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April 10, 2014
Serial: HNP-14-042

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 2013-004-01 Operation Prohibited by Technical Specifications

Ladies and Gentlemen:

Duke Energy Progress, Inc. submits the enclosed Licensee Event Report 2014-001-00 in accordance with 10 CFR 50.73 for Shearon Harris Nuclear Power Plant, Unit 1, which describes a condition prohibited by Technical Specifications. This report is a supplement to LER 2013-004-00 submitted on January 9, 2014. The prohibited condition involved the waste gas system which exceeded the required action time allowed for Limiting Condition for Operation (LCO) 3.11.2.5.

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


Sincerely,

A handwritten signature in black ink, appearing to read 'Ernest J. Kapopoulos, Jr.', written in a cursive style.

Ernest J. Kapopoulos, Jr.

Enclosure: LER 2013-004-01

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 (02-2014)	U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB: NO. 3150-0104	EXPIRES: 01/31/2017
 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 FOIA, Privacy and Information Collections 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 Shearon Harris Nuclear Power Plant, Unit 1	2. DOCKET NUMBER 05000400	3. PAGE 1 OF 5
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4. TITLE
 Operation Prohibited by Technical Specification Due to Exceeding Hydrogen and Oxygen Concentrations in the Waste Gas System

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
11	11	2013	2013	004	01	04	10	2014	None	
									FACILITY NAME	DOCKET NUMBER
									None	

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)			
5	<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)
10. POWER LEVEL 000	<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

LICENSEE CONTACT Dave Corlett, Manager, Regulatory Affairs	TELEPHONE NUMBER (Include Area Code) 919.362.3137
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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
A	WE	AC	Teledyne	Y					

14. SUPPLEMENTAL REPORT EXPECTED <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	15. EXPECTED SUBMISSION DATE <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th>MONTH</th><th>DAY</th><th>YEAR</th> </tr> <tr> <td> </td><td> </td><td> </td> </tr> </table>	MONTH	DAY	YEAR			
MONTH	DAY	YEAR					

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

On November 11, 2013, while in Mode 5, sample results of the 'C' waste gas decay tank (WGDT) were not properly evaluated in which hydrogen results should have been documented as greater than 4 percent and oxygen at 4.03 percent. Due to this condition, it was not recognized that the conditions of Technical Specification (TS) 3.11.2.5 were not met and required immediate suspension of all additions of waste gas to the system, reduction of oxygen to less than or equal to 4 percent by volume, then reduction of oxygen to less than or equal to 2 percent within 48 hours. HNP was in this condition for 30 calendar days until the oxygen concentration in the 'C' WGDT was reduced to below the TS limit on December 11, 2013.

The root cause was determined to be an inadequate understanding of the risks associated with degassing the waste gas system with inoperable analyzers. Corrective actions include revising procedures, training, and reinforcing expectations for procedural use and adherence. This event is considered to have no safety significance as an engineering evaluation determined that this condition did not generate any combination of explosive gases in the system.



**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

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NARRATIVE

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

Background

The waste gas system (WGS) [WE] consists of a series of tanks, two compressor [WE, CMP] skids and two hydrogen recombiner [WE,RCB] skids ('A' skid in long term shutdown). The system is designed to collect and process gases from various plant tanks [TK] which contain large amounts of hydrogen. Due to the flammability of hydrogen when in the presence of oxygen, levels must be established to prevent inadvertent ignition of the gas mixture. The system is normally operated in high pressure mode which consists of a recirculation loop that can accept purge gas from the selected tank. Waste gas is pumped through a compressor, an outlet oxygen analyzer [WE,AA], and then into one of eight waste gas decay tanks (WGDTs) [WE, TK]. Unless transferring contents of one WGDT to another, only one WGDT is aligned to the WGS flow path at any given time. Pressure in the WGDT will then drive the waste gas flow to the hydrogen recombiner skid. In the recombiner skid, waste gas will flow through the first set of hydrogen and oxygen analyzers before passing through the recombiner. Following the recombination of hydrogen and oxygen to create water, the moisture is separated and the waste gas is sent through a second set of hydrogen and oxygen analyzers, located downstream of the recombiner. Following the analyzers, the waste gas is then drawn into the compressor suction piping, completing a recirculation loop.

