Entergy

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John A. Ventosa
Site Vice President

NL-13-074

May 13, 2013

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

SUBJECT: Licensee Event Report # 2013-004-00, "Technical Specification (TS) Prohibited Condition Due to Leak in the Reactor Coolant Pressure Boundary Caused by Defects in a Weld on Seal Table In-Core Detector Drive E-11"
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) 2013-004-00. The attached LER identifies an event where there was a Technical Specification (TS) prohibited condition due to a leak in the Reactor Coolant Pressure Boundary caused by defects in a weld on seal table In-Core detector drive E-11 which is not permitted by the TS, therefore 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-IP3-2013-01556.

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) 254-6710.

Sincerely,

JAV/cbr

cc: Mr. William Dean, Regional Administrator, NRC Region I
NRC Resident Inspector's Office, Indian Point 2
Ms. Bridget Frymire, New York State Public Service Commission
LEREvents@inpo.org

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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: 50 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-I0202, (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 Due to a Leak in the Reactor Coolant Pressure Boundary Caused By Defects in a Weld on Seal Table In-core Detector Drive E-11

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
03	14	2013	2013-	004 -	00	05	13	2013		05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE

6

10. POWER LEVEL

0%

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)*
Nelson Azevedo, Supervisor Code Programs	(914) 254- 6775

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
B	AB	PSP	U080	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 14, 2013, during a scheduled refueling outage (RO) boric acid program walk down inspection, boron residue was identified on the fillet weld which attaches the E-11 in-core guide tube to the seal table. Since there was no visible leak path indication that the leak had initiated at the high pressure mechanical seal connection located just above the fillet weld, the boron residue was cleaned and a surface examination [i.e., Liquid Penetrant Test (PT)] was performed on the fillet weld. Although this surface examination did not identify any rejectable indications at the leak location, it did identify rounded indications in the weld which could have been the cause of the leakage. No linear indications (i.e., cracks) were identified on the weld or on the guide tube base material above the toe of the weld. Because PT results showed rounded indications in the weld and boron residue was present, the condition was judged to represent a potential through wall defect therefore a Reactor Coolant leak path. The seal table In-core detector guide tube is part of the reactor coolant pressure boundary (RCPB). Technical Specification (TS) 3.4.13 does not allow any RCPB leakage. The apparent cause of the defect was OD initiated stress corrosion cracking of the stainless steel guide tube base material under the fillet weld. It is postulated that the rounded indications on the weld metal allowed contaminants from previous mechanical joint leaks to contact the guide tube base material under the weld resulting in SSC of the tube base material. Corrective actions included VT-2 visual examination of the remaining seal table penetrations to verify that no additional through wall leaks were present and the leaking guide tube was removed from service by cutting the tube below the leaking area and installing a welded plug to form a new RCPB. The event had no significant effect on public health and safety.

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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 14, 2013, during a scheduled refueling outage (RO) boric acid program walk down inspection, boron residue was identified on the fillet weld which attaches the E-11 in-core guide tube to the seal table. Since there was no visible leak path indicating that the leak had initiated at the high pressure mechanical seal connection located just above the fillet weld, the boron residue was cleaned and a surface examination [i.e., Liquid Penetrant Test (PT)] was performed on the weld. Although this surface examination did not identify any rejectable indications at the leak location, it did identify rounded indications in the fillet weld which could have been the cause of the leakage. No linear indications were identified on the weld or on the guide tube base metal above the toe of the weld. Because the PT results showed rounded indications in the weld and boron residue was present, the condition was judged to be an indication of a potential through wall defect therefore, a reactor coolant leak path. In August 2012 a maintenance walkdown identified dried boron residue at this location (CR-IP3-2012-02668). The boron was cleaned from the weld and a VT-1 (examination of imperfections) and a VT-2 (leakage) examination was performed. No active leakage or deformities were identified. The boron observed was limited, dry, and easily removed. No evidence of thru-wall defects were observed. Based on the results of the examinations Engineering concluded the area of interest was structurally sound with no reactor coolant pressure boundary (RCPB) leak. The seal table in-core detector guide tube is part of the RCPB. Technical Specification (TS) 3.4.13 (RCS Operational Leakage) does not allow any RCPB leakage. The condition was recorded in the Indian Point Energy Center (IPEC) Corrective Action Program (CAP) as Condition Report CR-IP3-2013-01556.

Inspections are performed during ROs on systems, components and piping inside containment that contain borated water and fall within the requirements of the Boric Acid Program. During the Unit 3 2013 spring RO, inspections identified locations where dry boron had accumulated. Each location was evaluated to determine if additional actions were required. As a result of these inspections, one location with boron deposits was judged to represent a through wall defect in RCPB. None of the remaining locations with boron deposits were attributed to RCPB leakage.

