



**Tanya M. Hamilton**  
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919.362.2502

10 CFR 50.73

Serial: HNP-16-108

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

Shearon Harris Nuclear Power Plant, Unit 1  
Docket No. 50-400/Renewed License No. NPF-63

Subject: Licensee Event Report 2016-004-00

Ladies and Gentlemen:

Duke Energy Progress, LLC, submits the enclosed Licensee Event Report 2016-004-00 in accordance with 10 CFR 50.73 for Shearon Harris Nuclear Power Plant, Unit 1. This report details a reactor trip with safety injection that occurred on October 8, 2016, prior to a refueling outage. The site was performing turbine testing with the unit at approximately 8 percent power when the event occurred. The unit was shut down successfully, with all Engineered Safety Features and Reactor Protection Systems functioning as designed. Further evaluation is underway.

This document contains no regulatory commitments. Please refer any questions regarding this submittal to Jeff Robertson, Manager – Regulatory Affairs, at (919) 362-3137.

Sincerely,

A handwritten signature in black ink that reads "Tanya M. Hamilton". The signature is written in a cursive, flowing style.

Tanya M. Hamilton

Enclosure: Licensee Event Report 2016-004-00

cc: Mr. C. D. Jones, NRC Sr. Resident Inspector, HNP  
Ms. M. Barillas, NRC Project Manager, HNP  
NRC Regional Administrator, Region II



**LICENSEE EVENT REPORT (LER)**  
(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form  
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

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 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.

<b>1. FACILITY NAME</b> Shearon Harris Nuclear Power Plant – Unit 1	<b>2. DOCKET NUMBER</b> 05000 -400	<b>3. PAGE</b> 1 OF 3
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**4. TITLE**  
Reactor Trip and Safety Injection During Turbine Control Testing at Low Power

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
10	08	2016	2016	004	00	12	07	2016	None	05000 N/A
									None	05000 N/A

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

<b>1</b>	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
<b>10. POWER LEVEL</b>  <b>008</b>	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> 73.77(a)(1)
	<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)(D)	<input type="checkbox"/> 73.77(a)(2)(i)
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 73.77(a)(2)(ii)
		<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> OTHER	Specify in Abstract below or in NRC Form 366A

**12. LICENSEE CONTACT FOR THIS LER**

LICENSEE CONTACT Jeffrey Robertson – 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
D	TG	PS	United Ele	Y	D	TG	ACC	Parker Hyd	Y

**14. SUPPLEMENTAL REPORT EXPECTED**      **15. EXPECTED SUBMISSION DATE**

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

MONTH	DAY	YEAR

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

On October 8, 2016, the Shearon Harris Nuclear Power Plant was reducing power to enter a planned refueling outage (RFO-20). The plant was at approximately 8 percent power in Mode 1 when the unit experienced an unplanned reactor trip with a safety injection (SI) and main steam line isolation (MSLI). A malfunction of the turbine controller during turbine mechanical overspeed trip testing caused an excessive draw of steam flow from the Steam Generators (SGs). This caused the Engineering Safety Features Actuation System instruments to detect a valid change in SG pressure and initiate a rate compensated Low Steam Line Pressure signal. This signal initiated a SI and MSLI, which in turn initiated reactor trip, turbine trip, feedwater isolation, and closed the main steam isolation valves.

Degraded equipment within the turbine controller resulted in excessive opening of the governor valves; this was caused by an inadequate supply of hydraulic oil to meet the increased system demand during testing. Insufficient hydraulic accumulator capacity was available to support system demand. One accumulator was known to be out-of-service; a second was discovered post-event. Also, a hydraulic oil pressure switch used for turbine control was not functioning properly. The equipment deficiencies have been corrected. Changes have been made to the testing procedure to validate at least four accumulators are in service prior to testing. The Power Operation (Mode 2 to Mode 1) procedure will also be revised to validate at least four accumulators are in service. A new calibration procedure will be implemented for the deficient oil pressure switch to ensure better quality control over verifying switch function.



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

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<b>1. FACILITY NAME</b> Shearon Harris Nuclear Power Plant – Unit 1	<b>2. DOCKET NUMBER</b> 05000- 400	<b>3. LER NUMBER</b>		
		<b>YEAR</b> 2016	<b>SEQUENTIAL NUMBER</b> 004	<b>REV NO.</b> 00

**NARRATIVE**

NARRATIVE

Note: Energy Industry Identification System (EIIS) codes are identified in the text within brackets [ ].

