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SUBJECT: LER 89-011-00:on 890915,turbine stop valve closure due to auto stop oil line break.

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FPL

P. O. Box 3088, Florida City, FL 33034

L-89-374
10 CFR 50.73

OCT 13 1989

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: 89-11
Date of Event: September 15, 1989
Turbine Stop Valve Closure Due to Auto Stop Oil Leak Resulted
In a Manual Reactor Trip And A Manual Safety Injection

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/JEC/VAK/DRP/DWH

Attachment

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

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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)

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Turkey Point Unit 4	0 5 0 0 0 2 5 1	1 OF 0 6

TITLE (4) Turbine Stop Valve Closure Due To Auto Stop Oil Line Leak Resulted In A Manual Reactor Trip And A Manual Safety Injection

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)
									N/A	0 5 0 0 0
0 9	1 5	8 9	8 9	0 1 1	0 0	1 0	1 2	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)	1 0 0	20.402(b)	20.405(c)	X 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)	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
David R. Powell, Regulation and Compliance Supervisor	AREA CODE 3 0 5 2 4 6 - 6 5 5 0

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
B	T G	W E L D	X 9 9 9	N	B	C B	P S	U 0 7 5	Y
E	A A	I M O D	H 0 1 5	Y	D	S J	F S V	A 6 0 9	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)

At 0426, on September 15, 1989, with Unit 4 operating at 100 percent power, a manual reactor trip was initiated. A High Pressure (HP) turbine stop valve Auto Stop Oil line weld leak identified at 0045 led to closure of the stop valve. When the control rods failed to insert in automatic or manual in response to the sudden turbine power decrease, as called for by a T-AVE/T-REF mismatch signal, a manual reactor trip was initiated. A failure of the 4C Steam Generator feedwater control valve to close during a subsequent Feedwater Isolation (slow closure) signal resulted in overfeed of the Steam Generator and "shrink" of the Reactor Coolant System inventory. A manual Safety Injection signal was initiated by procedure because pressurizer level dropped below 12 percent. The Auto Stop Oil line weld failure was due to inadequate field installation and fatigue failure. The failure of the control rods to drive in automatically was due to an inadequacy in the refueling Preventive Maintenance program. The Automatic Rod Control Speed Signal output summator was out of calibration. The feedwater control valve failure to close is due to an inadequate procedure used during a recent modification. The thermal transient experienced did not affect the structural integrity of Reactor Coolant System components. Various corrective actions have been/will be performed.

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

Description of the Event

At 0045, on September 15, 1989, the Nuclear Turbine Operator (NTO) notified the Plant Supervisor - Nuclear (PSN) of oil leakage in the vicinity of the left High Pressure (HP) turbine stop valve (4-10-010) guarded oil line. After removing the inspection cover, a 0.5 to 1.0 gallon per minute (gpm) leak was identified on an Auto Stop Oil line weld (EIIS:TG, Component:WELD) for the left HP turbine stop valve. The oil leak was not considered by the PSN to pose an immediate threat to unit operation. A Reactor Control Operator (RCO) was assigned to perform hourly inspections of the leaking weld and Auto Stop Oil pressure for signs of increased leakage. Operations and maintenance personnel discussed options for repair of the cracked weld.

At 0426, on September 15, 1989, with Unit 4 in Mode 1 operating at 100 percent power, the left turbine stop valve failed closed. The reduction in steam flow to the main turbine caused the steam generators to experience an increase in pressure and a decrease in level (shrink). The large power mismatch (Reactor Power greater than Turbine Power) led to an increase in the average Reactor Coolant System temperature (T-AVE) and an expansion of the Reactor Coolant System fluid (swell), causing the pressurizer level to increase. At the setpoint of 75 percent pressurizer level, the 4C charging pump (EIIS:CB, Component:P) received a signal for low speed operation. The 4C charging pump tripped following receipt of this signal.

Due to an increase in T-AVE and a decrease in the Reactor Coolant System reference temperature (T-REF) (setpoint of 5 degrees F deviation between T-AVE and T-REF), control rods began "stepping in" automatically. The Nuclear Watch Engineer (NWE) noted that the control rods (EIIS:AA, Component:ROD) stopped automatically driving in after moving four steps. The RCO tried unsuccessfully to drive the control rods in manual. The Assistant Plant Supervisor - Nuclear (APSN) noted T-AVE increasing and the main steam code safety valves had opened. The APSN ordered a manual reactor trip.

