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



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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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.

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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 coverage 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.

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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.