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Michael J. Colomb
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October 29, 2012
JAFP-12-0132

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

SUBJECT: LER: 2012-002, High Pressure Coolant Injection System Pressure Control Valve Failure
James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
License No. DPR-59

Dear Sir or Madam:

This report is submitted in accordance with 10 CFR 50.73(a)(2)(v)(D), "Any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident."

There are no commitments contained in this report.

Questions concerning this report may be addressed to Mr. Chris Adner, Licensing Manager, at (315) 349-6080.

Sincerely,

Michael J. Colomb
Site Vice President

MC/CA/jo

Enclosure(s): LER: 2012-002, High Pressure Coolant Injection System Pressure Control Valve Failure

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

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013

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 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@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.

LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
James A. FitzPatrick Nuclear Power Plant	05000333	1 OF 5

4. TITLE

High Pressure Coolant Injection Pressure Control Valve Failure

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
									N/A	05000
08	30	2012	2012	– 002 –	00	10	29	2012	FACILITY NAME N/A	DOCKET NUMBER 05000

9. OPERATING MODE

1

10. POWER LEVEL

100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☒ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER *(Include Area Code)*
Mr. Chris Adner, Licensing Manager	(315) 349-6080

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
D	BJ	PCV	M120	N					

14. SUPPLEMENTAL REPORT EXPECTED

☐ Yes (If yes, complete 15. *EXPECTED SUBMISSION DATE*) ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On August 28, 2012, while testing the High Pressure Coolant Injection System (HPCI), it was discovered that water was leaking into the reactor building sump (20TK-69A). This leakage was due to the lifting of HPCI booster pump recirculation safety valve (23SV-66) caused by a failure of HPCI booster pump P-1B recirculation pressure control valve (23PCV-50).

Due to the amount of leakage, the HPCI system may not have been able to meet its mission time without realigning its suction source to the torus. As a result, HPCI was declared inoperable. The most probable cause of the 23PCV-50 failure was material introduced into the sensing line and sensing line filter when the system was filled using torus water during a maintenance activity on June 8, 2012. Immediate corrective actions included replacing the snubber and filter, refilling the sensing line with condensate storage tank water, and then venting the system. Future corrective actions will include revising the procedure used to fill the HPCI system such that it contains additional guidance when filling the HPCI suction piping.

This event is reportable in accordance with 10 CFR 50.73(a)(2)(v)(D) as an event or condition that could have prevented the fulfillment of a safety function of a system required to mitigate the consequences of an accident.

NARRATIVE

BACKGROUND

On January 18, 1988, a design change was made that installed a larger inline filter in the pressure sensing line for the High Pressure Coolant Injection (HPCI) [EIIS System Identifier: BJ] booster pump P-1B recirculation pressure control valve (23PCV-50) [EIIS Component Identifier: PCV]. This change was made because of several instances where the 23PCV-50 filter or snubber would become blocked by debris thereby preventing the pressure control valve from controlling. A two year preventative maintenance (PM) activity was also established to clean, inspect, and replace the filter and snubber.

On April 30, 2012, a new revision of OP-15, "High Pressure Coolant Injection" was issued. This revision of OP-15 added a new section, G.9, "Fill and Vent HPCI Suction Piping From Condensate Storage Tanks (CST)," to address a corrective action identified during the Nuclear Regulatory Commission (NRC) inspection on gas accumulation earlier in the year.

On June 8, 2012, a HPCI outage was conducted in order to perform PM on HPCI Booster Pump P-1B Suction From Suppression Pool Check Valve (23HPCI-61) [EIIS Component Identifier: V]. This required the HPCI system to be isolated and drained, including the pump and suction line piping. In addition, the filter and snubber on the pressure sensing line for 23PCV-50 were also replaced as required by the PM.

During restoration, a portion of the HPCI suction piping was filled and vented from the torus per OP-15, Section G.8, "Fill and Vent HPCI Suction Piping from Torus." The remaining HPCI suction piping was filled and vented from the CSTs in accordance with OP-15, Section G.9. Post work and return to service testing was completed satisfactory three days later and operability was demonstrated by a successful completion of ST-4N, "HPCI Quick-Start, Inservice, and Transient Monitoring Test (IST)."

EVENT DESCRIPTION & ANALYSIS

On August 28, 2012, while running the HPCI turbine for ST-4N, several annunciators were received in the control room, indicating that the reactor building equipment sump "A" (20TK-69A) [EIIS Component Identifier: TK] was being overflowed and water was running down into the floor sump. This condition was confirmed visually by an operator. At that time the source of the extra water was unknown. Since the volume of water entering 20TK-69A was greater than what was expected to come from the HPCI system. It was assumed that torus water was coming through a leaking check valve on the discharge of the reactor building equipment drain sump pump. At the time of discovery, torus water level was being lowered by pumping it to the radwaste system [EIIS System Identifier: WD] via the equipment drain discharge header.

On August 30, 2012, operators performed ST-4E, "HPCI and SGT Logic System Functional and Simulated Automatic Actuation Test." The data collected during this surveillance revealed that while the HPCI turbine was in operation, there was approximately 75 gpm of water going into the "A" reactor building sump. The source of this water was determined to come from HPCI Booster Pump P-1B Recirculation Safety Valve (23SV-66) [EIIS Component Identifier: RV] which was lifting on high pressure. Troubleshooting determined that the cause of 23SV-66 to lift was a failure of 23PCV-50 to properly control pressure.

