Entergy

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J. E. Pollock
Site Vice President

NL-11-043

May 3, 2011

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Stop O-P1-17
Washington, D.C. 20555-0001

SUBJECT: Licensee Event Report # 2011-004-00, "Technical Specification Prohibited Condition Caused by Two Main Steam Safety Valves Outside Their As-Found Lift Setpoint Test Acceptance Criteria"
Indian Point Unit No. 3
Docket No. 50-286
DPR-64

Dear Sir or Madam:

Pursuant to 10 CFR 50.73(a)(1), Entergy Nuclear Operations Inc. (ENO) hereby provides Licensee Event Report (LER) 2011-004-00. The attached LER identifies an event where there was a Technical Specification prohibited condition for two inoperable Main Steam Safety Valves, which is reportable under 10 CFR 50.73(a)(2)(i)(B) . This condition was recorded in the Entergy Corrective Action Program as Condition Report CR-IP3-2011-00960.

There are no new commitments identified in this letter. Should you have any questions regarding this submittal, please contact Mr. Robert Walpole, Manager, Licensing at (914) 734-6710.

Sincerely,

JEP/cbr

cc: Mr. William Dean, Regional Administrator, NRC Region I
NRC Resident Inspector's Office, Indian Point 3
Mr. Paul Eddy, New York State Public Service Commission
LEREvents@INPO.org

IE22
NRR

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@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
INDIAN POINT 3	05000-286	1 OF 4

4. TITLE: Technical Specification Prohibited Condition Caused by Two Main Steam Safety Valves Outside Their As-Found Lift Setpoint Test Acceptance Criteria

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
										05000
3	08	2011	2011	004 -	00	05	03	2011	FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE

1

10. POWER LEVEL

99%

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

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☒ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☐ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER *(Include Area Code)*
Steven Manzione, Component Engineering Supervisor	(914) 734-6772

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	SB	RV	C710	Y					

14. SUPPLEMENTAL REPORT EXPECTED

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

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

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

On March 8, 2011, during the performance of surveillance procedure 3-PT-R006A, main steam safety valves (MSSV) MS-47-4 and MS-48-4 failed their As-Found lift set point test. In accordance with the test, these valves must lift at +/- 3% of their required setting. Valve MS-47-4 lifted at 1135.4 psig, 8.4 psig outside its acceptance range of 1063 to 1127 psig. Valve MS-48-4 failed to lift at greater than 1161.9 psig which is outside its acceptance range. The other 8 MSSVs tested passed their As-Found test criteria. Technical Specification (TS) 3.7.1, "Main Steam Safety Valves," requires the MSSVs to be operable in accordance with TS Table 3.7.1-1 and Table 3.7.1-2. TS Surveillance Requirement (SR) 3.7.1.1 requires each MSSV be verified to lift per Table 3.7.1-2 in accordance with the Inservice Testing Program. Operability of the MSSVs includes the ability to open within the setpoint tolerances. As these two valves were found outside their limit they failed their As-Found testing. In accordance with NUREG-1022, Section 3.2.2, reporting guidelines, the existence of similar discrepancies in multiple valves is an indication that the discrepancy may have arose over a period of time, and therefore existed during plant operation and is reportable. The direct cause of the two MSSVs lifting greater than 3% of their nominal setpoint is internal friction caused by spindle wear and spring skew. The apparent cause is inadequate frequency for preventive maintenance (PM). Corrective actions include, adjusting and re-testing with an As-Left setting within the +/- 1% As-Left set point criteria, valve overhaul and testing and the increase of PM frequency from 8 years to 6 years, and processing a modification to install bronze wear sleeves in the spring washers and adjusting bolts. The event had no effect on public health and safety.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Indian Point Unit 3	05000-286	2011	- 004 -	00	2 OF 4

NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

Note: The Energy Industry Identification System Codes are identified within the brackets {}.

