



John R. Dills  
Plant Manager  
Shearon Harris Nuclear Power Plant  
5413 Shearon Harris Road  
New Hill, NC 27562-9300

919.362.2000

10 CFR 50.73

September 16, 2019  
Serial: RA-19-0361

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 2019-002-00

Ladies and Gentlemen:

Duke Energy Progress, LLC, submits the enclosed Licensee Event Report (LER) 2019-002-00 in accordance with 10 CFR 50.73 for Shearon Harris Nuclear Power Plant, Unit 1 (HNP). This report describes an event resulting in the 'B' train of the Essential Services Chilled Water System being inoperable for a time period longer than permitted by HNP Technical Specifications. The system has since been restored. This event had no significance with respect to the health and safety of the public.

There are no regulatory commitments contained within this report.

Please refer any questions regarding this submittal to Chuck Yarley at (919) 362-2477.

Sincerely,

A handwritten signature in blue ink, appearing to read 'John R. Dills', written over a horizontal line.

John R. Dills

Enclosure: Licensee Event Report 2019-002-00

cc: J. Zeiler, NRC Senior Resident Inspector, HNP  
M. Barillas, NRC Project Manager, HNP  
NRC Regional Administrator, Region II



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Sincerely,

John R. Dills

Enclosure: Licensee Event Report 2019-002-00

cc: J. Zeiler, NRC Senior Resident Inspector, HNP  
M. Barillas, NRC Project Manager, HNP  
NRC Regional Administrator, Region II

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 Information Services Branch (T-2 F43), 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.

**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/>

<b>1. Facility Name</b> Shearon Harris Nuclear Power Plant, Unit 1	<b>2. Docket Number</b> 05000 0400	<b>3. Page</b> 1 OF 3
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<b>4. Title</b> 'B' Train Chiller for the Essential Services Chilled Water System Tripped on High Compressor Oil Temperature
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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
07	14	2019	2019	002	00	09	16	2019	Facility Name	05000

<b>9. Operating Mode</b>	<b>11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)</b>			
<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 type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
<b>10. Power Level</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)
<b>100</b>	<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 checked="" 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)	

<b>12. Licensee Contact for this LER</b>
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<b>Licensee Contact</b> Chuck Yarley, Regulatory Affairs Engineer	<b>Telephone Number</b> (Include Area Code) (919) 362-2477
----------------------------------------------------------------------	---------------------------------------------------------------

<b>13. Complete One Line for each Component Failure Described in this Report</b>
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Cause	System	Component	Manufacturer	Reportable to ICES	Cause	System	Component	Manufacturer	Reportable to ICES
C	KM	COND	A321	Y					

<b>14. Supplemental Report Expected</b>	<b>15. Expected Submission Date</b>	Month	Day	Year
<input type="checkbox"/> Yes (If yes, complete 15. Expected Submission Date) <input checked="" type="checkbox"/> No				

**Abstract** (Limit to 1400 spaces, i.e., approximately 14 single-spaced typewritten lines)  
On July 14, 2019, the Shearon Harris Nuclear Power Plant, Unit 1, declared the 'B' train of the Essential Services Chilled Water (ESCW) system inoperable after the water chiller (WC-2B) tripped on high compressor oil temperature. The ESCW system was last ran successfully on July 13, 2019, and was restored on July 16, 2019. This time frame exceeded the technical specification (TS) allowed out-of-service time. The 'A' train of the ESCW system was operable during this time period. The event represents a condition prohibited by TS per 10 CFR 50.73(a)(2)(i)(B).

Several factors caused WC-2B to trip on high oil temperature. Fouling of WC-2B raw water condenser, along with a reduction in refrigerant volume, led to reduced heat transfer from refrigerant to service water in the condenser. The result was an overall increase in compressor bearing loading that exacerbated the effects of the oil level, which was low though in-band. Oil and refrigerant were added and a refrigerant leak was addressed, restoring the system to operable.

The condenser was physically cleaned, recovering additional chiller operational margin. Actions are being taken to address service water fouling.

