REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 8802160247 DOC. DATE: 88/02/10 NOTARIZED: NO DOCKET #
FACIL: 50-251 Turkey Point Plant, Unit 4, Florida Power and Light C 0500025
AUTH. NAME AUTHOR AFFILIATION
HART, R. D Florida Power & Light Co.
WOODY, C. O. Florida Power & Light Co.
RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 87-028-01: on 871218, unit shutdown commenced when two intake cooling water pumps declared inoperable. Caused by broken shaft coupling & packing box bearing failure. Broken shaft coupling replaced & pump returned to svc. W/880210 ltr.

DISTRIBUTION CODE: IE22D COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 5
TITLE: 50.73 Licensee Event Report (LER), Incident Rpt, etc.

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD2-2 LA	1	1	PD2-2 PD	1	1
	EDISON, G	1	1			
INTERNAL:	ACRS MICHELSON	1	1	ACRS MOELLER	2	2
	AEOD/DOA	1	1	AEOD/DSP/NAS	1	1
	AEOD/DSP/ROAB	2	2	AEOD/DSP/TPAB	1	1
	ARM/DCTS/DAB	1	1	DEDRO	1	1
	NRR/DEST/ADS	1	0	NRR/DEST/CEB	1	1
	NRR/DEST/ELB	1	1	NRR/DEST/ICSB	1	1
	NRR/DEST/MEB	1	1	NRR/DEST/MTB	1	1
	NRR/DEST/PSB	1	1	NRR/DEST/RSB	1	1
	NRR/DEST/SGB	1	1	NRR/DLPQ/HFB	1	1
	NRR/DLPQ/GAB	1	1	NRR/DOEA/EAB	1	1
	NRR/DREP/RAB	1	1	NRR/DREP/RPB	2	2
	NRR/DRIS/SIB	1	1	NRR/PMAS/ILRB	1	1
	REG FILE 02	1	1	RES TELFORD, J	1	1
	RES/DE/EIB	1	1	RES/DRPS DIR	1	1
	RGN2 FILE 01	1	1			
EXTERNAL:	EG&G GROH, M	5	5	FORD BLDG HOY, A	1	1
	H ST LOBBY WARD	1	1	LPDR	1	1
	NRC PDR	1	1	NSIC HARRIS, J	1	1
	NSIC MAYS, G	1	1			

TOTAL NUMBER OF COPIES REQUIRED: LTTR 46 ENCL 45

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 4	0 5 0 0 0 2 5 1	1 OF 0 4

TITLE (4) Unit Shutdown Commenced When Two Intake Cooling Water Pumps Were Declared Inoperable Due to a Broken Shaft Coupling and a Packing Box Bearing Failure

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)
									NA	0 5 0 0 0
1 2	1 8	8 7	8 7	0 2 8	0 1	0 2	1 0	8 8	NA	0 5 0 0 0

OPERATING MODE (9)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)									
1	20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)			
POWER LEVEL (10) 1 0 0	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 O. 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	B I	C P L G	J 1 0 5	Y							
X	B I	P	J 1 0 5	Y							

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 December 18, 1987, while Unit 4 was at 100% power, two intake cooling water (ICW) pumps were declared out of service which exceeded the limits of technical specification (TS) 3.4.5. On December 18, 1987 the annunciator for ICW low pressure alarmed. The operators noticed that the 4C ICW pump was indicating low amps. An immediate attempt was made to start the 4B ICW pump but the pump would not operate. Another attempt was made to start the 4B ICW pump with the 4C ICW pump isolated but this was unsuccessful. Both pumps were declared out of service. TS 3.4.5 requires three (3) ICW pumps to be operable in mode 1 and the ACTION statement only allows one (1) ICW pump to be inoperable for up to 24 hours. Therefore, 2 ICW pumps out of service exceeds the requirements of TS 3.4.5 requiring the unit to be shutdown and placed in hot standby within 7 hours. A shutdown of Unit 4 was commenced and an unusual event was declared in accordance with the applicable Turkey Point emergency procedures. An event response team was formed to determine root cause of the failures and provide corrective actions. At this time discretionary enforcement was requested and granted by NRC Region II to allow 24 hours of operation to repair both pumps. Both pumps were repaired and returned to service before the end of the 24 hour period.

IE22 1/1

NRC Form 366

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Turkey Point Unit 4	0 5 0 0 0 2 5 1	8 7	— 0 2 8	— 0 1	0 2 OF 0 4

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

EVENT:

On December 18, 1987, while Unit 4 was at 100% power, two intake cooling water (ICW) (EIIS:BI) pumps were declared out of service which exceeded the limits of technical specification (TS) 3.4.5. At 1535 on December 18, 1987 the annunciator for ICW low pressure alarmed. The operators noticed that the 4C ICW pump was indicating low amps. An immediate attempt was made to start the 4B ICW pump but the amperage indication was erratic so the pump was stopped. Another attempt was made to start the 4B ICW pump with the 4C ICW pump isolated but this was unsuccessful. Both pumps were declared out of service. TS 3.4.5 requires three (3) ICW pumps to be operable in mode 1 and the ACTION statement only allows one (1) ICW pump to be inoperable for up to 24 hours. Therefore, 2 ICW pumps out of service exceeds the requirements of TS 3.4.5 requiring the unit to be shutdown and placed in hot standby within 7 hours. At 1633 a shutdown of Unit 4 was commenced and an unusual event was declared in accordance with the applicable Turkey Point emergency procedures. The appropriate notifications were made. An event response team (ERT) was formed to determine root cause of the failures and provide interim and long term corrective actions.