The E-11 in-core guide tube up to the seal table is approximately 1.0 inches in diameter up to the bottom of the seal table and then it reduces down to approximately 0.87 inches as it extends through the seal table up to the high pressure mechanical seal. The thimble tube, which extends into the core inside the reactor vessel, is located inside the guide tube. Reactor coolant fills the annulus between the thimble tube and the outer guide tube. The guide tube material is Type 304 Stainless Steel (SS). The fillet weld where the leak occurred is not a pressure boundary weld but rather a structural weld which attaches the outer guide tube to the seal table.

An extent of condition inspection consisted of visual (VT-2) inspections of the remainder of the guide tube to seal table fillet welds to determine if other signs of boron were also present. This visual inspection did not identify any additional issues at the remainder of these locations.

The Cause of Event

The apparent cause of the through wall defect was OD initiated stress corrosion cracking (SSC) of the stainless steel (SS) guide tube base material under the fillet weld. This conclusion was based on finding no linear or other rejectable indications.

Engineering postulates that the rounded indications on the weld metal allowed contaminants from previous mechanical joint leaks to contact the guide tube base material under the weld resulting in SCC of the tube base material. Type 304 SS does not corrode when exposed to the RCS fluid. However, it is susceptible to stress corrosion cracking when contaminated with chlorides and/or fluorides. OD initiated SCC of SS caused by contaminants has been observed throughout the industry and is the most plausible defect propagating mechanism. ID initiated cracking of SS in PWR water chemistry environment is a lower probability mechanism given the low oxygen content in reactor coolant.

Corrective Actions

The following corrective actions have been performed under the Corrective Action Program (CAP) to address the cause of this event.

- A VT-2 visual examination of the remaining seal table penetrations was performed to verify that no additional defects existed. This examination confirmed that no additional defects existed.
- The defective guide tube was removed from service by cutting the tube below the leaking area and installing a welded plug to form the new reactor coolant pressure boundary. A subsequent inspection of the fillet weld and a pressure test confirmed the integrity of the guide tube and the new plug.

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's Technical Specification (TS). This event meets the reporting criteria because the Limiting Condition for Operation (LCO) for TS 3.4.13 allows no RCPB leakage and based on surface examinations and boron deposits, it was concluded the condition existed during past plant operation and the TS actions not taken.

Past Similar Events

A review was performed of the past three years of Licensee Event Reports (LERs) for events reporting a TS violation due to a through wall defect in the RCPB. No unit 3 LERs were identified reporting RCPB leaks. Unit 2 reported RCPB leakage in two previous LERs: LER-2012-003 and LER-2010-004.

LER-2012-003 reported two through wall defects. Defect #1) Pressure Control Valve PCV-455A Spray Inlet Stop valve 4152 contained a defect on the top of the horizontal leak-off pipe in the base metal approximately one inch from where the pipe connects to the valve bonnet. Defect #2) The socket weld of a 3/8 inch diameter tubing "tee" fitting down stream of valve 4138 contained a defect. The apparent cause of defect 1 (leak-off pipe) was stress corrosion cracking due to surface contamination. The apparent cause of defect 2 was poor quality weld due to insufficient weld reinforcement in part of the weld. Although the cause for defect #1 was similar the corrective action was to eliminate the capped leak-off pipes on RCS valves which would not have prevented the event reported in this LER.

LER-2010-004 reported a leak in the RCPB on a 3/4 inch pipe (#76) upstream of check valve 256B on the 22 Reactor Coolant Pump seal bypass line. The leak was discovered during a Refueling Outage inspection under the Boric Acid Program. The defect was a through wall indication as a result of a minor weld defect from the time of construction. This event is different as it was a result of missing weld material due to poor workmanship.

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

Safety Significance

This event had no significant effect on the health and safety of the public. There were no actual safety consequences from the event because there were no significant failures in the RCPB. Periodic inspections identify leaks when they are small so that repairs can be performed to prevent RCPB degradation. TS 3.4.13 has Surveillance Requirement 3.4.13.1 to verify RCS leakage is within limits by performance of RCS inventory balance every 72 hours. This surveillance ensures the integrity of the RCPB is maintained and provides a trend of leakage early before significant degradation. An early warning of RCPB leakage or unidentified leakage is provided by the systems that monitor containment atmosphere radioactivity and operation of the containment sump. Failure of a RCPB would be a Loss of Coolant Accident (LOCA). A LOCA is analyzed in UFSAR Section 14.3. A minor pipe break (small break) is defined as a rupture of the RCPB with a total cross-sectional area less than 1.0 square foot in which the normally operating charging system flow is not sufficient to sustain pressurizer level and pressure. The results of analysis in UFSAR Section 14.3.3.4 concluded the limiting break was a 3 inch cold leg break. The results of the analysis demonstrated that for a small break LOCA, the Emergency Core Cooling System will meet the acceptance criteria contained in 10CFR50.46. The LOCA analysis of Section 14.3 are bounding for the components reported in this LER.