DESCRIPTION OF EVENT

On March 8, 2011, while at approximately 99% reactor power, at approximately 08:50 hours, during the performance of surveillance procedure 3-PT-R006A, main steam (MS) {SB} safety valves (MSSVs) {RV} MS-47-4 and MS-48-4 failed their As-Found lift set point test. In accordance with the test, these valves must lift at +/- 3% of their required setting. Valve MS-47-4 lifted at 1135.4 psig, 8.4 psig outside its acceptance range of 1063 to 1127 psig. Valve MS-48-4 failed to lift at greater than 1161.9 psig. The other eight MSSVs valves tested passed their As-Found test criteria and were left within +/- 1% of their required setting in accordance with the test procedure. Adjustments were made to MS-48-4 in accordance with the test procedure and subsequent re-testing was successful in getting the valve to lift. MS-48-4 was then re-adjusted and left to +/- 1%, satisfying the As-Left set point criteria. No adjustments were required to be made for MS-47-4 as its subsequent lifts were lower than the original and fell within the +/- 1% As-Left set point criteria. Technical Specification (TS) 3.7.1,(Main Steam Safety Valves), requires the MSSVs to be operable in accordance with TS Tables 3.7.1-1 and 3.7.1-2. TS Surveillance Requirement (SR) 3.7.1.1 requires each MSSV be verified to lift per Table 3.7.1-2 in accordance with the Inservice Testing (IST) Program. Operability of the MSSVs is determined by periodic surveillance testing in accordance with the TS and IST program. As these two valves were found outside their limit they failed their As-Found test criteria. MS-47-4 and MS-48-4 are associated with SG-34.

There are five code safety valves (MSSVs) and one atmospheric dump valve (ADV) {RV} on each main steam (MS) line outside the Reactor Containment {NH} and upstream of the MS isolation valves {ISV}. The MSSVs consist of four 6-inch by 10-inch and one 6-inch by 8-inch valve per SG on each of four MS lines for a total of 20 valves. The MSSV's also provide a heat sink for the reactor coolant system if the Main Condenser is unavailable and the Atmospheric Dump Valves can not relief steam line pressure. The five valves on each steam line are set to open at 1065, 1080, 1095, 1110, and 1120 psig. The operability of the MSSVs is defined as the ability to open within the set points tolerances, relieve SG overpressure, and reset when pressure has been reduced. The accident analysis requires five MSSVs per SG to provide overpressure protection for design basis transients occurring at 102% reactor thermal power. The MSSVs are Code relief valves, manufactured by Crosby Valve and Gauge Company {C710}. Valves MS-47-4 and MS-48-4 are 6-inch by 10-inch valves Model # HC-65W-6R10.

An extent of condition (EOC) was performed that As-Found tested two additional valves in In-Service Test (IST) Group II for each failure (4 additional valves total). All 4 EOC valves were found satisfactory. All the IST Group II valves (MSSVs) have been tested within the last four years. All MSSVs have been tested in the last four years per the IST program.

Cause of Event

The direct cause for lifting at greater than 3% of their nominal set point was due to internal friction caused by spindle wear and spring skew. All springs exhibit some spring skew causing the spindle and internals to not remain perpendicular to the centerline of the valve and creating contact with the guide. In most cases the spring skew is acceptable but if the spring skew is too great it will push the moving internal parts off to one side and produce frictional forces that will affect the set point. The typical result is the relief valve lifts too high.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Indian Point Unit 3	05000-286	2011	- 004 -	00	3 OF 4

During the Preventive Maintenance (PM) of both valves, run-out and wear along the radius of the spindles were noted. In a high flow system, the result would be increased wear along the spindle in the form of steps which were found with MS-47-4 and MS-48-4. The resulting frictional force normally occurs on the first lift and then disappears. The valve vendor noted there is no fix for spring skew but increasing the inner diameter of the guide will reduce the probability of the spindle coming in contact with the guide bearing. Both valves have previously had their guide bearing inner diameters increased. The valve vendor did not recommend any further increasing of the guide bearing diameter. The apparent cause was inadequate PM. It is known that all valves experience wear and in most cases the wear is low level and does not have any adverse affect on valve operation. However, in some cases, spindle wear can cause additional friction and out-of-specification set point during As-Found testing. The MSSV's are installed in a high flow, high pressure system causing the spindles to touch their contact points including the spring washer inside diameter (ID) and adjusting bolt ID, resulting in wear in the form of steps on the spindle. When the valves are actuated during set pressure testing, it is possible for these steps to touch their contact points causing increased friction in the opening direction and resulting in elevated As-Found set pressures. This is the likely cause of the test failures for MS-47-4 and MS-48-4.

