



Entergy Nuclear Northeast  
Entergy Nuclear Operations, Inc.

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**Pete Dietrich**  
Site Vice President

June 10, 2009  
JAFP-09-0071

United States Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D.C. 20555

**SUBJECT:** James A. FitzPatrick Nuclear Power Plant  
Docket No. 50-333  
License No. DPR-59  
Licensee Event Report: LER-2006-002-01, "High Pressure Coolant Injection System Declared Inoperable Due to Turbine Speed Oscillations, and Changing From MODE 2 To MODE 1 With HPCI System Inoperable," Revision 1.

**REFERENCES:** 1. Letter from Pete Dietrich (Entergy) to United States Nuclear Regulatory Commission, "LICENSEE EVENT REPORT: LER-06-002 (CR-JAF-2006-04754), "High Pressure Coolant Injection System Declared Inoperable Due to Turbine Speed Oscillations," JAFP-07-0001, January 3, 2007.

Dear Sir or Madam:

This report supplements LER-2006-02-00 (Reference 1) by adding a second reportable condition associated with the original reported condition in LER-2006-02-00. The second condition is submitted in accordance with 10 CFR 50.73(a)(2)(i)(B), "Operation or Condition Prohibited by Technical Specifications."

There is no commitment contained in this report.

Questions concerning this report may be addressed to Mr. Joseph Pechacek, Licensing Manager, at (315) 349-6766.

Sincerely,



Pete Dietrich  
Site Vice President

PD:JP:ed  
cc: next page

JEP2  
NRR

Enclosure: 1. Licensee Event Report 2006-002-01

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

**LICENSEE EVENT REPORT (LER)**

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose 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. person is not required to respond to, the

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**4. TITLE**  
High Pressure Coolant Injection (HPCI) System Declared Inoperable Due to Turbine Speed Oscillations, and Changing From MODE 2 To MODE 1 With HPCI System Inoperable

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
11	04	2006	2006	002	01	06	10	2009	N/A	05000
									FACILITY NAME	DOCKET NUMBER
									N/A	05000

<b>9. OPERATING MODE</b>  1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:</b> (Check all that apply)											
	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)								
<b>10. POWER LEVEL</b>  0	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)								
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)								
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)								
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)								
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)								
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)								
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER								
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A								

**12. LICENSEE CONTACT FOR THIS LER**

FACILITY NAME Mr. Joseph Pechacek, Licensing Manager	TELEPHONE NUMBER (Include Area Code) (315) 349-6766
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
A	BJ	65	W290	Y					

<b>14. SUPPLEMENTAL REPORT EXPECTED</b> <input type="checkbox"/> Yes (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	<b>15. EXPECTED SUBMISSION DATE</b> MONTH: _____ DAY: _____ YEAR: _____
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**ABSTRACT** (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On November 4, 2006, at 1810 hours, with the plant operating at approximately 20 percent power in Mode 1, Operations determined that the High Pressure Coolant Injection (HPCI) [BJ] System was inoperable due to HPCI flow and turbine speed oscillations during post work testing following refueling outage work activities. Therefore, HPCI was inoperable when MODE 1 was entered, which is prohibited by TS 3.0.4. During this post work testing, the HPCI turbine operated for approximately one minute, within required flow limits, but was manually tripped by the Operations crew when oscillations did not improve. The Operations crew declared the HPCI System inoperable until the unexpected oscillations could be evaluated and resolved. A 14 day TS LCO was entered as required. The NRC Operations Center was informed via the Emergency Notification System at 2101 hours on November 4, 2006. All other ECCS and RCIC remained operable.

The turbine speed oscillations were caused by two turbine governor hydraulic actuator oil lines incorrectly connected during maintenance activities. The oil lines were reconnected to their correct ports.

There were no adverse nuclear, radiological or safety consequences associated with this event.

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**NARRATIVE**

**BACKGROUND**

The High Pressure Coolant Injection (HPCI) [BJ] turbine speed is controlled by a Woodward EG Series Electric Type Governor. The governor serves to maintain a constant speed for all loads within the capacity of the turbine except momentarily at a time when a load change occurs. The EG governor consists essentially of three separate assemblies: a control box, a speed adjusting potentiometer and a hydraulic actuator.

