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10 CFR 50.73

ONS-2013-019

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November 4, 2013

Attn: Document Control Desk
U. S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2746

Subject: Duke Energy Carolinas LLC (Duke Energy)
Oconee Nuclear Station Units 1, 2, and 3
Docket Nos. 50-269,-270, -287
Licensee Event Report 269/2013-03, Revision 0
Problem Investigation Process No.: O-13-9586

Enclosed is License Event Report 269/2013-03, Revision 0 for Oconee Nuclear Station, Units 1, 2, and 3. This report is being submitted in accordance with 10 CFR 50.73 (a)(2)(i)(B) as an Operation or Condition Prohibited by Technical Specifications.

This event is considered to be of minimal safety significance that had no consequences with respect to the health and safety of the public.

There are no regulatory commitments contained in this report. Any questions regarding the content of this report should be directed to Corey Gray, ONS Regulatory Affairs Group, at (864) 873-6325.

Sincerely,

Scott L. Batson
Vice President
Oconee Nuclear Site

Enclosure

JE22
NKH

NRC Document Control Desk

November 4, 2013

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cc: Mr. Victor McCree
Administrator, Region II
U.S. Nuclear Regulatory Commission
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NRC Senior Resident Inspector
Oconee Nuclear Station

INPO (Word File via E-mail)

LICENSEE EVENT REPORT (LER)

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

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 Records and FOIA/Privacy Service 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 Oconee Nuclear Station, Unit 1	2. DOCKET NUMBER 05000-269	3. PAGE 1 OF 4
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4. TITLE
Keowee Hydroelectric Station Unit 2 - Emergency Power Lockout

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
9	4	13	2013	03	0	11	4	13	Unit 2	05000 270
									Unit 3	05000 287

9. OPERATING MODE U1 1 U2 1 U3 1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)											
	<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)
10. POWER LEVEL U1 100 U2 100 U3 100	<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)	<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

NAME Corey A. Gray, Engineer III	TELEPHONE NUMBER (Include Area Code) (864) 873-6325
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13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO ICES	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
AP-913	KEOWEE GENERATOR	INPO58097 7 Ap-913	Westinghouse Elec Corp/Hagan	Yes					

14. SUPPLEMENTAL REPORT EXPECTED <input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	15. EXPECTED SUBMISSION DATE MONTH DAY YEAR
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16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On September 4, 2013, the Keowee Hydroelectric Station Unit 2 (KHU-2) experienced an emergency lockout that rendered it inoperable. The Keowee Hydroelectric Station is one of Oconee Nuclear Station's (ONS) emergency power sources. Following troubleshooting activities it was determined that from August 17, 2013 until September 4, 2013, KHU-2 had previously been susceptible to this type of emergency lockout resulting in a condition that exceeded the allowed outage time given in the plant's technical specifications.

An investigation of the event determined that the cause of the event was vibration from a Governor Oil pump that caused relay 86E2X to "chatter." The chatter generated a spurious signal that activated the emergency lockout relay.

A completed corrective action included the replacement of relay 86E2X and relocating it to an environment not susceptible to vibration.

This event is reportable under 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by the plant's technical specifications. This event is considered to have minimal safety significance and no consequences with respect to the health and safety of the public.

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NARRATIVE

EVALUATION:

BACKGROUND

At the time this condition was identified, Oconee Nuclear Station (ONS) Units 1, 2, and 3 were operating in Mode 1 at approximately 100 percent power. No significant structures, systems or components were out of service at the time of this event that contributed to this event. This condition affected Keowee Hydroelectric Unit 2 (KHU-2) [EIS:EK] rendering it inoperable. It was later determined that the duration of KHU-2's inoperability was greater than that allowed by the plant's technical specifications and as such, this condition is being reported as an operation or condition prohibited by the plant's technical specifications pursuant to 10 CFR 50.73(a)(2)(i)(B).

The Keowee Hydroelectric Station consists of two 87.5 MVA units (KHU-1 and KHU-2) that provide an onsite emergency power source for ONS via separate and independent underground and overhead power paths. The speed of each unit is controlled by each unit's Governor Control System (GCS). The GCS is made up of a computer [EIS:CPU] system that controls the actuators used to position the wicket gates. A protective relay system provides protection to the generator and is integrated within the GCS equipment skid.

The Governor Oil system's three pumps [EIS:P] are aligned, in parallel, to take suction from the Governor Oil sump. The pumps discharge to an oil header that connects to the Governor Oil Pressure Tank (GOPT). The GOPT provides the working force for the wicket gates.

The KHU's protective relay [EIS:RLY] system has individual relays that monitor various parameters and provide input into an emergency lockout relay. The 86E2X relay monitors for GCS failure. The emergency lockout relay is a rotary, two-position switch. An internal coil spring mechanism maintains the switch in the TRIP position when actuated.

ONS Technical Specification (TS) 3.8.1, "AC Sources – Operating," requires AC electrical power sources to be operable during normal operation (Modes 1, 2, 3, and 4) as follows:

- Two offsite sources on separate towers connected to the 230 KV switchyard to a unit startup transformer and capable of automatically supplying power to one main feeder bus; and
- Two KHUs with one capable of automatically providing power through the underground emergency power path to both main feeder buses and the other capable of automatically providing power through the overhead emergency power path to both main feeder buses.

