DUKE ENERGY

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January 15, 2014
Serial: HNP-14-006

10 CFR 50.73

Attn: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington DC 20555-0001

Shearon Harris Nuclear Power Plant, Unit 1
Docket No. 50-400

Subject: Licensee Event Report 2013-003-00 Reactor Head Nozzle 37 Indication

Ladies and Gentlemen:

Duke Energy Progress, Inc. submits the enclosed Licensee Event Report 2013-003-00 in accordance with 10 CFR 50.73 for the Shearon Harris Nuclear Power Plant, Unit 1, which describes a condition where an indication was identified in reactor vessel head penetration nozzle 37 by inspections performed during a refueling outage.

This document contains no regulatory commitments. Please refer any questions regarding this submittal to Dave Corlett at (919) 362-3137.
Sincerely,

Ernest J. Kapopoulos, Jr.

Enclosure: LER 2013-003-00

cc: Mr. J. D. Austin, NRC Sr. Resident Inspector, Harris Nuclear Plant
Mr. A. Hon, NRC Project Manager, Harris Nuclear Plant
Mr. V. M. McCree, NRC Regional Administrator, Region II

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

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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4. TITLE
Reactor Pressure Vessel Head Penetration Nozzle 37 Indication Attributed to Primary Water Stress Corrosion Cracking

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: None	DOCKET NUMBER
11	18	2013	2013 – 003 – 00			01	15	2014	FACILITY NAME: None	DOCKET NUMBER

9. OPERATING MODE: 6

10. POWER LEVEL: 000

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)*
Dave Corlett, Manager, Regulatory Affairs	919.362.3137

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

CAUSE	SYSTEM	COMPONENT	MANUFACTUER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	AB	RPV	CB&I	N					

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO				

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

On November 18, 2013, the reactor vessel head penetrations were being examined while the Harris Nuclear Plant was shut down for a scheduled refueling outage. Ultrasonic examinations identified an indication in head penetration nozzle 37. The indication was approximately 0.46 inches long with an axial orientation. An inspection of the exterior surfaces of the reactor head confirmed there was no leakage. Nozzle 37 was repaired utilizing the inside diameter temper bead welding process, which was completed December 2, 2013. The repair restored compliance with the American Society of Mechanical Engineers code requirements.

The cause of the indication in nozzle 37 was attributed to primary water stress corrosion cracking. Per the requirement of 10 CFR 50.55a(g)(6)(ii)(D)(5), examinations are required to be performed on the reactor vessel head every refueling outage to identify flaws and ensure appropriate repairs are performed. This is similar to the conditions reported in Harris Licensee Event Report 2013-001-00.

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NARRATIVE

Background

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].

On November 18, 2013, the Harris Nuclear Plant was shut down for a scheduled refueling outage in mode six, at 0% power. The reactor pressure vessel head penetration nozzles [RPV-NZL] in the reactor coolant system [AB] were being examined as required by 10 CFR 50.55a(g)(6)(ii)(D). Ultrasonic examinations identified an indication in head penetration nozzle 37.

There were no systems, structures, or components that were inoperable at the start of the event that contributed to the event.

This condition is reportable in accordance with 10 CFR 50.73(a)(2)(ii)(a), as an event or condition that resulted in the condition of the nuclear power plant, including its principal barriers, being degraded.

Event Description

Ultrasonic test data revealed an indication approximately 0.46 inches long and axial in orientation. The indication was repaired using the inside diameter temper bead welding process. The elapsed time from discovery on November 18 until the nozzle was repaired on December 2 was approximately 14 days.

The remaining control rod drive mechanism nozzles were also examined using nondestructive methods, and a surface examination of the vent line was performed. A bare metal visual examination of the top of the reactor vessel closure head was completed with no indications of leakage.

The reactor pressure vessel closure head was manufactured by Chicago Bridge and Iron, Serial Number T40.

Causal Factors

The cause of the flaw in nozzle 37 was attributed to Primary Water Stress Corrosion Cracking (PWSCC). PWSCC occurs under conditions of high tensile stresses (either operating or residual), conducive environment (temperature and chemistry), and susceptible material. There is widespread industry operating experience that documents PWSCC of Alloy 600 dissimilar metal weld configurations.

Corrective Actions

Nozzle 37 was repaired utilizing the inside diameter temper bead welding process. Per the requirement of 10 CFR 50.55a(g)(6)(ii)(D)(5), if flaws attributed to PWSCC have been identified, examinations are required to be performed on the reactor vessel head every refueling outage to identify flaws and ensure appropriate repairs are performed.

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NARRATIVE (continued)

Safety Analysis

The ultrasonic testing results revealed that the flaw was 21% through-wall and axial in orientation. An inspection of the exterior surfaces of the reactor head confirmed there was no leakage. The safety significance of the flaw's presence during operation was minimal. An extensive industry safety assessment of PWSCC in reactor vessel head penetrations concluded that a program of periodic nonvisual non-destructive examinations at appropriate intervals supplemented by periodic bare metal visual examinations provides adequate protection against potential safety-significant failures. Based on the industry safety assessment, it is reasonable to conclude that an inspection program in accordance with the requirements of ASME Code Case 729-1 as modified by the additional limitations set forth in 10 CFR 50.55a(g)(6)(ii)(D), provide assurance against any credible PWSCC degradation event that would challenge nuclear safety.

Additional Information

LER 2013-001-00 reported previously identified and repaired flaws on the Harris reactor vessel closure head nozzles. The reported indications in April 2012 and May 2013 also exhibited characteristics of PWSCC.

As stated previously, Energy Industry Identification System (EIIS) codes are identified in the text as [XX].

This report contains no regulatory commitments.