The output signal of the EG control box serves as the input signal to the EG hydraulic actuator; the actuator in turn controls the turbine control valve which regulates turbine steam flow. The EG hydraulic actuator possesses a buffering mechanism that regulates oil flow and serves to reduce turbine speed oscillations.

During a plant startup HPCI operability is initially determined by passing a low-pressure (150-165 psig) surveillance (TS SR 3.5.1.9) test. After obtaining a reactor dome pressure of > 970 psig, the final (high-pressure) HPCI operability surveillance (TS SR 3.5.1.8) is performed. During the November 4<sup>th</sup> 2006 startup, HPCI passed the low pressure surveillance test prior to the plant entering into MODE 1, and was considered OPERABLE. Later in the startup, the plant entered into MODE 1 from MODE 2. Soon after entering into MODE 1, the high pressure HPCI surveillance test was performed, and the HPCI was declared inoperable. TS LCO 3.0.4 does not allow entry into a MODE if an applicable LCO for that MODE is not met. The root cause of the HPCI failing the high pressure test was determined to be improper connection of the governor hydraulic lines during maintenance activities, performed during the refueling outage. Since this maintenance activity occurred prior to entering into MODE 1, TS LCO 3.0.4 was not met, and this condition is reportable under 10 CFR 50.73(a)(2)(i)(B), "Operation or Condition Prohibited by Technical Specifications."

**EVENT DESCRIPTION**

On November 4, 2006, at approximately 1810 hours, with the plant operating at approximately 20 percent power in Mode 1, Operations determined that the HPCI System was inoperable due to HPCI flow and turbine speed oscillations during surveillance test ST-4N "HPCI Quick Start, Inservice and Transient Monitoring Test (IST)", performed as part of post work testing following refueling outage work activities. The HPCI pump flow oscillated between 3646 gallons per minute (gpm) and 4375 gpm, within range limits and above the minimum TS flow requirement of 3400 gpm. The frequency of these cycles ranged from three to five seconds.

During this ST, the HPCI System operated for approximately one minute within required flow ranges but was manually tripped by the Operations crew when oscillations did not improve. The Operations crew declared the HPCI System inoperable until the unexpected oscillations could be evaluated and resolved. TS Limiting Conditions for Operation (LCO) 3.5.1 Condition C was entered with an Allowed Out of Service Time (AOT) of 14 days.

The NRC Operations Center was informed via the Emergency Notification System at 2101 hours on November 4, 2006 in accordance with 10 CFR 50.72(b)(3)(v). All other Emergency Core Cooling Systems (ECCS) and the Reactor Core Isolation Cooling System (RCIC) remained operable.

During troubleshooting of the HPCI turbine, mechanics discovered two hydraulic oil lines to the HPCI turbine EG hydraulic actuator connected to the wrong oil ports. The "A" and "C" lines were connected to the "C" and "A" ports respectively. With the "A" line and the "C" lines swapped the flow of oil to and from the servo piston was impacted. Instead of hydraulic oil from the pump being supplied directly to one end of the buffer piston it was supplied to the underside of the power piston and the supply oil that should have been connected to the underside of the power piston was instead connected to the seal grooves in the servo. This caused the HPCI EG hydraulic actuator buffer mechanism to be bypassed which resulted in turbine speed oscillations.

The oil lines were reconfigured to their proper ports and ST-4N was commenced at 0658 hours on November 5, 2006 at approximately 977 psig. HPCI flow and turbine speed was as expected with no abnormal oscillations. HPCI was declared

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**EVENT DESCRIPTION (continued)**

OPERABLE at 1100 hours on November 5, 2006.

At 0704 during the 11/04/06 startup, HPCI satisfied the low-pressure operability surveillance test, by developing the required discharge pressure and flow, and HPCI was considered to be OPERABLE. At 1418 reactor pressure reached 970 psig. At 1501 the Reactor Mode Switch was placed in Run (MODE 1). The high-pressure operability surveillance test was initiated at 1520, and this test resulted in HPCI being declared inoperable, which caused Rev. 0 of this LER to be generated. It was not recognized at that time that since the governor hydraulic lines were reversed during the refueling outage maintenance activity, the HPCI was inoperable prior to the plant entering into MODE 1, regardless of the fact that HPCI had passed the low-pressure operability test prior to entering into MODE 1. This issue was identified in Condition Report CR-JAF-2009-01076, and the CR resulted in this LER revision being initiated.