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

(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/>)

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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Shearon Harris Nuclear Power Plant, Unit 1	05000-400	2019	002	00

**NARRATIVE**

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

**A. Background**

Prior to the event, Shearon Harris Nuclear Power Plant, Unit 1 (HNP), was operating in Mode 1 at approximately 100 percent power under steady state conditions. There were no structures, systems, or components that were inoperable prior to the event that contributed to the event. HNP remained in Mode 1 at approximately 100 percent power after the event.

HNP Technical Specifications (TSs) require two trains of the Essential Services Chilled Water (ESCW) [KM] system to meet the associated limiting condition of operability. The system circulates chilled water to the safety related cooling coils of the air handling units serving their respective heating, ventilation, and air conditioning (HVAC) [ACU] systems. This serves to transfer the thermal loads generated in the various areas of the plant to service water systems. TS allowed out-of-service time (AOT) for the loss of a single train of the ESCW system is 72 hours. This event is reportable per 10 CFR 50.73(a)(2)(i)(B) as "any operation or condition which was prohibited by the plant's Technical Specifications."

**B. Event Description**

On July 14, 2019, the 'B' water chiller (WC-2B) [CHU] tripped on high compressor [CMP] oil temperature, revealing a condition which could have prevented WC-2B from completing its 30-day mission time. The ESCW system was last ran successfully on July 13, 2019, until it was secured at about 15:50. After the trip, WC-2B was declared operable on July 16, 2019 at 22:14, over 78 hours after it had been secured. This time frame exceeded the TS AOT. The 'A' train of the ESCW system was operable during this time period.

**C. Causal Factors**

Several factors caused WC-2B to trip on high oil temperature. After the WC-2B trip, the oil level was found low, though in-band. Additionally HNP personnel identified a reduction in refrigerant volume. A review of data from May 2019 shows evidence of raw water fouling in the WC-2B condenser [COND]. The fouling in the condenser led to a reduction in heat transfer through the condenser tubes between refrigerant and service water, reducing chiller operational margin. The reduction in refrigerant further decreased heat transfer, and increased the compressor bearing loading. These factors likely increased the pressure in the compressor's oil sump, disrupting proper operation of the refrigerant oil reclaim circuit. Together, these factors elevated the oil temperature over the high oil temperature trip setpoint.

A refrigerant leak was identified which contributed to the loss of refrigerant. The fouling was a result of silt accumulation from the Harris Lake. Microbiological growth, caused by inadequate chlorination, produced an environment favorable for silt accumulation. Chemistry processes did not ensure adequate free chlorine in the system.

**D. Corrective Actions**

Immediate actions were taken to restore WC-2B to operable, including adding oil and refrigerant, and addressing the identified refrigerant leak. Additional WC-2B operational margin was restored by physical cleaning of the condenser. A chemical treatment regime was developed to mitigate the effects of fouling. The preventative maintenance strategy for the chillers will be revised to track a parameter which is indicative of significant condenser fouling. This will allow corrective actions to be taken prior to incurring the reduction in operational margin witnessed prior to the event. The chemistry monitoring plan will be revised to ensure adequate free chlorine in the system.

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CONTINUATION SHEET**

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Shearon Harris Nuclear Power Plant, Unit 1	05000-400	2019	- 002	- 00

**NARRATIVE****E. Safety Analysis**

The ESCW cooling capacity for each train is sized for 100 percent of the plant safety HVAC system cooling demand. This ensures that with the 'A' train of ESCW operable, the site would still be within the analyzed results for all transient and accident conditions, particularly as documented within the HNP Final Safety Analysis Report Chapter 6 and Chapter 15. No loss of safety function occurred as a result of this event. At no point during the impacted periods was the ESCW system required to mitigate the impact of a design basis event. As such, this event had no significance with respect to the health and safety of the public.

**F. Additional Information**

The events leading to the WC-2B trip are unique to this event. There have been no LERs submitted in the past three years due to a similar event.