EVENT DESCRIPTION

On August 17, 2013, KHU-2 was returned to service following a planned modification activity that included replacement of the KHU-2's emergency lockout relay with a new model. The new emergency lockout relay was more sensitive to chattering within the circuitry, which uncovered a latent condition associated with 86E2X relay. The post modification testing verified all trip inputs into the emergency lockout relay actuated the lockout as expected and all associated alarms for the individual inputs were received. On August 21, 2013, KHU-2 experienced an emergency lockout and was declared inoperable and entry made

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into TS 3.8.1, Condition D. The lockout was not accompanied by event recorder points, computer points, stat alarms, or protective relay target flags that would have indicated what device or circuit initiated the trip. A failure matrix was developed and resulted in replacement of 4 relays that could not be conclusively refuted as the cause because of potential internal failures. The relays replaced with identical relays from stock were the emergency lockout relay, 86E2X, 63FX and S3SUIX. Following troubleshooting activities, KHU-2 was declared operable and returned to service on August 24, 2013.

On September 4, 2013, KHU-2 experienced a second emergency lockout when the emergency lockout relay activated. KHU-2 was declared inoperable and the TS entered.

Due to the emergency lockout that occurred on August 21, 2013, electrical current monitoring equipment had been installed on inputs to the emergency lockout relay as a precautionary measure. When the event recurred on September 4, 2013, the monitoring equipment captured the signal that actuated the emergency lockout relay. Plant Engineering was able to determine from the monitoring equipment that the signal originated from the 86E2X relay circuitry, which is an input to the emergency lockout relay. The cause of the failure was determined to be contact chatter in the 86E2X relay caused by vibration from the Governor Oil pump. It was later revealed that the new emergency lockout relay was sensitive enough to be affected from the 86E2X relay's chatter and therefore actuated.

It was subsequently concluded that from August 17, 2013, until September 4, 2013, KHU-2 had been susceptible to this same type of a spurious lockout while in the TS mode of applicability. Technical Specification Limiting Condition for Operation 3.8.1, "AC Sources - Operating," Condition D, requires a 72-hour restoration time for an inoperable KHU or its required underground path. Since KHU-2 was in service and vulnerable to a spurious lockout from August 17, 2013, until August 21, 2013, for a period of approximately 110 hours and then again from August 24, 2013, until September 4, 2013, for a period of approximately 273 hours, it was concluded that the unit had previously been inoperable beyond the TS allowed outage time. As a result, this event is reportable as an operation or condition prohibited by plant's technical specifications.

CAUSAL FACTORS

An apparent cause evaluation concluded that the causal factors for this event are as follows:

- There was abnormal noise / vibration condition from KHU's Governor Oil pump(s), and
- The design of the 86E2X relay was susceptible to chatter, and was installed in an environment with the potential for mechanical vibration.

CORRECTIVE ACTIONS

Immediate:

- KHU-2 was declared inoperable and the applicable Technical Specification Action was entered.
- Per procedure, the standby buses were energized from a dedicated Lee Combustion Turbine (offsite power).

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Planned:

Note: The planned action was completed prior to returning KHU-2 back to operation after the second Emergency Lockout on September 4, 2013. In addition this planned action was also completed on KHU-1 as an extent of condition.

- Replace 86E2X relay and move relay to a cabinet not susceptible to vibration.

In addition, an extent of condition was conducted on the similar relays located in the same cabinet on both KHU units. The results of this review concluded that KHU operation would not be adversely affected.

SAFETY ANALYSIS

Duke Energy used a risk-informed approach to determine the risk significance associated with operating ONS Unit 1, 2, and 3 without entering TS 3.8.1 due to the problem with the lockout relay. A risk evaluation was conducted using the ONS Probabilistic Risk Analysis (PRA) model with the following assumptions to reflect the conditions associated with the TS violations. First, the Keowee unit aligned to the underground path was assumed to fail to start. Second, maintenance unavailability values for all plant systems were set to their average values. Third, tornado-related initiating events were removed to reflect that the TS violation occurred during a season of historically low tornado activity and that actual weather conditions were favorable during the period.

Based on a total duration of approximately 16 days in the non-compliant condition, the analysis results estimated an incremental conditional core damage probably (ICCDP) of approximately 3E-7 for each Oconee unit. This represents a very low impact on plant risk.

ADDITIONAL INFORMATION

The cause of this condition was discovered as a result of precautionary measures put in-place due to a similar event that occurred a few days before on August 21, 2013. On August 21, 2013, KHU-2 experienced an emergency lock out due to the emergency lockout relay being activated. In this event troubleshooting was performed and KHU-2 was returned on operable status on August 24, 2013. In addition, the corrective action program data for the last five years was also reviewed. Other than this previous event documented on August 21, 2013, no other similar events were identified.

Energy Industry Identification System (EIIIS) codes are identified in the text as [XX]. This event is considered INPO Consolidated Events System (ICES) Reportable. No component was selected because no specific equipment failures occurred. There were no releases of radioactive materials, radiation exposures or personnel injuries associated with this event.