**CAUSE OF EVENT**

A HPCI minor maintenance inspection was performed in October 2006 during refuel outage 17. This inspection consisted of removal and inspection of the Gland Seals, Journal Bearings, Thrust Bearings, the Over Speed Trip Tappet and measurements of shaft thrusts, bearing clearances and seal clearances. Maintenance Department mechanics reattached the control oil lines incorrectly during these planned HPCI maintenance activities and failed to adequately self-check or adequately perform a procedurally required verification. The "A" and "C" oil ports on the actuator were correctly identified using an ink marker plus hard punch marks from previous maintenance and the oil tubing is correctly identified with permanent plastic labels. No time or situational pressures during these maintenance activities were identified. The cause of the incorrectly connected EG hydraulic actuator oil lines was inadequate work practice.

[Cause Code A]

The cause of not recognizing (and thus not reporting) the Mode change with HPCI inoperable is human error. The apparent cause of this error is that HPCI had passed the low-pressure operability test, and thus, was considered to be OPERABLE prior to the Mode change.

**EVENT ANALYSIS**

Actual Consequences

Because the HPCI System had been taken out of service for surveillance testing at the time of this event, actual consequences were limited to the unplanned unavailability of the system.

The HPCI System was last tested as required by TS and declared operable on November 4, 2006, at 0706 hours upon satisfactory completion of ST-4N at 150 psig reactor pressure. Oscillations were not observed during this test. HPCI was placed in stand-by until the required operability run at rated reactor pressure, performed at 1810 hours, at which time oscillations occurred and HPCI declared inoperable. HPCI was repaired, tested and declared operable at 1100 hours on November 5, 2006. It is conservatively estimated that HPCI was inoperable for approximately 28 hours, which is well within the TS LCO 3.5.1 Allowed Out of Service Time (AOT) of 14 days.

Potential Consequences

The HPCI System is required to function as an injection source to mitigate Loss of Coolant Accidents over a reactor pressure range from 150 psig to 1195 psig. Following this event, an evaluation was conducted to determine if the condition described in this report would have prevented the HPCI system from successfully injecting to the reactor. Due to the potential impact of the continued speed oscillations on various HPCI System critical components, operability could not be confirmed for the HPCI mission time of 8 hours.

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**EVENT ANALYSIS (continued)**

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.

The HPCI System achieved the required minimum flow requirement in the required time as demonstrated during the surveillance tests. However, the operability evaluation concluded that operability could not be confirmed over HPCI's entire mission time, assuming the oscillations continued. This condition is therefore considered reportable under 10 CFR 50.73(a)(2)(v)(B) and (D), "Any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to remove residual heat and mitigate the consequences of an accident."

There were no adverse nuclear, radiological or safety consequences associated with this event.

**CORRECTIVE ACTIONS**

*Corrective Actions Completed by JAF Prior to this Report:*

1. Reconnected the HPCI oil lines to the correct ports.
2. Counseled the involved Maintenance Department mechanics regarding proper use of self-checking, peer checking, and verification practices.
3. Provide performer/verifier training to mechanics.
4. Revised LER to reflect the additional reporting criterion.
5. Briefed Licensing Personnel on human performance errors associated with the missed reporting criterion.

*Corrective Actions not yet Completed:*

1. None

**SAFETY SYSTEM FUNCTIONAL FAILURE REVIEW**

The HPCI inoperability constituted a Safety System Functional Failure as defined by NEI 99-02 Revision 4

**SIMILAR EVENTS**

A review of LERs at JAF identified four LERs concerning HPCI; LERs 1999-011, 2000-002, 2000-013 and 2000-016. The corrective actions from those events are not expected to have prevented this event because the cause of this event is unrelated.

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**FAILED COMPONENT IDENTIFICATION**

There was no component failure. The event was caused by incorrectly configured control oil lines caused by human error during maintenance activities. The affected component information is as follows:

Component Description: HPCI Turbine Hydraulic Governor Actuator

Component Mark Number: 23GOV-1

Manufacturer: Woodward Governor Company

Model Number: DR9903-099

**REFERENCES**

1. JAF Condition Report CR-JAF-2006-04754, HPCI Flow and Turbine Speed Oscillations.
2. JAF Condition Report CR-JAF-2006-04738, HPCI Turbine Slow Roll Test Aborted.
3. JAF Condition Report CR-JAF-2009-01076, Failure to Report Mode Change With HPCI Inoperable.