Control pressure for 23PCV-50 is 75 psia which is the design pressure for the HPCI lube oil cooler (23E-2) [EIIS Component Identifier: CLR] and gland seal condenser (23E-1) [COND]. However, data collected during the ST-4E run on August 30, 2012, demonstrated that 23PCV-50 was not repositioning as expected. The increased down stream pressure caused 23SV-66 to lift, allowing CST water into the reactor building equipment sump.

The HPCI system is considered operable when it is aligned to one or both CSTs with power available to support automatic realignment to the suppression pool if required. This is based on the design of the CSTs and the accident analysis which credits the suppression pool for supplying the HPCI System. With an assumed leakage of 75 gpm of CST water being directed into 20TK-69A, HPCI may not have been able to meet its mission time without realigning its suction to the torus.

As a result, HPCI was declared inoperable on August 30, 2012. On September 2, 2012, after replacing the sensing line filter and snubber; flushing the system with clean CST water; and successfully performing return to service testing; HPCI was restored to operable status. This was reported to the NRC on August 30, 2012, via ENS #48258. It is being reported in this LER in accordance with 10 CFR 50.73(a)(2)(v)(D), any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident.

CAUSE OF EVENT

Mechanistic

The apparent cause of the event was determined to be material in the 23PCV-50 sensing line and filter. This was validated by physical inspection during troubleshooting. The material was a result of filling and venting the 23PCV-50 sensing line with torus water containing suspended solids.

Normally the 23PCV-50 sensing line is maintained full of water. With its short stroke, suspended solids don't make their way up the line and into the filter. However, during the HPCI LCO in June, both the HPCI system and the 23PCV-50 pressure sensing lines were drained at the same time. Therefore, when the HPCI suction piping was filled from the torus, the sensing line was also filled. This resulted in suspended solids from the torus water clogging the filter in the sensing line.

Programmatic

The event was reviewed for organizational and programmatic deficiencies that may have caused or contributed to the event. It was determined that Operations Procedure, OP-15 had insufficient detail in its guidance for filling and venting from the torus. This had the unintended consequence of filling portions of the HPCI line, including the instrument line for 23PCV-50, with material from the torus.

EXTENT OF CONDITION

An extent of condition review was performed for other PCVs subject to the same failure mode. The systems reviewed were HPCI, Reactor Core Isolation Cooling [EIIS System Identifier: BN], Residual Heat Removal [EIIS System Identifier: BO], and Core Spray [EIIS System Identifier: BM]. This review did not identify any other PCV that was applicable to the failure mode described in this LER.

FAILED COMPONENT IDENTIFICATION

Description: HPCI Booster Pump P-1B Recirc Pressure Control Valve
Manufacturer: Masoneilan Intl, Inc.
Model/Part Number: 525
NPRDS Manufacturer Code: M120
FitzPatrick Component ID: 23PCV-50

CORRECTIVE ACTIONS

Completed

- The PCV in-line filter and snubber have been replaced.
- The pressure sensing line for 23PCV-50 was flushed with clear water.
- 23PCV-50 was tested satisfactory.
- All other components in the HPCI system have been evaluated for extent of condition, and are not susceptible to this failure mode.
- HPCI system has been tested successfully per ST-4N.

Future Actions

- Revise OP-15 to add additional guidance for filling the HPCI suction piping.
- Evaluate a design change to have 23SV-66 discharge into torus vice equipment sump.
- Revise PM to fill sensing line using a clean water source.

ASSESSMENT OF SAFETY CONSEQUENCES

The HPCI System is designed to provide adequate core cooling to limit fuel clad temperatures in the event of a small break in the Reactor Coolant System piping with a loss of coolant that does not result in rapid depressurization of the reactor pressure vessel (RPV).

The significance of this condition is based on the safety function performed by the HPCI system. With 23PCV-50 not controlling pressure, 23SV-66 would lift continuously with HPCI in operation. This would result in CST water being directed to 20TK-69A. This condition would result in total leakage sources outside containment exceeding the 5 gpm limit established by the Final Safety Analysis Report (FSAR).

Radiological & Industrial Safety

There were no actual or potential radiological or industrial safety consequences as a result of this condition.

Nuclear Safety

There was no actual or potential nuclear safety consequences associated with this condition. At all times HPCI was available to provide a source of RPV water inventory in the event of a loss of coolant accident. Therefore, this is considered a safety system functional failure.

However, this deficiency does have a potential impact on the Primary Coolant Sources Outside Containment Program required by TS 5.5.2. This program is in place to ensure that leaks are tracked, assessed, and prioritized such that the potential to exceed post accident release rates are minimized. With respect to this program, it would only be impacted in the event that the HPCI suction was aligned to the torus.

The potential impact of this condition was minimized because during the course of this event, the HPCI system suction was aligned to the CST's. In addition, Emergency Operating Procedures (EOP) preferentially maintain the HPCI suction aligned to the CSTs.

SIMILAR EVENTS

Internal operating experience (OE) was reviewed through Entergy's corrective action program. There were no relevant events found. Similarly, external industry OE was reviewed via INPO. Although there were several events that had some applicability to JAF, none of the events were relevant with regards to the event being reported in this LER. Insights from the OE search were incorporated into the corrective action plan.

REFERENCES

- JAF Condition Reports: CR-JAF-2012-04994, CR-JAF-2012-04958, CR-JAF-2012-03015
- JAF TS 3.5.1, ECCS – Operating, TS 5.5.2 – Primary Coolant Sources Outside Containment
- JAF Engineering Change 39479
- JAF FSAR 6.4.1 High Pressure Coolant Injection System