James A. FitzPatrick
Nuclear Power Plant
P.O. Box 41
Lycoming, New York 13093
315 342-3840

New York Power Authority

Harry P. Salmon, Jr.
Resident Manager

March 22, 1994
JAFP-94-0176

United States Nuclear Regulatory Commission
Document Control Desk
Mail Station P1-137
Washington, D.C. 20555

SUBJECT: DOCKET NO. 50-333
LICENSEE EVENT REPORT: LER-94-001:

High Pressure Coolant Injection System Declared Inoperable Due to Turbine Shaft Seal Leakage

Dear Sir:

This report is submitted in accordance with 10CFR50.73(a)(v).

Questions concerning this report may be addressed to Mr. Donald Simpson at (315) 349-6361.

Very truly yours,

HARRY P. SALMON, JR.

HPS:DES:tlc

Enclosure

cc: USNRC, Region I
USNRC Resident Inspector
INPO Records Center

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NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
James A. FitzPatrick Nuclear Power Plant	05000333	01 OF 04

TITLE (4) High Pressure Coolant Injection System Declared Inoperable Due to Turbine Shaft Seal Leakage

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 NAME	DOCKET NUMBER
										0500(
02	24	94	94	001	00	03	22	94	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	N
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	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
	20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		(Specify in Abstract below and in Text, NRC Form 366A)
	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 (Include Area Code)
Mr. Donald Simpson, Senior Licensing Engineer	(315) 349-6361

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 15 single-spaced typewritten lines) (16)

The plant was operating at 100 percent power on 2/24/94 with the reactor mode switch in Run. The High Pressure Coolant Injection (HPCI) system had been declared inoperable in order to perform scheduled surveillance testing. During initial roll of the turbine, operators observed an approximate 3 to 4 foot plume of steam from the inboard shaft seal which did not diminish as the turbine came up to speed. The turbine was tripped and the limiting condition for operation for HPCI system inoperablity continued.

The shaft seal was replaced and the HPCI system declared operable on 2/26/94. The steam seal leakage was caused by minor corrosion on gland seal surfaces and shaft sealing surfaces due to moisture within the turbine casing. Increased monitoring for leakage past the HPCI steam supply valve during standby conditions, balancing of the HPCI gland exhaust system and corrective maintenance on the gland seal casings will improve turbine steam seal performance.

LER-89-014 describes a similar event where the HPCI system was declared inoperable due to moisture intrusion in the lubricating oil system.

EIIS Codes are in []

Event Description

On February 24, 1994, the plant was operating at 100 percent power with the reactor mode switch in Run. Preparations had been completed for performing a quick start transient monitoring test on the High Pressure Coolant Injection (HPCI) [BJ] system turbine. A Limiting Condition for Operation (LCO) was entered in accordance with Technical Specification 3.5.C.1. At 0833 hours, the turbine was rolled with steam. Operators stationed at the turbine to observe the HPCI response observed a 3 to 4 foot plume of steam from the inboard turbine shaft seal. As the turbine came up to speed the leak did not diminish. The turbine was immediately tripped and the HPCI system declared inoperable. The limiting condition for operation was continued. ENS notification was completed at 0958 hours in accordance with 10CFR50.72.

The steam seal was replaced and the turbine shaft inspected for damage. The maintenance turbine engineer concluded based upon equipment failure evaluation that the installed seal had not failed, that the leakage observed was minor and would have had no significant effect on HPCI performance. Post maintenance testing on the HPCI turbine was performed and HPCI declared operational at 0056 hours on 2/26/94. The HPCI system was inoperable for approximately 40 hours.

Cause

The HPCI system seal leakage was caused by minor corrosion of the gland seal casing and pitting of the turbine shaft in the seal area. The gradual degradation of these components was due to exposure to a damp environment over an extended period of time because of past seat leakage of the HPCI steam supply isolation valve (Cause Code X). Frequent periodic testing and potential inbalance of the gland exhaust system contributed to the observed degradation. Because the HPCI system is normally in a standby condition, the wetted environment permitted accelerated corrosion of the gland seal casing which prevented the carbon ring seals from providing an adequate (radial) seal when steam is admitted to the turbine. Tapered dowels, which align the upper and lower gland casing, were found to be worn and could also have contributed to the observed leakage. Minor pitting of the turbine shaft in the seal area had cut groves into the two inboard seal rings, thereby providing a second (axial) path for steam leakage.

Analysis

The HPCI system is an engineered safety feature designed to provide a highly reliable source of water to the reactor vessel at sufficient pressure and volume to maintain reactor core ccverage through a broad spectrum of postulated accident conditions. If this system is not available, core coverage is still assured by the Automatic Depressurization [SB] System together with other low pressure emergency core cooling systems including the two redundant trains of Core Spray [BM] and the two redundant trains of Low Pressure Coolant Injection (LPCI) [BO].

Because the HPCI system was conservatively declared inoperable upon the observation of steam seal leakage this event is reportable under 10CFR50.73(a)(2)(v) as a condition that could have prevented the fulfillment of the safety function of a system needed to remove residual heat or mitigate the consequences of an accident. The safety significance of this occurrence is low because subsequent inspection showed the seals were in good condition and that the minor leakage was due to gradual degradation of the gland casing and shaft pitting. Turbine shaft pitting had not degraded appreciably since a March, 1992 inspection.

Based upon observed leakage during the test performance and subsequent inspection findings, there is reasonable assurance that the HPCI system could have performed its intended function. The leakage observed was minor and not of sufficient magnitude as to result in a system isolation due to steam leak detection or high ambient temperature.

Corrective Actions

1. New turbine shaft seals were installed on 2/25/94.

2. The HPCI steam supply isolation valve is not leaking past the seat at this time. The most recent apparent leakage occurred in February, 1993. Plant operators have initiated periodic monitoring of the HPCI turbine casing temperature during standby conditions to provide early identification of steam supply isolation valve leakage.

3. The HPCI turbine gland seal casing will be replaced or refurbished during the 1994 refuel outage.

4. The HPCI turbine shaft pitting condition will be evaluated and an action plan developed by June 30, 1994.

5. The HPCI turbine gland exhaust system will be balanced prior to the scheduled April, 1994, maintenance outage to optimize the gland seal casing environment.

Additional Information

Failed Component Identification: None

Previous Similar Events: LER-89-014, Reported the HPCI system declared inoperable due in part to steam supply isolation valve leakage which resulted in water contamination of the lubricating oil system.