At this time the NRC was contacted regarding the application of discretionary enforcement for the situation.

One difficulty in the operability determination is the current custom TS for the ICW system. The ICW system at Turkey Point consists of 3 pumps that can feed two ICW headers. The 4A ICW pump is powered from the 4A 4160 volt safety related bus (EIIS:EB). The 4B and 4C ICW pumps are powered from the 4B 4160 volt safety related bus. At that time both the A and B emergency diesel generators (EDGs) (EIIS:EK) were operable and capable of supplying reliable onsite emergency power to their respective busses.

The current TS do not describe operability for the ICW system, based on electrical trains. The standard Technical Specifications (STS), including the FPL submitted version under the Performance Enhancement Program (PEP), would allow 72 hours of operation in this condition. Based on this and the fact that the failures of the 4C ICW pump (broken shaft coupling) and the 4B ICW pump (stuffing box bearing bound to shaft) were not common mode, and the 4A ICW pump was operable and had an improved coupling material, a 24 hour extension of operation was requested from and granted by Region II to allow repair of both pumps before completion of a unit shutdown. The unit shutdown was stopped at 2044 with the reactor at approximately 55% power. The broken coupling was replaced on the 4C ICW pump and the pump satisfactorily tested at 0248 on December 19, 1987. The 4B ICW pump was replaced with the spare pump and satisfactorily tested at 1505 on December 19, 1987 ending the 24 hour LCO.

CAUSE OF EVENT:

The cause of the 4C ICW pump being out of service was a broken lower headshaft coupling. This coupling connects the lower head shaft to the line shaft. An investigation into the coupling material determined that this material was 17-4 PH (ASTM A564 Gr.630). This coupling material was the original used for the ICW pumps at Turkey Point. The couplings with this material have had random previous failures at Turkey Point. The previous coupling failures have been evaluated and the metallurgical analysis indates a prevailing root cause of marginal coupling material relative to its application in a corrosive medium (salt water). Our engineering department had recommended replacing these couplings with an improved material less susceptible to this type of failure. This replacement has been ongoing as pumps are rebuilt and at the time of the failure the 4C and 3A ICW pumps still had the old coupling material.

An investigation into the cause of the failure of the 4B ICW pump revealed that the packing box bearing had fused to the shaft. The exact root cause of the bearing failure could not be positively determined. Also, the pump had recently been purchased by the manufacturer and the manufacturer had no quantitative records on bearing clearance. However, the ERT has determined that the most likely root cause was improper bearing to shaft interface clearance.

ANALYSIS OF EVENT:

During the time that both the 4B and 4C ICW pumps were out of service, ICW pump 4A was operable along with the A EDG. In addition the 4A ICW pump had couplings made out of the improved material less susceptible to this type of failure. Final Safety Analysis Report section 9.6.4 requires only one ICW pump and one loop header to be operable to meet design bases requirements. Based on the above, the health and safety of the public were not affected.

CORRECTIVE ACTIONS:

1) A diver was sent to inspect the 4B and 4C ICW pump wells and could find no evidence of any obstruction that would have prevented rotation of either pump.

2) The broken shaft coupling on the 4C ICW pump was replaced with the improved coupling material and the pump was satisfactorily tested and placed back in service. The remaining 3 couplings of the old material will be replaced upon availability of a spare ICW pump.

3) The 4B ICW pump was replaced with the spare ICW pump and satisfactorily tested and placed back in service.

4) The ICW pump removed from the 4B well was rebuilt with the stuffing box from the 3A ICW pump and replaced in the 3A ICW pump well. The old 3A ICW pump with the couplings made with the 17-4 PH material is currently being overhauled and upon completion will be used to replace the 4C ICW pump.

5) An event response team was formed to evaluate the root cause and recommend corrective actions. In addition to the repairs recommended for the 4C and 4B ICW pumps the following corrective actions are in progress:

a) Ensure that future purchase orders for new or rebuilt ICW pumps require quantitative records be maintained on all fits and clearances measured during assembly.

b) Review manufacturer's recommendations for ICW pump material enhancements and procedures for pump repair and overhaul of ICW pumps.

c) Investigate possible enhancements of the ICW pump coupling design.

ADDITIONAL DETAILS:

The ICW pumps used at Turkey Point are manufactured by the Johnston Pump Company, type 33CMC.

Similar occurrences: LER 251-87-004 reported an event where 2 ICW pumps were also out of service at the same time. One ICW pump was out of service due to a failed pump shaft coupling similar to the one described in this LER and the other pump was out of service due to maintenance being performed on the discharge check valve.

P. O. BOX 14000, JUNO BEACH, FL 33408-0420

FPL

FEBRUARY 10 1988

L-88-60
10 CFR 50.73

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

Gentlemen:

Re: Turkey Point Unit 4
Docket No. 50-251
Reportable Event: 87-28 Revision 1
Date of Event: December 18, 1987
Unit Shutdown Commenced When Two Intake
Cooling Water Pumps Were Declared Inoperable
Due to a Broken Shaft Coupling and a Frozen Bushing

The attached Licensee Event Report (LER) Revision is being submitted to correct an inadvertent mislabeling of the pumps in the event section and to complete missing NPRDS manufacturer information.

Very truly yours,

C. O. Woody
Executive Vice President

COW/SDF/gp

Attachment

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

SDF/018.LER

IE22
1/1