FPL.

L-2014-137
10 CFR § 50.73
May 15, 2014

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

Re: Turkey Point Unit 3
Docket No. 50-250
Reportable Event: 2014-002-00
Reactor Coolant System Pressure Boundary Leakage at Pressurizer Heater Sleeve Attachment Weld

The attached Licensee Event Report 05000250/2014-002-00 is submitted in accordance with 10 CFR 50.73(a)(2)(ii)(A) to provide notification of the subject event.

If there are any questions, please call Mr. Robert J. Tomonto at 305-246-7327.

Very truly yours,

Michael Kiley
Vice President
Turkey Point Nuclear Plant

Attachment

cc: Regional Administrator, USNRC, Region II
Senior Resident Inspector, USNRC, Turkey Point Nuclear Plant

IE22
NRR

Florida Power & Light Company
9760 SW 344th St., Florida City, FL 33035

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 FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resourse@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
Turkey Point Unit 3	05000250	1 of 4

4. TITLE

Reactor Coolant System Pressure Boundary Leakage at Pressurizer Heater Sleeve Attachment Weld

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
3	19	2014	2014	- 002 -	00	5	15	2014	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE

5

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)0
- ☐ 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)
Robert J. Tomonto	305-246-7327

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

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 March 19, 2014 with the Unit 3 reactor in Mode 5 at 0% power (Cold Shutdown), examination revealed evidence of leakage in the annulus between the outer surface of the Pressurizer heater sleeve and the lower head bore at heater penetration 11. Unit 3 was in Mode 5 in preparation for refueling. Non-destructive examination confirmed that there was no flaw in the heater sleeve indicating that the in-vessel attachment weld was the probable source of leakage. Because of the inability to characterize the flaw in the attachment weld, the most likely root cause is attributed to an original fabrication welding defect in the heater sleeve partial penetration weld further impacted by stress corrosion cracking and/or thermal fatigue. Corrective action involved the installation of a half-nozzle ASME Code repair of heater sleeve 11, which relocated the reactor coolant system pressure boundary to the outside of the Pressurizer lower head at the heater sleeve penetration. Relief was authorized to leave the flaw in place for one operating cycle.

LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET NUMBER	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Turkey Point Unit 3	05000250	2014	- 002	- 00	Page 2 of 4

NARRATIVE

DESCRIPTION OF THE EVENT

On March 17, 2014 with the Unit 3 reactor [AC, RCT] in Mode 5 (Cold Shutdown) boric acid deposits were observed on the bottom of the Pressurizer [AB, PZR] while conducting scheduled visual inspections. Unit 3 was in Mode 5 in preparation for refueling. Further investigation on March 19, 2014 revealed that the boric acid deposits were due to primary coolant leakage from the annular space surrounding the heater sleeve [AB, PZR, EHTR, SLV] at penetration 11. No other heater sleeves were identified with boric acid deposits.

The condition is reportable in accordance with 10 CFR 50.73(a)(2)(ii)(A). Event Notification 49933 was made on March 19, 2014 in accordance with 10 CFR 50.72((b)(3)(ii)(A).

Relief was authorized to leave the flaw in place for one operating cycle.

CAUSE OF THE EVENT

The root cause of leakage cannot be determined because of limitations in examination techniques. The most likely root cause is an original fabrication welding defect in the heater sleeve partial penetration weld further impacted by stress corrosion cracking and/or thermal fatigue.

ANALYSIS OF THE EVENT

Background

The Pressurizer provides a high point in the Reactor Coolant System (RCS) [AB] where a steam bubble can be drawn and used to establish system pressure, maintains RCS pressure during steady-state operation, limits pressure variation caused by coolant thermal expansion and contraction during normal load transients, accommodates expansion and contraction of the RCS coolant volume caused by load transients, and relieves excessive pressure to the Pressurizer Relief Tank [AB, PZR,TK] to prevent RCS pressure from exceeding the design limit.