At 0427, a manual reactor trip was initiated from the Control Room console by opening the Reactor Trip Breakers and Unit 4 entered Emergency Operating Procedure 4-EOP-E-0, "Reactor Trip or Safety Injection." The manual reactor trip resulted in an automatic turbine trip and, with a low T-AVE (less than the 554 degrees F setpoint), an automatic Feedwater Isolation (slow closure) signal which causes closure of the main feedwater control valves within 20 seconds. The Balance Of Plant (BOP) operator noted dual position indication on feedwater control valve FCV-498 (EIIS:SJ, Component:FCV) and increasing level in Steam Generator 4C. The BOP operator placed FCV-498 control in manual and attempted to close the valve.

Failure of FCV-498 to close within 20 seconds resulted in overfeed of Steam Generator 4C and a decrease in T-AVE. This led to a decrease (shrink) in pressurizer level. The RCO started charging pumps 4A and 4C to compensate for the decrease in pressurizer level, however, the level could not be maintained. When

the pressurizer level decreased below 12 percent level, the APSN ordered initiation of a manual Safety Injection in accordance with 4-EOP-E-0.

At approximately 0429, the RCO manually initiated a Safety Injection signal and a Phase A Containment Isolation signal. The manual Safety Injection signal initiated a Feedwater Isolation (fast closure) signal and a trip of the Steam Generator feedwater pumps. Equipment associated with the Safety Injection signal, including the Emergency Diesel Generators, started per design.

At approximately 0430, the condenser air ejector radiation monitor (R-15) (EIIS: IL, Component:DET) spiked to approximately 13,000 counts per minute (cpm) then returned to normal. Operations personnel considered this alarm to be spurious due to readings returning to normal within a short period of time. (An alarm condition is indicative of a primary to secondary system leak through the steam generator tubes.) Chemistry Department personnel were notified and instructed to check the Sping-4 steam jet air ejector (SJAE) monitor and the Main Steam line radiation monitors.

At 0440, the manual Safety Injection signal and manual Phase A Containment Isolation signal were reset. Unit 4 entered Emergency Operating Procedure 4-EOP-ES-1.1, "SI Termination." Reactor Coolant System pressure did not decrease below the shutoff head of the safety injection pumps; therefore, no actual injection of borated water into the the Reactor Coolant System occurred.

At 0445, the Shift Technical Advisor (STA) verified the Safety Status Trees to be normal with exception of the Steam Generator 4C high level. At this time, Chemistry Department personnel verified the Sping-4 SJAE monitor and the Main Steam line monitors to be reading normal.

At 0500, Emergency Diesel Generator (EDG) A (EIIS:EK, Component:DG) was declared out of service due to a lube oil low pressure switch hose leak of approximately 0.5 gpm. The leaking hose was repaired and EDG A operability was verified. At 1105, EDG A was declared operable.

FPL considers this event to be terminated upon transition from Emergency Operating Procedures to normal plant operating procedures. At 0545, the RCO commenced performance of General Operating Procedure 4-GOP-103, "Power Operation to Hot Standby."

Cause of the Event

The cause of the left HP turbine stop valve Auto Stop Oil line leak is due to inadequate field installation. In this section of the Auto Stop Oil system, a metering valve is connected to the Auto Stop Oil line by use of an insert which is socket welded at the valve end and at the line end. These welds were found to be overlapping in the middle of the insert which created built-in residual stresses. The Auto Stop Oil line leak was located in this zone. FPL confirmed fatigue failure to be the failure mechanism.

The cause of the 4C charging pump trip on low speed is due to design. The lube oil pressure switch was found to be out of calibration high. The pressure switch has a range of 0 - 100 psi and is normally set at 4 psi. At that setting, there

is very little tension placed on the adjustment set screw. Misapplication of the pressure switch, coupled with vibration experienced by the pressure switch being mounted on the charging pump, led to the pressure switch being out of calibration.

The cause of the control rod drive mechanisms failure to automatically or manually drive in is due to an inadequacy in the refueling Preventive Maintenance program. The Automatic Rod Control Speed signal output summator to the Rod Control Logic Cabinet was found to be out of specification. The maximum expected voltage should be 9.5 Vdc and it was found to be 10.14 Vdc. This high voltage caused the Rod Control System pulser/oscillator to call for rod speed which was faster than the system capability. A Logic Cabinet Urgent Failure Alarm halted rod motion as designed. FPL believes the Automatic Rod Control module setpoint drifted over time. These components are normally calibrated during refueling outages. During the last refueling outage for Unit 4, a decision was made not to perform the calibrations. A Preventive Maintenance task for periodic calibration checks on the Automatic Rod Control Speed Signal output summator does not exist.