Corrective Actions

The following corrective actions have been or will be performed under Entergy's Corrective Action Program to address the cause and prevent recurrence:

- Adjusted and tested each valve (MS47-4, MS-48-4) and left both valves within the +/- 1% As-Left set point criteria.
- In accordance with the In-service Test (IST) program two additional valves in IST Group II were tested for each failure (4 additional valves). All four extent of condition (EOC) valves tested satisfactorily.
- Performed Preventive Maintenance (PM) on each valve (MS47-4, MS-48-4) and replaced the valve spindle on each valve.
- The MSSV PM frequency was increased from an 8 year cycle to a 6 year cycle.
- A modification will be processed to install bronze wear sleeves in the spring washers and adjusting bolts.
- The unit 2 and 3 MSSV's will be re-classified in EN-DC-153 (Preventive Maintenance Component Classification) as severe environment components.

Event Analysis

The event is reportable under 10CFR50.73(a)(2)(i)(B). The licensee shall report any operation or condition which was prohibited by the plant TS. TS 3.7.1,"Main Steam Safety Valves," requires the MSSVs to be operable in accordance with TS Tables 3.7.1-1 and 3.7.1-2. TS Surveillance Requirement (SR) 3.7.1.1 requires each MSSV be verified to lift per Table 3.7.1-2 in accordance with the Inservice Testing Program. Operability of the MSSVs includes the ability to open within the setpoint tolerances. As these two valves were found outside their limit they failed their As-Found testing criteria. In accordance with NUREG-1022, Section 3.2.2, reporting guidelines, the existence of similar discrepancies in multiple valves is an indication that the discrepancy may have arose over a period of time, and therefore existed during plant operation and is reportable.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Indian Point Unit 3	05000-286	2011	- 004 -	00	4 OF 4

NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

Past Similar Events

A review was performed of Licensee Event Reports (LERs) for the past three years for any events reporting TS prohibited conditions due to multiple test valve failures. LER-2009-002 reported a similar event where two MSSV's failed their As-Found lift set point test. The apparent cause was indeterminate but most likely caused by setpoint drift. Setpoint drift was not the cause identified for this LER. Unit 2 LER-2010-002 reported two MSSV's failures, one of which was due to valve spring skew and the other was set point drift. The inner diameter of both valves guide bearings were increased to reduce the potential for spring skew. The work history of the valves reported in this LER were determined to have had their guide bearing inner diameters increased to the vendor recommended maximum. A corrective action (CAs) for one valve (MS-48C) reported in LER-2010-002 was to polish out a mark on the spindle where it had been coming in contact with the guide bearing. The valve spindle was not replaced. After reviewing the collective issues from the past events, the frequency of the PM for the MSSVs has been increased from 8 to 6 years. This action will encompass the issues identified in the previous recent events.

Safety Significance

This event had no effect on the health and safety of the public. There were no actual safety consequences for the event because there were no accidents or transients requiring the MSSVs.

There was no significant potential safety impact of the condition under reasonable and credible alternate conditions. Had an accident or transient occurred during the condition of the two out of tolerance MSSVs, the condition would not have significantly affected accident mitigation capability and the MSSVs overpressure function would have been adequate. The design basis of the MSSVs is to limit the secondary system pressure to 110% of design pressure when passing 100% of design steam flow. The combined MSSVs are sufficient to relieve 108% of design steam flow. Each MS line has an ADV capable of releasing steam to the atmosphere. The ADVs have the capability to relieve approximately 10% of total steam. The combined pressure relief capability of the MSSVs and ADVs is approximately 118% of rated steam flow and adequate pressure relief was available with 18 of 20 MSSVs and 4 ADVs as a result of 2 of 20 MSSVs being out of tolerance. The limiting UFSAR Chapter 14 transients which do not credit the ADVs and which are impacted by the higher MSSV set points, were evaluated and it was concluded that the acceptance criteria for the transients would have been met with the two out of tolerance MSSVs.