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 RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 90-003-00:on 900220,spent fuel pool cooling pump 3B
 shaft failure resulted in damage to pump shaft mechanical.
 W/9 ltr.

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MAR 21 1990

L-90-113
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: 90-03
Date of Event: February 20, 1990
Spent Fuel Pool (SFP) Cooling Pump 3B Shaft Failure Resulted
in Damage to the Pump Shaft Mechanical Seal and Release of
Borated Contaminated Water to the SFP Building

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,


K. N. Harris
Vice President
Turkey Point Plant Nuclear

KNH/DRP/DWH/rat

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

9003280411 900321
PDR ADCK 05000250
S PNC



LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Turkey Point Unit 3										DOCKET NUMBER (2) 0 5 0 0 0 2 5 0					PAGE (3) 1 OF 0 4	
TITLE (4) Spent Fuel Pool Cooling Pump 3B Shaft Failure Resulted In Damage To The Pump Shaft Mechanical Seal and Release Of Borated Contaminated Water To The SFP Building																
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 NA				DOCKET NUMBER(S) 0 5 0 0 0			
0 2	2 0	9 0	9 0	0 0 3	0 0	0 3	2 1	9 0					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)														
6		20.402(b)				20.406(e)				60.73(a)(2)(iv)				73.71(b)		
POWER LEVEL (10)		20.406(a)(1)(i)				60.36(e)(1)				60.73(a)(2)(v)				73.71(c)		
0 1 0 0		20.406(a)(1)(ii)				60.36(e)(2)				60.73(a)(2)(vi)				<input checked="" type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 306A)		
		20.406(a)(1)(iii)				60.73(a)(2)(i)				60.73(a)(2)(viii)(A)						
		20.406(a)(1)(iv)				60.73(a)(2)(ii)				60.73(a)(2)(viii)(B)						
		20.406(a)(1)(v)				60.73(a)(2)(iii)				60.73(a)(2)(ix)						
LICENSEE CONTACT FOR THIS LER (12)																
NAME David R. Powell, Regulation and Compliance Supervisor										TELEPHONE NUMBER 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 NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC						
X	DA	P	I	0 7 5	N											
SUPPLEMENTAL REPORT EXPECTED (14)												EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR
<input checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)														0 6	1 5	9 0
<input type="checkbox"/> NO																

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

At 1120, on February 20, 1990, with Unit 3 in Mode 6 (Refueling), Control Room personnel were notified that a mechanical seal failure had occurred on the 3B Spent Fuel Pool (SFP) Cooling Pump (EIS:DA, Component:P). Approximately three inches of borated contaminated water had accumulated in the Unit 3 SFP heat exchanger room and the Unit 3 cask wash area. The 3B SFP Cooling Pump shaft sheared as the result of fatigue failure. FPL believes that abnormal operating stresses due to either pump subcomponent alignment or hydraulic instability at the pump impeller led to the fatigue failure. When the pump shaft failed, the impeller and that portion of the pump shaft up to the fracture point continued to rotate without radial or axial support. This resulted in failure of the mechanical seal. The Auxiliary Building drains are designed to accommodate approximately 70 gallons per minute (gpm) total system leakage. The 3B SFP Cooling Pump mechanical seal failure is estimated to have created an 18 gpm leak. Partially clogged drain lines in the Auxiliary Building led to the water accumulation. No radioactive liquid effluent was released to the environment or to an unrestricted area. The effects on the SFP and Unit 3 refueling cavity water level were negligible. An Event Response Team (ERT) has been formed to address the cause of the pump shaft failure and drain clogging.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (8)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
Turkey Point Unit 3	05000250	90	003	00	02	OF	04

TEXT (If more space is required, use additional NRC Form 368A's) (17)

DESCRIPTION OF THE EVENT

At 1120, on February 20, 1990, with Unit 3 in Mode 6 (Refueling), a Nuclear Operator (NO) notified Control Room personnel that a mechanical seal failure had occurred on the 3B Spent Fuel Pool (SFP) Cooling Pump (EIIS:DA, Component:P). Approximately three inches of contaminated borated water had accumulated and was contained in the Unit 3 SFP heat exchanger room and the Unit 3 cask wash area as a result of the mechanical seal failure and partially clogged drain lines. The 3B SFP Cooling Pump was stopped and isolated. Maintenance Department personnel were notified of the mechanical seal failure.

At 1140, the 3A SFP Cooling Pump was placed in service to re-establish cooling water flow to the Unit 3 SFP. Partially clogged floor drains in the Auxiliary Building were unblocked and the remaining water drained to the Waste Holdup Tanks for processing. The spill was contained in the Auxiliary Building. Release of contaminated borated water to the environment or to an unrestricted area did not occur.

At 1150, the Unit 3 reactor cavity (connected to the Unit 3 SFP) water level was verified to be within Technical Specification level limits. No significant decrease in the Unit 3 SFP water level or increase in water temperature was noticed during this event.

At 1532, voluntary notification of a significant event was made to the NRC Operations Center concerning the 3B SFP Cooling Pump mechanical seal failure. This notification was made because of expected news media interest. Subsequently, a news release was made by FPL.

