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JAFP-90-0255

United States Nuclear Regulatory Commission
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Washington, D.C. 20555

SUBJECT: DOCKET NO. 50-333
LICENSEE EVENT REPORT: 90-005-00
High Pressure Coolant Injection
Turbine Degraded Valve Response
Time

Dear Sir:

This Licensee Event Report is submitted in accordance with 10 CFR 50.73(a)(2)(v).

Questions concerning this report may be addressed to Mr. Hamilton Fish at (315) 349-6013.

Very truly yours,

WILLIAM FERNANDEZ

WF:HCF:lar

Enclosure

cc: USNRC, Region I
NRC Resident Inspector
INPO Records Center
American Nuclear Insurers

Cert NO
P-73306/1117
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)
JAMES A. FITZPATRICK NUCLEAR POWER PLANT	0 5 0 0 0 3 3 3	1 OF 0 4

TITLE (4) High Pressure Coolant Injection System Inoperable - Foreign Material in Control Servo Caused Increased Hydraulic Stop Valve Opening Time During Inservice Testing

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 2	2 0	9 0	9 0	— 0 0 5	— 0 0	0 3	2 1	9 0		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	N	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)	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)	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
Hamilton C. Fish	AREA CODE 3 1 5 — 3 4 9 — 6 0 1 3

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	

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)

EIIS Codes are in [ ]

A regularly scheduled quarterly surveillance test for the High Pressure Coolant Injection system (HPCI) [BJ] was performed on 02/20/90 with the reactor operating at full power. Test data indicated that the 25.3 second time interval allowed by the inservice testing (IST) program for the opening of the HPCI turbine stop valve (23HOV-1) was exceeded by 1.75 seconds (7%). HPCI was conservatively declared to be inoperable at 1:20 P.M. initiating a 7-day Limiting Condition for Operation (LCO). During the next 5 days of troubleshooting and testing HPCI was subjected to 6 test runs. The stop valve which failed the IST criteria is hydraulically operated by the turbine oil. During the search for the cause of the slow response time, the hydraulic oil system filters and the main shaft driven oil pump were replaced. The search narrowed to a piping dead leg associated with the controlling servo mechanism which was found to contain metal filings, dirt, and small paint chip particles. After cleaning the servo mechanism, HPCI met the IST criteria and was declared operable at 2:05 P.M. on 02/25/90 HPCI was technically inoperable for 5 days, 45 minutes. Corrective action includes adding the remote servo mechanism to a once-per-cycle preventive maintenance program.

EIIS Codes are in []

Description

Beginning at approximately 12:00 noon on February 20, 1990 the regularly scheduled quarterly surveillance test, ST-4N, "HPCI Flow Rate and Inservice Test (IST)", was performed for the High Pressure Coolant Injection (HPCI) [BJ] system. As a part of this test, the time intervals for overall HPCI response, and the initiation signal to first movement and full stroke opening of the steam admission valve (23HOV-1), were observed and recorded. The observed time intervals for these parameters were all significantly longer than the normally observed and expected values. The observed overall response time for HPCI of 29.8 seconds did marginally meet the Final Safety Analysis Report (FSAR) assumption of less than or equal to 30 seconds. However, the IST time required from initiation signal to full open for the single HPCI stop valve was 27.05 seconds. This is 1.75 seconds (or about 7%) longer than the maximum IST criteria of 25.30 seconds. The annunciator for "HPCI Turbine Oil Filter Differential Pressure High" activated during the test. Although the HPCI system met the FSAR response time assumption and would, in fact, have continued to activate automatically or manually in response to plant conditions, HPCI was conservatively declared to be inoperable at 1:20 P.M. This started a 7-day Limiting Condition for Operation (LCO).