A. Background

Event Date: October 8, 2016      Initial Mode: 1      Initial Reactor Power: ~8 percent  
Event Time: 0150 EDT              Final Mode: 3              Final Reactor Power: 0 percent

This event is reportable per 10 CFR 50.73(a)(2)(iv)(A) as “an event or condition that results in valid actuation of any of the systems listed in paragraph (a)(2)(iv)(B) of [10 CFR 50.73]...” due to actuation of the reactor protection system [JC], general containment isolation signal [JE], emergency core cooling systems [BQ], auxiliary feedwater systems [BA], and emergency diesel generators [EK]. All actuated safety systems functioned as designed.

B. Event Description

On October 8, 2016, at 0150, the Shearon Harris Nuclear Power Plant (Harris) was reducing power to enter a planned refueling outage (RFO-20). The plant was at approximately 8 percent power in MODE 1 when the unit experienced an unplanned reactor trip with a safety injection (SI) and main steam line isolation (MSLI). The SI was terminated in 6 minutes with pressurizer level at 80 percent. Pressurizer safety valves did not actuate.

The licensee was performing testing on the turbine mechanical overspeed trip system. The digital-electrohydraulic (DEH) control system [TG] was in throttle valve (TV) [FCV] control. Operators initiated the swap from TV control to governor valve (GV) [FCV] control per the test procedure. The GVs unexpectedly opened to about 15 percent with the TVs still at full open. This valve alignment caused excessive steam flow through the main turbine [TRB], drawing down the steam generator (SG) [SG] pressure. This resulted in the actuation of SI and MSLI signals on Low Steam Line Pressure (rate compensated), as steam line pressure rapidly dropped from 1050 psig to 1000 psig. The SI and MSLI signal initiated a reactor trip, turbine trip, feedwater isolation signal, and closed the main steam isolation valves.

This event was caused by a combination of degraded equipment within the DEH control system, which failed to align the TVs and GVs to properly control turbine speed. Two of the five high-pressure hydraulic accumulators [ACC] were out-of-service at the time of the event. In addition, an oil pressure switch [PS] was found to be improperly functioning. The combination of high hydraulic fluid demand due to the TV to GV control swap and the degraded equipment caused the GVs to not properly position to control turbine speed.

The high-pressure DEH accumulators are Parker Hydraulics series A7L hydraulic accumulators. One accumulator had been found with low pressure in August 2015 and was scheduled for repair. A second accumulator was found to have low pressure during troubleshooting following the event. The pressure switch is a United Electric Controls series 400 switch, and was identified deficient after the event.



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**NARRATIVE**

**C. Causal Factors**

- The test procedure did not contain a validation that at least four out of five of the high-pressure DEH accumulators be in service prior to performing turbine testing.
- The hydraulic oil pressure switch was not functioning properly, causing the turbine to improperly position the control valves.

**D. Corrective Actions**

**Completed Actions:**

- All five accumulators have been restored to service and the hydraulic oil pressure switch was replaced with a switch verified to be functioning properly.
- The Turbine Mechanical Overspeed Trip testing procedure has been revised to add verifications for ensuring at least four accumulators are in service prior to testing.
- The Power Operation (Mode 2 to Mode 1) procedure was revised to include additional verifications for ensuring at least four accumulators are in service prior to turbine start-up. (Accumulators are required for turbine start-up, but are not necessary during normal operation. The turbine will still be able to trip in the event of a loss of all accumulators. No actions required for ensuring normal turbine operation.)

**Planned Actions:**

- A new calibration procedure will be implemented for the deficient oil pressure switch to ensure better quality control over verifying switch function.

**E. Safety Analysis**

At the time of the event, Harris was at approximately 8 percent power and descending. The safety injection was terminated six minutes after initiation, with pressurizer level at 80 percent. All Engineered Safety Features [B] and Reactor Protection Systems [J] functioned as designed. No loss of reactor coolant system (RCS) inventory or excessive RCS cooldown occurred. Pressurizer safety valves did not actuate. Thus, this event is low risk significant per Probabilistic Risk Assessment analysis. This event represents a minimal challenge to the health and safety of the public, with no actual dose consequence.

**F. Additional Information**

No similar events have occurred over the past three years.