Event Description

The HNP Technical Specification (TS) requirement for the waste gas system is as follows:

TS 3.11.2.5: The concentration of oxygen in the gaseous radwaste treatment system downstream of the hydrogen recombiners shall be limited to less than or equal to 2 percent by volume whenever the hydrogen concentration exceeds 4 percent by volume.

On November 11, 2013, while in Mode 5, during degassing operations for refueling outage (RFO-18), grab samples were being taken from the 'C' WGDT (in-service tank) due to inoperable hydrogen and oxygen analyzers in the waste gas system as a result of water intrusion from the 'H' WGDT. Normal operational uses of the system had resulted in water accumulation in the 'H' WGDT, and coupled with degassing operations for RFO-18 eventually resulted in water intrusion into the waste gas system piping. Once water was drained from the waste gas system and extensive troubleshooting was completed to determine the cause of the water accumulation, it was determined that guidance in APP-511-1-2 allowed resuming degas evolutions (analyzers still out of service). Samples were being taken from the 'C' WGDT to monitor hydrogen and oxygen concentrations via surveillance procedure RST-202 as directed by plant procedure PLP-114. At approximately 9:03 pm, sample results of the 'C' WGDT measured the hydrogen and oxygen concentrations to be 0.88 percent and 4.03 percent, respectively. However, the surveillance procedure included a note that the hydrogen concentration should be assumed to be greater than 4 percent with an inoperable hydrogen analyzer. This would have resulted in sample results of hydrogen greater than 4 percent and oxygen at 4.03 percent in the



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'C' WGDT. Additionally, with oxygen concentration in the waste gas system exceeding 2 percent by volume, the final safety analysis report (FSAR) requires securing all sources of oxygen influents. However, due to the reporting of incorrect information from RST-202, procedure OST-2044 was also completed incorrectly, and thus the high oxygen condition was not detected. Due to the manner in which RST-202 was completed, it was not recognized that the conditions for TS Limiting Condition for Operation (LCO) 3.11.2.5 were not met for the concentration of oxygen in the waste gas system exceeding 2 percent when the hydrogen concentration exceeded 4 percent by volume. The action statement required immediate suspension of all additions of waste gas to the system, reduction of the oxygen concentration to less than or equal to 4 percent by volume, then reduction of the oxygen concentration to less than or equal to 2 percent within 48 hours. HNP was in this condition for 30 calendar days from November 11, 2013, until December 11, 2013, at approximately 3:30 pm when the oxygen concentration in the 'C' WGDT was reduced to below 2 percent.

The waste gas system recombiner was not in service and the waste gas hydrogen and oxygen analyzers were not functional prior to exceeding the TS limits.

The hydrogen and oxygen analyzers are manufactured by Teledyne. The model numbers for the hydrogen analyzers (HAIC-1118B and HARC-1104B) are 237A-0-20-1X and 237A-0-20-2X respectively. The model number for oxygen analyzers (OAI-1101 and OAIC-1112B) is 327RA, and for OARC-1119B it is 317RA.

This condition is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B), as an event or condition that is prohibited by Technical Specifications.

