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FACIL:50-251 Turkey Point Plant, Unit 4, Florida Power and Light C 05000251
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SUBJECT: LER 89-006-01:on 890713,degraded intake cooling water flow condition to CCW HXs & unit shutdown required by TS.
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DEC 18 1989

L-89-454
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: 89-06-01
Date of Event: July 13, 1989
Degraded Intake Cooling Water Flow Condition to Component Cooling Water Heat Exchangers and Unit Shutdown Required by Technical Specifications due to Valve Failure

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

Very truly yours,

K. N. Harris
Vice President
Turkey Point Plant Nuclear

KNH/DRP/DWH/rat

attachment

cc: Stewart D. Ebneter, Regional Administrator,
Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point Plant

IE22
1/1

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)
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TITLE (4) Degraded Intake Cooling Water Flow Condition To Component Cooling Water Heat Exchangers and Unit Shutdown Required By Technical Specifications Due to Valve 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)
										0 5 0 0 0
0 7	1 3	8 9	8 9	- 0 0 6	- 0 1	1 2	1 8	8 9		0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	0 2 5	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	X 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
David R. Powell, Regulation and Compliance Supervisor	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	I S V	P 3 4 0	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 July 13, 1989, Intake Cooling Water (ICW) flow to the Unit 4 Component Cooling Water (CCW) heat exchangers degraded to below the design basis flow rate for fifteen minutes while backwashing the 4A ICW/CCW basket strainer. ICW flow was restored within five minutes of recognizing the degraded flow condition. On July 15, 1989, the same condition occurred but ICW flow was maintained above the design basis flow. On July 16, 1989, the 4B ICW header was taken out of service for investigation. The cause of these conditions was initially believed to be clogging of the 4B ICW/CCW basket strainer and/or a malfunction of its differential pressure gauge. Subsequent evaluation indicated flow obstruction in or around 4B ICW header isolation valve 4-50-308. Due to the frequency of cleaning ICW/CCW basket strainers, a management decision was made not to continue power operations with only one header of ICW operable. Unit 4 was placed in Mode 3 on July 17, 1989. Upon disassembly of valve 4-50-308, the valve disc was found to be in the partially opened position and separated from the valve stem. The failure mechanism of the upper two valve taper pins was fatigue. Valve 4-50-308 was replaced and the 4B ICW header was returned to service on July 20, 1989. The initial degraded ICW flow condition did not affect any other plant equipment.

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

Description of the Event

At 1625 on July 13, 1989, with Unit 4 in Mode 1 at 25% power, the 4A Intake Cooling Water (ICW)/Component Cooling Water (CCW) basket strainer (EIIS system BI, component: BSKT) was taken out of service for cleaning. (See simplified drawing of the ICW system attached.) At 1635 the Nuclear Operator observed a degraded flow condition on the CCW heat exchangers (EIIS System: CC, component: HX) and immediately notified the Control Room operator. The Nuclear Operator was instructed to valve the 4A ICW/CCW basket strainer back in service. At 1640, ICW flow was restored to the CCW heat exchangers. The Operations personnel believed the source of reduced ICW flow to the CCW heat exchangers to be clogging of the 4B ICW/CCW basket strainer. Between 1725 and 2125 the 4B ICW/CCW basket strainer was out of service for cleaning. The basket strainer was found to be more clogged than normal.

At approximately 2200 on July 14, 1989 the onsite Technical Department was directed to perform an evaluation of the ICW degraded flow condition. At 0800, on July 15, 1989, the Technical Department system engineer notified Operations Department personnel that an analysis of the degraded ICW flow condition on July 13, 1989 revealed that the ICW flow to the CCW heat exchangers was below the design basis flow rate from 1625 to 1640 on July 13, 1989.

At 1824 on July 15, 1989, an attempt was made to valve out the 4A ICW/CCW basket strainer for cleaning when ICW flow to the CCW heat exchangers decreased. The strainer was returned to a normal alignment while ICW flow was maintained above 15,400 gpm. Since the 4B ICW/CCW basket strainer had previously been cleaned and showed a differential pressure decrease to approximately 1.0 psid, Operations personnel suspected the strainer to be clogged and the differential pressure gauge to be in error.

At 1425 on July 16, 1989, with Unit 4 in Mode 1 at 100% power, the 4B ICW/CCW basket strainer was taken out of service in accordance with Technical Specification 3.4.5.b.1 for cleaning and to inspect for obstructions. The inspection showed no significant blockage. Subsequent evaluation of the degraded ICW flow condition by the System Engineer indicated probable flow restriction in or around 4B ICW header isolation valve 4-50-308.

Due to the frequency of cleaning ICW/CCW basket strainers, a management decision was made not to continue operation with only one header of ICW operable. Therefore, at 0325 on July 17, 1989, a Unit 4 shutdown was initiated and at 0607 Unit 4 was placed in Mode 3 (hot standby).

Examination and repair of the 4-50-308 valve required isolation of the 4B ICW header. Although no degraded flow conditions were indicated for the 4A ICW/CCW basket strainer, to ensure the maximum flow capability, FPL determined that backwash of the 4A ICW/CCW basket strainer was prudent. However, with the 4B ICW header at reduced flow (approximately 8200 gpm) and therefore, technically inoperable, NRC approval was required to isolate the 4A ICW/CCW basket strainer.