The cause of the 4C Steam Generator feedwater control valve FCV-4-498 failure to close within 20 seconds of receiving a Feedwater Isolation signal is due to an inadequate procedure. Foreign material was found in solenoid valve SV-4-498B which prevented it from totally "switching states" (i.e., all three ports were open at the same time). The foreign material consisted of metallic particles (magnetic and non-magnetic) and thread sealant. FPL believes this material entered the solenoid valve during Plant Change/Modification (PC/M) 88-241 performed during the recent Unit 4 refueling outage. Failure to establish adequate system cleanliness controls led to the introduction of foreign materials. The ASCO solenoid valves on feedwater control valves FCV-4-478 and FCV-4-488 were found to be free of debris which would prevent proper solenoid valve operation.

The cause of the condenser air ejector radiation monitor spiking is due to design. During plant transients, where elevated main steam pressure causes moisture carryover through the steam jet air ejectors, slight impacts may occur on the thin wall of the beta/gamma Geiger-Meuller tube. The result is momentary spiking with a return to normal readings.

The cause of the EDG A lube oil low pressure switch hose leak is due to aging and vibration induced rubbing and chafing from contact with the EDG control cabinet cover plate.

Analysis of the Event

Operator actions in response to the identified equipment problems were appropriate and resulted in a safe shutdown of the unit. These actions were in accordance with approved plant procedures.

The Reactor Coolant System thermal transient experienced during this event has been evaluated by Westinghouse. The thermal transient has been determined to be similar to the design basis reactor trip from full power event.

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

Corrective Actions

1) The insert between the metering valve and the Auto Stop Oil line for the Unit 4 left HP turbine stop valve was replaced. This same section of Auto Stop Oil line for the right HP turbine stop valve was visually inspected. The readily accessible welds were found to have acceptably spaced welds.

2) A visual inspection of the readily accessible welds in the same section of Auto Stop Oil lines to the Unit 3 left and right HP turbine stop valves will be performed by November 1, 1989.

3) Vibration on the Auto Stop Oil lines to both Unit 4 HP turbine stop valves will be observed and measured during unit restart. Appropriate corrective actions will be implemented as necessary.

4) The 4C charging pump lube oil pressure switch was replaced with the same type switch. Loctite thread sealant was applied to the adjustment set screw for each of the Unit 3 and Unit 4 charging pump lube oil pressure switches.

5) Plant Changes/Modifications PC/M 89-388 (Unit 3) and PC/M 89-473 (Unit 4) were issued to replace the charging pump lube oil pressure switches with a different switch type which is more appropriate for this application and to remount the replacement switches to a location of lower vibration. Implementation of these PC/Ms should be complete prior to restart from the next refueling outage for each unit.

6) The Unit 3 and Unit 4 Automatic Rod Control Speed signal output summators were recalibrated.

7) A Preventive Maintenance task for periodically performing a calibration check on the Automatic Rod Control Speed signal output summator for Unit 3 and Unit 4 is being developed and will be issued by December 1, 1989.

8) The mechanism for canceling refueling outage activities will be reviewed and revised appropriately prior to the next scheduled refueling outage.

9) The 4C Steam Generator feedwater control valve solenoid valve (SV-4-498B) was replaced with the same type solenoid valve. The ASCO solenoid valves for Steam Generator feedwater control valves FCV-4-478 and FCV-4-488 were blown down, disassembled, and inspected. The solenoid valves were found to be free of debris which would hinder proper operation.

10) Cleanliness requirements for Instrument Air System tubing to instrumentation will be developed and incorporated into Backfit Construction Administrative Site Procedure ASP-24, "System Cleanliness," by December 1, 1989.

11) The background activity level after the condenser air ejector radiation monitor spike was verified to be the same as the background level before the spike. A response check of the radiation monitor was performed with satisfactory results.

12) The EDG A lube oil low pressure switch hose was repaired. The remaining hoses on EDG A and hoses on EDG B were visually inspected. No other hose leaks were identified.

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13) Preventive Maintenance tasks for replacing rubber hoses in the EDG engine panels every 5 years were created January 27, 1989. Initial performance of these PM tasks will occur during the next scheduled diesel outages of sufficient duration.

Additional Information

No similar Licensee Event Reports have been identified.