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United States Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station O-P1-17
Washington, D.C. 20555

Subject: **Docket No. 50-333**
LICENSEE EVENT REPORT: LER-00-016-01 (DER-00-05874)

High Pressure Coolant Injection System Declared Inoperable Due to Water in Turbine Exhaust Piping

Dear Sir:

This report is submitted in accordance with 10 CFR 50.73 (a) (2) (v).

Revision 1 of this report is submitted to provide the results of the root cause investigation for this event and to identify additional corrective actions.

There are no commitments contained in this report.

Questions concerning this report may be addressed to Mr. Tim Page at (315) 349-6209.

Very truly yours,

T. A. Sullivan

TAS:TP:las
Enclosure

cc: USNRC, Region 1
USNRC, Project Directorate
USNRC Resident Inspector
INPO Records Center

IE22

NRC FORM 366 (6-1998) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), 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. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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	1 OF 5

TITLE (4)

High Pressure Coolant Injection System Declared Inoperable Due to Water in Turbine Exhaust Piping

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
									N/A	05000
11	20	00	00	016	01	08	03	01	FACILITY NAME	DOCKET NUMBER
									N/A	05000

		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
OPERATING MODE (9)	N		20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
POWER LEVEL (10)	72		20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)
			20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
			20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)		OTHER
			20.2203(a)(2)(iii)		50.36(c)(1)	X	50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Mr. Timothy Page, Sr. Licensing Engineer	(315) 349-6209

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B	BJ	LS	M235	Y					

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION	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)

On November 20, 2000, at 2310 hours, with reactor power at approximately 72 percent, it was discovered that the High Pressure Coolant Injection (HPCI) System turbine exhaust drain pot level switch 23LS-98 was inoperable. Prior to the level switch failure, HPCI turbine steam supply isolation valve 23MOV-14 was experiencing valve seat leakage. These concurrent conditions resulted in water accumulation in the HPCI turbine exhaust line and rendered the HPCI System inoperable.

Immediate corrective actions included repairing level switch 23LS-98 and returning it to an operable condition, successfully completing Surveillance Testing of the HPCI System, and returning the HPCI System to an operable status.

Post event analysis determined the mechanistic cause of the event to be a combination of corrosion and misalignment in the level switch float coupled with loss of (permanent) magnetism in one of the internal switch components. This analysis also identified a staff knowledge deficiency regarding the details of the switch internal component configuration and theory of operation.

A contributing cause of the event was inadequate compensatory measures to assure HPCI operability given the 23MOV-14 seat leakage.

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DESCRIPTION

On November 20, 2000, at 2310 hours, with reactor power at approximately 72 percent, operators discovered that the High Pressure Coolant Injection (HPCI) System [BJ] turbine exhaust drain pot level switch 23LS-98 was inoperable. Prior to the level switch failure, HPCI turbine steam supply isolation valve 23MOV-14 was experiencing valve seat leakage. These concurrent conditions resulted in water accumulating in the HPCI turbine exhaust line and rendered the HPCI System inoperable. Compensatory measures were in place to periodically assess HPCI operability with this degraded condition but these compensatory measures did not address switch failures and the potential for water accumulation in the turbine.

There had been known seat leakage through isolation valve 23MOV-14. The function of 23LS-98 is to provide Control Room annunciation and automatic opening of HPCI turbine exhaust drain valve 23AOV-54 upon high water level in the HPCI turbine exhaust drain pot. On November 20, 2000, it was determined that 23LS-98 was not functioning as designed. During the ensuing investigation, Instrument and Controls (I&C) technicians determined that the reset over-travel adjustment of level switch 23LS-98 had moved from its original setting and resulted in the failure of the level switch contacts to makeup. This resulted in the failure of the switch to actuate on the high water level trip setting. The technicians completed repairs to the switch and returned 23LS-98 to an operable condition.

CAUSE OF THE EVENT

Seat leakage past 23MOV-14 resulted in the accumulation of water in the HPCI turbine exhaust line. The design function of 23LS-98 is to provide Control Room annunciation and opening of HPCI turbine exhaust drain valve 23AOV-54 upon high water level in the HPCI turbine exhaust drain pot. On November 20, 2000, level switch 23LS-98 was found inoperable. This condition resulted in the failure of the switch to actuate both the Control Room annunciator and the HPCI turbine exhaust drain valve 23AOV-54 on the high water trip set point. At the time of the event, it was concluded that the apparent cause for the level switch failure was the lack of a locking mechanism on the switch's over-travel adjustment machine screw. It was believed that this screw had rotated down from its original setting, preventing full switch arm movement and prohibiting switch contact makeup.

Post event analysis determined the mechanistic cause of the event to be a combination of corrosion and misalignment of the level switch float coupled with loss of (permanent) magnetism in one of the internal switch components [Cause Code B]. This analysis also identified a staff knowledge deficiency regarding the details of the switch internal component configuration and theory of operation.

The cause of the inadequate compensatory measures for assessing HPCI operability with seat leakage past 23MOV-14 was misjudgment on the part of the engineers involved with the operability evaluation (Cause Code A). Specifically, the engineering evaluation in support of operability did not address the potential for flooding the HPCI turbine with observed indications trending in a non-conservative manner. This event occurred because a degraded condition (leaking valve) presented a challenge that increased the duty cycle demand of a non-safety-related component (23LS-98). The engineering evaluation to support the operability determination did not address the potential affect on increased duty cycle on 23LS-98.

