanical seal on the 4B BATP resulted in a loss of seal water in the tank. As the water drained into the pump, the pressurized nitrogen supply entered the 4B BATP casing and into the boric acid system. This resulted in gas binding the Unit 4 BATPs. Also when the Unit 3 BATPs suction line was cross-connected to the Unit 4 BATPs through a normally closed cross-tie valve, the nitrogen entered the Unit 3 BATPs and gas bound these pumps.

ANALYSIS OF EVENT:

During this event, Unit 3 was in mode 6 and Unit 4 was in mode 5. A review of the Final Safety Analysis Report (FSAR) indicates that the accidents analyzed for in these conditions do not take credit for boron injection. The analysis for the boron dilution event during refueling assumes that the minimum boron concentration is 1950 ppm. The analysis assumes that the operator has prompt and definite indication of any boron dilution from the audible count rate instrumentation. Assuming the 1950 ppm concentration and a maximum dilution rate, it would take approximately 2 hours to reach the boron concentration that is required to make the reactor critical. This is ample time for the operator to recognize the high count rate signal and isolate the primary water makeup source by closing valves.

During this time period, the RCS boron concentration for Unit 3 was maintained greater than or equal to 2250 ppm which satisfied the requirements of TS 3.10.8 of maintaining the reactor at least 10% shutdown. The boron concentration for Unit 4 was maintained greater than or equal to 1550 ppm which satistied the requirements for a unit in cold shutdown of maintaining the reactor 1% shutdown as specified in TS Table 1.1, Operational Modes. In addition, the control rod drive system for both units was not capable of rod movement, so the accidents analyzed for this system were not applicable. Based on the above, the health and safety of the public were not affected.

CORRECTIVE ACTIONS:

1) The mechanical seal for the 4B BATP was inspected and repaired as necessary.

7) An event response team was formed to review the sequence of events to assist in identifying the root cause and propose appropriate corrective actions. The following are some of the corrective actions identified:

a) A request for engineering assistance will be generated to review the existing seal design to identify possible alternative seal designs or enhancements to the existing design.

b) The Training Department will be requested to review this event for appropriate training requirements and methods.

c) The Procedure Upgrade Group is developing guidance for a loss of boric acid flow and defining additional boric acid flow path valve alignments. This guidance will be incorporated into apropriate procedural requirements.

d) Additional guidance for Operations is being developed to clarify the requirements to be met during off normal conditions.

8) The safety injection pumps, the containment spray pumps, and the BATPs for both units will be tested for operability prior to the start up of either unit.

9) The results of this event response team will be provided to a team investigating charging pump and volume control tank problems to determine if the nitrogen in-leakage from the BATPs contributed to these problems.

ADDITIONAL DETAILS:

The BATPs are manfuctured by Goulds, Inc., model number 3196-ST-8. The mechanical seals are manufactured by Durametallic. The mechanical seal cooling design was done by our Power Plant Engineering Department in conjuction with Durametallic.

Similar occurrences: LER 251-79-011

2) The following procedures were revised to isolate the constant nitrogen supply and provide instructions for maintaining the proper nitrogen pressure based on the new configuration.

a) Operating surveillance procedure (OSP) 0-OSP-201.2, SNPO Daily Logs, was revised to direct the operators to off normal operating procedure (ONOP) 2608.2, CVCS-Malfunction Of Boron Concentration Control System, if the nitrogen pressure drops below 35 psig.

b) Administrative procedure (ADM) 0-ADM-205, Administrative Control of Valves, Locks and Switches, was revised to require the BATP seal tank nitrogen supply valves to be locked closed.

c) Operating procedure (OP) 0-OP-065.3, Nitrogen Gas Supply System, was revised to require the outlet isolation valves of the BATPs seal tank nitrogen regulator to be normally closed and the inlet isolation valves to be locked closed.

d) ONOP 2608.2 was revised to define the action to be taken if the acceptance criteria stated in 0-OSP-201.2 is not met.

3) Training brief 201 was issued to describe to the operators the sequence of events, the significance of what happened and the procedure changes described in corrective action 2 above.

4) The Safety Engineering Group has reviewed IE Information Notice 82-19, Loss of High Head Safety Injection Emergency Boration and Reactor Coolant Makeup Capability, for applicability at Turkey Point. Their review has indicated that gas intrusion into the charging system can only come from the BATP seal pot. Since the nitrogen supply is being administratively controlled to avoid unmonitored supply to the seal pot and a training brief on the concern has been issued, this item can be closed from review at Turkey Point. This response is currently under closure review per site administrative procedures.

5) A non-conformance report (NCR), NCR 87-157, has been issued to request Power Plant Engineering to evaluate and disposition the drawing changes necessary as a result of the procedure changes described in corrective action 2 above.

6) An inspection was conducted to determine if any of the nitrogen could have made its way into the safety injection and containment spray pumps for both units. The results indicated that the samples tested were similar to a test sample of air and that there was only a small amount of air present in the pumps.

P. O. BOX [illegible], JUNO BEACH, FL 33408

FLORIDA POWER & LIGHT COMPANY

JUNE 26 1987
L-87-271
10 CFR 50.73

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Gentlemen:

Re: Turkey Point Unit 3
Docket No. 50-250
Reportable Event: 87-17
Date of Event: May 28, 1987
Loss of Boric Acid Flowpath Due to Failed Mechanical Seal
Which Allowed Nitrogen to Enter and Bind Up the Pumps

The attached Licensee Event Report is being submitted pursuant to the requirements of 10 CFR 50.73 to provide notification of the subject event.

Very truly yours,

D. M. Paduano Jr.
for C. O. Woody
Group Vice President
Nuclear Energy

COW/SDF/gp

Attachment

cc: Dr. J. Nelson Grace, Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point Plant

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