The Pressurizer contains replaceable direct immersion heaters [AB, ETHR] at the bottom and a spray nozzle at the top. The surge line which is attached to the bottom of the Pressurizer connects the Pressurizer to the hot leg of the B loop in the RCS. During an outsurge caused by an increase in plant load, pressure is kept above minimum allowable limit by the immersion heaters cycling on. There are 78 individual heaters inside the Pressurizer.

The Pressurizer is a cylindrical pressure vessel installed with its longitudinal axis in a vertical position. It is 39 feet 7 inches high and 7 feet 8 inches in diameter; it has a volume of 1300 cubic feet. The vessel consists of a cylindrical barrel shell with a hemispherical head welded to each end. To minimize corrosion, the entire inside surface of the vessel is clad with two austenitic stainless steel layers, each 3/16 inch thick, and all internals exposed to primary water or steam is constructed of austenitic stainless steel.

The lower head is constructed of cast carbon steel. It contains one surge penetration nozzle and 78 penetrations for the immersion heaters. It also contains one sample penetration nozzle, one temperature instrument penetration, and three penetrations for level and pressure instruments. There is a retaining basket above the surge line nozzle that prevents any foreign matter in the Pressurizer vessel from entering the RCS piping. There are two baffle/supports that maximize in and outsurge contact with the heaters. The baffle/support plates also provide support for the heaters. The heaters enter the Pressurizer through a stainless steel (316) sleeve that is mechanically rolled into the Pressurizer shell. The pressure boundary is a weld on the inside of the Pressurizer at the cladding and around the sleeve.

Analysis

Boric acid deposits were discovered on the bottom head of the Unit 3 pressurizer while conducting a VT-2 visual inspection. This inspection is performed each refueling outage.

After removal of the heater element, eddy current testing confirmed that there was no flaw in the heater sleeve indicating that the through-wall leak path was in the partial penetration weld joining the heater sleeve to the stainless steel cladding on the inside surface of the Pressurizer. A borescope was inserted into the heater sleeve to visually examine the surface of the sleeve to cladding weld. An area of discoloration approximately ½ inch along the reinforcing fillet weld face was noted. However, no indication of cracking was identified in the discolored region or any other part of the weld that was viewed. In addition, there was no sludge build-up on the surface in the vicinity of the sleeve. The exact failure mechanism is not known because there was no available non-destructive examination method capable of interrogating the partial penetration weld, and removal of the weld for destructive examination was impractical.

No similar leakage has been reported at either Unit 3 or 4 Pressurizer heater sleeves since unit operation began.

Reportability

An unacceptable flaw in the reactor coolant pressure boundary is reportable in accordance with 10 CFR 50.73(a)(2)(ii)(A).

ANALYSIS OF SAFETY SIGNIFICANCE

This event resulted in a minor loss of primary coolant at a RCS pressure boundary. Although there was pressure boundary leakage, it was undetectable in the daily RCS leakrate investigations while the unit was in operation during the past cycle. Pressurizer base metal thickness was unaffected and thus did not challenge the pressure boundary. The flaw remaining in place has been judged to be acceptable for one operating cycle until more extensive analysis is completed.

LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET NUMBER	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Turkey Point Unit 3	05000250	2014	- 002	- 00	Page 4 of 4

NARRATIVE

CORRECTIVE ACTIONS

Corrective actions are in accordance with condition report 1949021 and include the following:

1. The leak was corrected with a half nozzle ASME Code repair of Pressurizer heater sleeve 11, which moved the RCS pressure boundary to the outside of the Pressurizer at the penetration.
2. A visual inspection of the remaining 77 heaters in the Unit 3 Pressurizer confirmed there were no other heater sleeve penetration leaks.
3. A VT-2 inspection at Normal Operating Pressure (NOP)/Normal Operating Temperature (NOT) in preparation for unit startup was performed with satisfactory results.

ADDITIONAL INFORMATION

EIIS Codes are shown in the format [IEEE system identifier, component function identifier, second component function identifier (if appropriate)].

FAILED COMPONENTS IDENTIFIED: In-vessel Pressurizer heater sleeve attachment weld

PREVIOUS SIMILAR EVENTS: None