CAUSE OF THE EVENT (cont'd.)

In addition, station personnel didn't recognize the condition. A downward trend in HPCI turbine bearing and casing temperatures had been indicative in the past that the 23MOV-14 seat integrity was not degrading. In the scenario discussed in this LER, valve leakage past the 23MOV-14 seat had actually increased following previously performed maintenance. HPCI turbine thrust bearing and turbine casing temperatures had remained elevated longer than normal following HPCI testing. It was initially believed that this was due to steam being exhausted through the turbine, which was then purged through a steam trap into the Torus. Later, it was determined that this was not the case, and that the leakage past 23MOV-14 was more significant than originally believed. Thus, these indications were not fully understood and led to a delayed identification of the actual conditions.

EVENT ANALYSIS

This report is being submitted in accordance with 10 CFR 50.73(a)(2)(v), "Any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to: Remove residual heat; or Mitigate the consequences of an accident."

The effects of water in the HPCI turbine exhaust piping had been identified as an industry concern as documented in General Electric's Service Information Letter (SIL) Number 580 dated May 6, 1994. The SIL described incidents involving the bursting of turbine exhaust line rupture diaphragms (discs) during HPCI turbine startups rendering HPCI inoperable. The cause of the incidents was identified as a malfunction of the turbine exhaust line drain system. During system startup, steam at reactor pressure is admitted to the turbine. If water is blocking the turbine exhaust line, the steam pressure in the turbine exhaust casing rapidly increases to accelerate the water slug through the line. This can result in the compression of the non-condensibles downstream or upstream of the water slug. If the rupture diaphragms are exposed to this momentary high pressure before the water slug is expelled, it can result in the rupture of both exhaust line rupture diaphragms, rendering HPCI System inoperable.

This potential scenario was the basis for declaring the HPCI System inoperable on November 20, 2000.

The HPCI System was last tested as required by Technical Specifications (TS) and declared operable on November 15, 2000 at 0035 hours. An evaluation estimated that the approximate date/time the HPCI exhaust line filled with water and became inoperable was November 17, 2000 at 1330 hours. The failure of 23LS-98 was discovered and HPCI System declared inoperable on November 20, 2000 at 2310 hours. Repairs and surveillance testing were successfully completed and the HPCI System was returned to an operable condition at 1755 hours on November 21, 2000. It is therefore estimated that the HPCI System was inoperable for 4 days, 4 hours and 25 minutes.

The safety significance of the condition was minimal based on the Automatic Depressurization System (ADS) [SB], the Residual Heat Removal (RHR) System [BO], and the Core Spray (CS) System [BM] being available as emergency core cooling systems during the period HPCI was inoperable. The Reactor Core Isolation Cooling (RCIC) System [BN] was also available as a source of high pressure injection during this period.

EXTENT OF CONDITION

An extent of condition review was completed for similar potential affects of water intrusion on the RCIC System. The review results identified that the RCIC System steam admission isolation valve was not leaking as evidenced by ambient temperatures on the turbine casing.

23LS-98 is a Mercoid level switch and is unique to the HPCI System.

An extent of condition review, for the inadequate compensatory measures identified in engineering evaluations supporting operability determinations, was performed. Open engineering evaluations supporting operability determinations for degraded or nonconforming conditions were reviewed. No additional discrepancies were identified.

CORRECTIVE ACTIONS

1. Immediately following the discovery of inoperable level switch 23LS-98, I & C technicians successfully completed repairs and returned 23LS-98 to an operable condition. **(Complete)**

2. Surveillance Test Procedure ST-4N, "HPCI Quick-Start, Inservice, & Transient Monitoring Test" was successfully completed following level switch repairs, and the HPCI System was returned to an operable status. **(Complete)**

3. A root cause investigation was conducted to determine the cause of this event. **(Complete)**

4. The level switch electrical subassembly and float were replaced. **(Complete)**

5. A periodic task has been added to the preventive maintenance program to inspect the level switch float and internal mechanism and the condition of the switch armature and magnet on the appropriate inspection frequency. **(Complete)**

6. Technicians will receive training on the theory of operation of Mercoid 215-1 level switches. (This training is currently scheduled to be held in conjunction with training on other level switches and transmitters.) **(Scheduled to be completed 1/31/02)**

7. Interim measures were implemented which added an additional peer review and required an engineering manager to approve all operability evaluations. Although these measures were not taken as a direct result of this LER, they were implemented as interim actions after similar issues were identified in other evaluations. **(Complete)**

8. Operations department personnel were sensitized to ensure they fully understand the available information in making operability determinations. **(Complete)**

CORRECTIVE ACTIONS (cont'd.)

9. Administrative Procedure AP-03.11 was revised to require a review of associated equipment relied upon for operability, to verify it is capable of performing its required function. This review will assure that the overall impact of the cause of the degraded condition is understood and considered in evaluating operability. **(Complete)**

ADDITIONAL INFORMATION

A. Previous Similar Events:

LER-89-014 reported declaring the HPCI System inoperable due to seat leakage through 23MOV-14 and resulting in water contamination of the turbine bearing lubricating oil system.

B. Failed Components:

Component Identification:	HPCI Turbine Exhaust Drain Pot Level Switch
Component Mark Number:	23LS-98
Component Description:	Displacement Level Switch
Manufacturer:	Mercoid Corp.
Model Number:	215-1

C. Applicability to NEI 99-02, Rev. 0:

This event does constitute a safety system functional failure in the context of NEI 99-02, Revision 0.