On July 18, 1989, the NRC approved a discretionary enforcement for a period of time not to exceed one hour to perform the requested backwash of the 4A ICW/CCW basket strainer. This operation took place between 2000 and 2100 on July 18, 1989.

Valve 4-50-308 was replaced and the 4B ICW header was returned to service at 1900 on July 20, 1989. Technical Specification Action Statement time requirements associated with the 4B ICW header low flow condition were met.

Cause of the Event

The cause of the degraded ICW flow to the CCW heat exchangers was due to failure of 4B ICW header isolation valve 4-50-308. Upon disassembly, the valve disc was found to be in the partially opened position and separated from the valve stem. Two tapered pins, connecting the disc to the valve upper stem, failed in the threaded region. A metallurgical analysis performed by FPL Nuclear Services concluded that the mechanism of failure was fatigue. The fatigue failure was most likely caused by cyclic loading from oscillation of the valve disc when normally open, combined with the pins working loose.

Analysis of the Event

The minimum required total flow to the CCW heat exchangers during power operation was less than the design basis flow from 1625 to 1640 on July 13, 1989. During this time, the CCW heat exchanger outlet temperature reached a maximum recorded value of approximately 109 degrees F.

The limiting components in the CCW system from the perspective of operating CCW temperatures are the Reactor Coolant Pumps seals. Based on this limitation, the CCW heat exchanger outlet temperature may exceed 105 degrees F up to 125 degrees F for a maximum period of 2 hours. Since the CCW heat exchanger outlet temperature reached a maximum recorded value of approximately 109 degrees F during the 15 minutes of degraded ICW flow, it may be concluded that this condition had no significant affect on plant equipment.

The degraded ICW flow to the CCW heat exchangers occurred during the backwashing of the 4A ICW/CCW basket strainer. Within 5 minutes of recognizing the degraded ICW flow condition, total ICW flow to the CCW heat exchangers was restored to above 15,400 gpm. Had a Design Basis Accident occurred during this time, ICW flow to the CCW heat exchangers could have been restored in time to accomodate the heat loads generated by a Large Break Loss of Coolant Accident.

During the time the 4B ICW header was out of service to repair valve 4-50-308, ICW total flow to the CCW heat exchangers was maintained above that required to mitigate the consequences of a Design Basis Accident.

The installed valve is a Model XR-70 36" manual butterfly valve supplied by the Henry Pratt Company. The replacement valve is a Model R1A 36" manual butterfly valve supplied by the Henry Pratt Company. FPL Engineering has determined that the R1A valves have several design differences, including a centered instead of

an offset stem, which would result in different loads on the taper pins. Based on this and many years of service without taper pin failures, the Model R1A valves in the ICW system are not suspect of being subject to the fatigue failure experienced on the Model XR-70 valve. The Model R1A 36" manual butterfly valve is used in the Unit 3 ICW system. Three Model XR-70 36" manual butterfly valves remain in the Unit 4 ICW system.

Corrective Actions

1) Caution statements have been added to procedures 3/4-OP-019, "Intake Cooling Water System," for operators to ensure that total ICW flow to the CCW heat exchangers does not drop below 15,400 gpm while valving an ICW/CCW basket strainer out of service for backwashing.

2) While valve 4-50-308 was removed from the 4B ICW header, a "crawl through" inspection was conducted to ensure removal of any obstructions to the 4B ICW/CCW basket strainer.

3) Valve 4-50-308 was replaced. After ensuring valve integrity and operability, the 4B ICW header was returned to service.

4) A disc/stem tapered pin from the 4-50-308 valve was recovered from the 4B ICW header. A metallurgical analysis performed by FPL Nuclear Services concluded that the mechanism of failure was fatigue. The fatigue failure was most likely caused by cyclic loading from oscillation of the valve disc when normally open, combined with the pins working loose.

5) A valve throttling test will be performed on valves 4-50-307, 309 and 310. The test will determine whether or not a throttled valve position will stop the oscillations. Elimination of the oscillations is also expected to reduce the possibility of the taper pins loosening. This test should be performed by January 15, 1990.

6) If the valve throttling test is successful in reducing oscillations, FPL Nuclear Engineering will evaluate the effect on ICW system flow with the valves throttled. If acceptable, a Design Equivalent Engineering Package (DEEP) will be issued. This action should be complete by February 15, 1990.

7) FPL Nuclear Engineering is pursuing design details for modifying the Model XR-70 36" manual butterfly valves such that the taper pins would be prevented from working loose. (The same modification will be considered for Model XR-70 30" manual butterfly valves installed in the Units 3 and 4 ICW system.) FPL Nuclear Engineering will issue a schedule for this task by January 10, 1990.

8) FPL Nuclear Engineering will issue a test request to inspect the Model XR-70 30" manual butterfly valves installed in the Unit 3 ICW system during the 1990 refueling outage for evidence of loosened taper pins. This request will be issued by December 15, 1989. The need to inspect the Model XR-70 30" manual butterfly valves installed in the Unit 4 ICW system will be based on the results of the Unit 3 inspection.

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

Additional Information

No similar Licensee Event Reports have been reported.