The HPCI stop valve (23HOV-1) is operated by the HPCI hydraulic oil system. Accordingly, during the next five days the effort to determine and correct the cause of the excessive operating time for this valve focused on the HPCI oil system. Additional instrumentation was installed on the system to monitor and record oil pressure at various points in the system and the movement of the control remote servo mechanism and governor valve. During the process of elimination, a number of components including the oil filter elements were first inspected, and then replaced. The main shaft driven oil pump was replaced. HPCI was operated six times as part of the troubleshooting process. When the problem area was narrowed to the remote servo mechanism, the servo and associated control lines were removed, cleaned, and flushed. Examination of the flushing oil showed the presence of metal filings, dirt, and small paint chip particles.

Upon completion of the remote servo work, ST-4N, "HPCI Flow Rate and Inservice Test (IST)", was again run at 12:40 P.M. on February 25, 1990. At this time there was significant improvement in the response time parameters for HPCI. The time from initiation to full open for the stop valve (23HOV-1) was 20.4 seconds, an improvement of 6.6 seconds (24%) and well within the IST acceptance criteria limits of 17.5 to 25.3 seconds. The overall HPCI response time was 24.14 seconds, an improvement of 5.7 seconds (19% improvement) and well within the FSAR assumption of less than 30 seconds.

Accordingly, upon completion of the review of these results, HPCI was declared to be operable at 2:05 P.M. on February 25, 1990, ending the 7-day LCO. HPCI had been administratively unavailable for 5 days, 45 minutes although it was functional during most of this time period.

Cause

The slow response time of the HPCI system was the result of sticking or binding in the remote servo which resulted in a delay in governor valve response. The slow stop valve (23HOV-1) opening time was the result of two separate problems.

First, clogged filter elements created a back pressure across the filters which led to a delay in pressurizing the 38 psig oil line which controls the stop valve pilot shuttle. Replacing the filters allowed faster pressurization of the 38 psig line and faster opening of the stop valve pilot shuttle to admit 90 psig oil to the stop valve cylinder. This results in the stop valve (23HOV-1) leaving the closed position in a shorter time following an initiation signal.

Secondly, although the HPCI lubrication oil and filters had been replaced numerous times during the last four months, and the lines flushed, the servo mechanism is located in a blind leg of the system. This permitted foreign material to accumulate in this location. The slow governor valve response was caused by dirt in the servo mechanism which caused a large speed drop resulting in decay of shaft oil pump pressure until the auxiliary oil pump automatically cycled back on at the low pressure setpoint. Restoring the governor valve response by cleaning and flushing the servo reduced the large speed drop and shortened the time interval where oil pressure degrades, thus increasing the speed of the stop valve stroke.

Analysis

The HPCI system is an engineered safety feature designed to inject a highly reliable source of water into the reactor at rated pressure and in sufficient volume to maintain core coverage through a broad spectrum of hypothetical accident conditions. The principal component is a turbine driven, high pressure, high volume, multi-stage centrifugal pump. The steam supply to the turbine comes directly from the reactor vessel thus ensuring availability regardless of the condition of the AC electrical power supplies.

Because the HPCI system was administratively inoperable due to the degraded (relative to IST criteria) response time of a single stop valve, it may qualify as an event reportable under 10 CFR 50.73(a)(2)(v) as an event or condition that alone could have prevented the fulfillment of the safety function of a system needed to remove residual heat or mitigate the consequences of an accident.

Surveillance tests verified that the back-up emergency core cooling systems were operable. While HPCI was not available, core coverage was assured by the automatic depressurization system together with the low pressure emergency core cooling systems including the two core spray systems [BM] and two residual heat removal (low pressure coolant injection) subsystems [BO].

Furthermore, the HPCI system remained operable in the manual mode except for those intervals when oil pump replacement or servo maintenance were in progress. The SAFER/GESTER LOCA sensitivity analysis shows that the HPCI response time (which was within FSAR limits) has little effect on peak clad temperatures. By extrapolation, response time of the steam admission valve 23HOV-1 would also have little effect on peak clad temperature.

Corrective Action

The remote servo will be replaced. Disassembly and rebuilding of the servo will be added as a preventive maintenance item once per operating cycle. Replacement of the oil filters and oil are already included on the preventive maintenance schedule once per operating cycle.