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Lawrence M. Coyle
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JAFP-13-0125
September 16, 2013

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

Subject: LER: 2013-002, RCIC Condensate Storage Tank Level Switch Inoperable
due to Corrosion

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)(i)(B), An Operation or Condition Prohibited by Technical Specifications.

There are no commitments contained in this report.

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

Sincerely,


Lawrence M. Coyle
Site Vice President

LMC/CMA/mh

Enclosure(s): JAF LER 2013-002, RCIC Condensate Storage Tank Level Switch Inoperable
due to Corrosion

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

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 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.

1. FACILITY NAME
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2. DOCKET NUMBER
05000333

3. PAGE
1 OF 4

4. TITLE
RCIC Condensate Storage Tank Level Switch Inoperable due to Corrosion

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
08	19	13	2013	- 002 -	00	09	16	13	N/A	N/A
									N/A	N/A

9. OPERATING MODE
1

10. POWER LEVEL
100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (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)
<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 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 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. Chris M. Adner, Licensing Manager
TELEPHONE NUMBER (Include Area Code): (315) 349-6766

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
C	EJ	LS	R290	Y					

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)

The Reactor Core Isolation Cooling (RCIC) "B" condensate storage tank (CST) level switches failed to trip due to corrosion build-up caused by water intrusion. The first instance in which corrosion interfered with the trip mechanism was when 13LS-76B failed to trip due to corrosion while testing on July 16, 2013. The second instance was both 13LS-76B and 13LS-77B failed to trip due to corrosion on August 19, 2013. These two instruments are 2 of 4 channels for the CST low level function of the RCIC system. The "A" side channels are Operable and show no signs of being affected by corrosion or water intrusion. The "B" side channels share a junction box which is evidently the source of water intrusion from environmental conditions of the CST pit. This deficiency is being corrected by replacing the affected level switches and update testing procedures to identify signs of corrosion.

The Technical Specifications (TS) requires all 4 RCIC CST level switches be Operable. Since two of the level switches were Inoperable due to corrosion the RCIC system also became Inoperable. Since the actions prescribed by the TS were not performed, the RCIC had been in a condition prohibited by TS, 10 CFR 50.73(a)(2)(i)(B).

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NARRATIVE

Background

Reactor Core Isolation Cooling (RCIC) System [BN] is comprised of various components which include pumps, valves, piping, and instrumentation. The RCIC System is designed to operate either automatically or manually following reactor pressure vessel isolation accompanied by a loss of coolant flow from the feedwater system to provide adequate core cooling and control the reactor water level under these conditions. The normal water source for the RCIC is the Condensate Storage Tanks (CST) [KA] 33TK-12A and 33TK-12B.

Low CST Level indicates the unavailability of an adequate supply of makeup water from this normal source (CST). Normally, the suction valve between the RCIC pump and the CSTs is open and, upon receiving a RCIC initiation signal, water for RCIC injection would be taken from the CSTs. However, if the water level in both CSTs falls below a preselected level, the water source is automatically changed to the suppression pool. This ensures that an adequate supply of makeup water is available to the RCIC pump.

Level switches detect the water level for the 2 CSTs. Each tank has 2 RCIC instrumentation level switches, 13LS-76A and 13LS-77A for the "A" tank and 13LS-76B or 13LS-77B for the "B" Tank. Four channels of low CST level function are available and are required to be Operable when RCIC is required to be Operable to ensure that no single instrument failure can preclude RCIC automatic suction source alignment to suppression pool source.

Preceding events

On 01-04-2013, 13LS-77B did not actuate (trip) on low CST water level during ISP-75-1. The other three level switches operated satisfactory. The 13LS-77B was then re-tested and operated satisfactory. The switch was disassembled and water was found in the switch casing. The Apparent Cause for the source of the water was from the environmental conditions in the CST pit. Water penetrated through the junction box (JB-CIC-31) into a conduit to the level switch assembly. The junction box has weep holes to drain water; however, it was evident that there was a buildup of water in the junction box due to foreign material blocking the weep hole. The weep hole was cleaned and the contacts in the level switch were replaced. The excessive water in the switch affected the switch operation by causing intermittent failure.

On 03-28-2013, ISP-75-1 was performed successfully for all 4 RCIC CST level switches.

EVENT DESCRIPTION

On 07-16-2013, 13LS-76B did not trip on low CST water level during ISP-75-1. The other three level switches actuated (tripped) properly. When the top cover was removed the technician stated that it took excessive force to manually actuate the switch. Once the switch was freed up it worked repeatedly. There was evidence of corrosion due to water intrusion into the electrical top works and that the water was apparently coming from within the upstream conduit and junction box; however, water was not present.

On 08-19-2013, 13LS-76B and 13LS-77B did not trip on low CST water level during ISP-75-1. The plant was at 100% power. Corrosion formation due to water exposure prevented the switch from changing state. The other two "A" CST level switches operated satisfactory.

EVENT ANALYSIS

The failures of 13LS-77B and 13LS-76B both stem from water intrusion into the switch casing from their shared junction box (JB-CIC-31) and associated conduit. The junction box and level switches are not Environmentally Qualified devices. Rain water or run off water from conditions in the CST pit were able to penetrate the junction box and make its way through the conduit to the level switch assembly. Only one of two level switches (13LS-76B or 13LS-77B) for "B" CST and one of the two level switches (13LS-76A or 13LS-77A) for "A" CST are required to perform the swap from the CST to the suppression pool. This condition only affects the "B" CST level

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switches.