Causal Factors

The root cause evaluation determined that operations and chemistry personnel possessed an inadequate understanding of the risks associated with degassing the waste gas system in the specific configuration (i.e. loss of both analyzers due to damage from moisture). Additionally, five primary contributing causes were identified:

- The wording of a note in procedure OST-2044 was unclear and led operators to an incorrect conclusion regarding acceptability of grab samples to satisfy TS requirements
- Operator knowledge of FSAR and TS requirements and bases for waste gas was not adequate to support a successful challenge of the OST-2044 results (training of insufficient detail)
- Chemistry technicians failed to stop work and make appropriate notifications when unexpected conditions arose
- Procedure RST-202 was incorrectly classified as a reference use procedure (should be continuous use)
- Supervisory review of RST-202 was not timely and did not detect errors in completion of the procedure



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Corrective Actions

Completed Corrective Actions

- 1) Reduced 'C' WGDT oxygen concentration to less than 2 percent
- 2) Operations, chemistry, and operations training personnel completed training OPS-JITI-01
- 3) Issued Standing Instruction 14-001, "Review of Chemistry Surveillance"
- 4) Issued Standing Instruction 13-035, "Waste Gas Ops with Oxygen Greater than 2 Percent"

Planned Corrective Actions

- 1) Revise RST-202 to improve human factoring issues
- 2) Revise OP-120.07 to include guidance for swapping WGDT's within 5 days of starting degassing operations. This includes PRT, RCDT and RCS (VCT) degassing operations supporting a plant outage. (PRR 643201).
- 3) The training department will provide training to operations personnel to ensure operations has thorough knowledge and understanding of WG System operation following significant revision to procedures OST-2044, OP-120.07, OWP-RM-20, OWP-RM-21, and OWP-RM-22. (TRF 665605)
- 4) Revise OP-120.07 per PRR 665476. This PRR will correct the error introduced by PRR 152796, restoring a procedural method to comply with FSAR required actions when Waste Gas oxygen exceeds 2 percent by volume (secure all oxygen inputs). It will also incorporate guidance for adding nitrogen to in-service and out of service tanks for the purpose of inserting the tank's contents.
- 5) Revise OST-2044 per PRR 665473. PRR 665473 removes the information that incorrectly implies that the use of grab sample results to satisfy the TS 4.11.2.5 surveillance is acceptable.
- 6) Training Organization will provide training to Operations personnel to ensure understanding of Tech Spec and regulatory requirements as they apply to the Waste Gas system.
- 7) Reinforce the expectations for verbatim procedure use and adherence with the chemistry technicians and supervisors.
- 8) Administer accountability actions for the individuals who failed to follow RST-202 as written, who failed to stop work when unexpected conditions arose, related to this event, and for supervisors directly involved in the inadequate review of completed procedures.
- 9) Develop and deliver a communication to the operations department alerting them to the fact that OP-120.07 is a continuous use procedure and should be used as such.
- 10) Establish timeliness and quality expectation for supervisor review of completed surveillances.
- 11) Revise RST-202 to reclassify it as a "Continuous Use" procedure, and revise RST-201, RST-203, RST-204, RST-205, RST-206, RST-207, RST-208, RST-209, RST-210 and RST-211 for correct level of use as Continuous Use procedures.



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- 12) Revise applicable sections of each of the Operating Procedures identified in OST-2044, OST-1021, OST-1022, and OST-1033 for correct level of use as "Continuous Use" procedure sections. It is not intended that each of the OP's become a Continuous Use procedure in its entirety
- 13) Issue communication to chemistry technicians reinforcing the importance of stopping work when unsure of procedure intent.

Safety Consequences

At the time when the 'C' WGDT was observed to contain greater than 4 percent oxygen, the 'A' WGDT, contained greater than 4 percent hydrogen. The sample results of the 'A' WGDT (November 10, 2013, 4:15 pm) measured hydrogen levels at 5.4 percent and oxygen at less than 0.5 percent. A lowering pressure trend in this tank, indicated that the isolation valve for this tank leaked while oxygen was greater than 2 percent in other portions of the waste gas system. However, an engineering evaluation determined that this condition did not generate any combination of explosive gases in the system.

Previous Similar Events

A review of past chemistry sampling jobs performed over the past year showed that there are some minor procedure use and adherence issues that existed in the completion of RSTs by the chemistry department. The root cause evaluation determined that none of the minor errors observed resulted in non-compliance with a TS LCO.

Commitments

This report contains no regulatory commitments.