This Licensee Event Report is being submitted on a voluntary basis. A similar event reported in LER 50-251/88-011-01 resulted in an uncontrolled liquid effluent release to the environment.

CAUSE OF THE EVENT

The 3B SFP Cooling Pump shaft sheared as the result of fatigue failure. FPL believes that the fatigue failure of the pump shaft is due to the formation of a notch which acted as a stress intensifier. Although the notch magnified stresses locally, operating stresses may be higher than desirable due to pump subcomponent alignment or hydraulic instability. The following factors may have contributed to the 3B SFP Cooling Pump shaft failure:

- a. During disassembly and inspection of the pump, 1-2 cubic inches of foreign material was recovered from the oil return passageways in the bearing housing. This debris was determined to be metallic fragments from previous bearing and oil seal failures. The plugged passages resulted in oil with entrained metallic particles coming in contact with the elastomeric oil seal. Maintenance Procedure MP 3507.2 requires that the bearing housing be cleaned upon disassembly of the pump. The

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	9 0	- 0 0 3	- 0 0 0	0 3	OF	0 4

TEXT (If more space is required, use additional NRC Form 368A's) (17)

oil return passageways in the bearing housing may not have been cleaned during the previous pump disassembly.

- b. Parallel circumferential scratches and a V-shaped notch approximately 10 mils in depth in the vicinity of the inboard elastomeric oil seal and pump shaft fracture plane were observed by visual examination. Additionally, the lodging of debris between the elastomeric oil seal and the pump shaft may have provided the source to create a stress intensifier at the fatigue location. Debris may have hindered lubrication of the elastomeric oil seal at the failure site, causing a heat rise that accelerated deterioration of the elastomeric oil seal.

When the pump shaft failed, the impeller and that portion of the pump shaft up to the fracture point continued to rotate with no radial or axial support. This resulted in impeller-to-pump casing damage (wear and scratches), wiping of the mechanical seal, and destruction of the inboard oil seal ring.

The Auxiliary Building floor drains are designed to accommodate total system leakage of approximately 70 gallons per minute (gpm). The leakage experienced due to the 3B SFP Cooling Pump mechanical seal failure is estimated to have been approximately 18 gpm. Partial clogging of the floor drains in the Auxiliary Building hindered water drainage to the Waste Holdup Tanks.

ANALYSIS OF THE EVENT

Borated contaminated water from the 3B SFP Cooling Pump mechanical seal failure was contained within the Unit 3 SFP heat exchanger room and the Unit 3 cask wash area. No borated contaminated water was released to the environment or to an unrestricted area. Air samples taken in the Unit 3 SFP heat exchanger room and the Unit 3 cask wash area revealed airborne radioactivity levels to be a fraction of the Maximum Permissible Concentrations (MPCs) for radionuclides required for declaring the areas as airborne radioactivity areas.

Two Operations Department personnel received contamination of their clothes. One of these individuals received minor contamination on the bottom of his left foot. These two individuals were whole body counted. No internal contamination was found.

The Spent Fuel Pool Cooling System consists of two normally available fuel pool cooling pumps and a separate emergency fuel pool cooling pump. The design of the Spent Fuel Pool Cooling System is such that either normally available fuel pool pump can provide adequate flow to maintain the fuel pool temperature. The emergency fuel pool cooling pump can provide limited cooling of the fuel pool. Following loss of all pumps, an extended period is available prior to the fuel pool temperature increasing from its normal temperature of 127 degrees Fahrenheit (F) to the established limit of 180 degrees F to restore cooling flow. Within approximately 20 minutes of identifying the mechanical seal failure on the 3B SFP Cooling Pump, the 3A SFP Cooling Pump was started to restore cooling water flow to the Unit 3 SFP. No decrease in the Unit 3 SFP water level or increase in water temperature was identified as a result of the 3B SFP Cooling Pump mechanical seal failure.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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	9 0	0 0 3	0 0 0	0 4	OF	0 4

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

CORRECTIVE ACTIONS

- The 3A SFP Cooling Pump (Goulds) has been aligned as the primary SFP cooling pump.
- Clearances against the Ingersoll-Rand SFP Cooling Pumps (3B and 4A) require permission of the Operations Superintendent prior to operation.
- An On-The-Spot-Change (OTSC) has been issued against Maintenance Procedure MP 3507.2 to address cleaning the oil return passageways in the bearing housing.
- Event Response Team (ERT) 90-004 has been formed to determine the reason for the 3B SFP Cooling Pump shaft failure and the partial blockage of SFP building drains. The identified causes and associated corrective actions will be discussed in a supplemental Licensee Event Report.

ADDITIONAL INFORMATION

The 3B SFP Cooling Pump is a Model 6X13LP centrifugal pump manufactured by Ingersoll-Rand. The 3A SFP Cooling Pump is manufactured by Goulds. The Emergency SFP Cooling Pump is manufactured by Worthington.

A similar event was reported in LER 50-251/88-011-01.