In January, water present in the switch directly caused the failure of 13LS-77B. There is no firm evidence that the level switches continued to be Inoperable as a result of excessive water after the January event. On March 28, 2013, ISP-75-1 was performed successfully for all RCIC CST level switches. Later, in July and August, both "B" CST level switches (13LS-76B and 13LS-77B) experienced corrosion on the trip mechanism from water exposure.

Whenever a level switch was tested and did not trip repairs were performed and the level switch was restored to Operable status prior to exiting the maintenance activity. However, as a consequence of corrosion, the "B" CST level switches were Inoperable from July 16, 2013, until restoring the level switches to Operable status after the event of August 19, 2013.

RCIC Instrumentation

Limiting Condition of Operation (LCO) 3.3.5.2 requires that the RCIC System instrumentation for each 4 channels of Low CST water level be Operable while in Mode 1, Mode 2, and Mode 3 with reactor steam dome pressure > 150 psig. When the channel was inoperable, Condition D action required that the channel be placed in trip. When this condition was not met Condition E required that RCIC be declared inoperable.

LCO 3.5.3 required RCIC be restored to Operable within 14 days or be in Mode 3.

Since both level switches 13LS-76B and 13LS-77B were Inoperable between July 16, 2013 and August 19, 2013. This period of time is longer than allowed by the Technical Specifications (TS); therefore, JAF had a condition reportable per 10 CFR 50.73(a)(2)(i)(B) as prohibited by TS.

High Pressure Coolant Injection (HPCI) Operability [BJ]

LCO 3.5.1 Condition C states that if HPCI is Inoperable then verify RCIC is Operable administratively. When RCIC is concurrently Inoperable then Condition G requires the plant to be in Mode 3 within 12 hours. The history of HPCI Operability was verified since January 1, 2013. All Inoperable instances were associated with the performance of normal surveillance procedures. At no point was HPCI Inoperable for greater than 12 hours. Therefore, this condition was not prohibited by TS 3.5.1 or the corresponding RCIC TS 3.5.3 Condition B.

CAUSE OF EVENT

The Apparent Cause of the failure of Reactor Core Isolation Cooling (RCIC) instrumentation for the "B" Condensate Storage Tank (CST) level switches was corrosion initiated by water intrusion. The source of the water into the level switches assembly came from junction box JB-CIC-31 shared by the level switches (13LS-76B and 13LS-77B).

EXTENT OF CONDITION

The only susceptible level switches to this condition were those associated with the "B" CST (13LS-76B and 13LS-77B) due to a shared junction box. There is no evidence that supports that either the "A" CST level switches 13LS-76A or 13LS-77A were inoperable or that the corresponding HPCI level switches 23LS-74A, 23LS-75A, 23LS-74B, 23LS-75B were inoperable.

FAILED COMPONENT IDENTIFICATION:

Manufacturer:	Robertshaw Controls
Manufacturer Model Number:	SL301-A2XS11-C31-1
NPRDS Manufacturer Code:	R290
NPRDS Component Code:	LS
FitzPatrick Component ID:	13LS-76B and 13LS-77B

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CORRECTIVE ACTIONS

Completed Actions

- Replaced affected components of 13LS-77B on 1/10/13
- Opened junction box JB-CIC-31 and cleared obstruction on 1/10/13
- Temporarily increased ISP-75-1 frequency to 45 days.
- Revise ISP-75-1 and ISP-75 to inspect and verify satisfactory condition of the junction box, switches, and corresponding conduit during the quarterly surveillance tests.

Post 8-19-13

- 13LS-76B placed in trip
- 13LS-77B corroded components replaced and level switch returned to Operable status

Future Actions

- Replace 13LS-76B in its entirety
- Examine the extent of the Corrosion Condition in the "A" CST level switches and the four corresponding HPCI level switches.
- Evaluate and implement a method to prevent or reduce water intrusion into HPCI and RCIC CST level switches.

SAFETY SIGNIFICANCE

Nuclear Safety

There were no actual nuclear safety consequences during this period as a result of this event.

The potential consequence was that the RCIC system may not have operated as designed. If RCIC was called upon to Operate during an accident scenario and the CSTs ran low on water then RCIC may not have detected this condition and swapped to the alternate water source automatically. Since this condition only affects 2 of 4 channels of RCIC low level CST instrumentation, in order to prevent the required function of the low level CST function both 13LS-76B and 13LS-77B need to fail to trip concurrently. Also, Operators have the ability to manually perform this swap.

JAF accident analysis does not take credit for the operation of the RCIC system. The accident analysis assumes the operation of the HPCI system and operation of the Automatic Depressurization System in conjunction with the Low Pressure Coolant Injection System. These systems were unaffected by the identified condition. Therefore, the potential consequences of the RCIC system inoperable during this period were minimal.

Radiological Safety

No radiological impact or dose associated with this condition.

Industrial Safety

No safety events or abnormal increases to personnel risk.

SIMILAR EVENTS

There are no historical cases of RCIC or HPCI level switches not functioning as a result of corrosion at JAF.

REFERENCES

- January 4, 2013 - CR-JAF-2013-00061
- July 16, 2013 - CR-JAF-2013-03735
- August 19, 2013 - CR-JAF-2013-04311, CR-JAF-2013-04312
- JAF Technical Specifications and Bases, 3.3.5.2, "Reactor Core Isolation Cooling (RCIC) System Instrumentation"
- ISP-75-1, RCIC CST Low Water Level Switch Functional Test