



KELVIN HENDERSON  
Catawba Nuclear Station  
Site Vice President

Duke Energy Carolinas, LLC  
4800 Concord Rd.  
York, SC 29745

803-701-4251

December 20, 2012

U.S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D.C. 20555

Subject: Duke Energy Carolinas, LLC (Duke Energy)  
Catawba Nuclear Station, Units 1 and 2  
Docket Nos. 50-413 and 50-414  
Licensee Event Report 414/2012-001

Pursuant to 10 CFR 50.73(a)(1) and (d), attached is Licensee Event Report 414/2012-001, Revision 0 entitled, "Diesel Generator (DG) 2B Was Unknowingly Inoperable from 09/28/12 to 10/23/12 Due to Failed Tachometer Relay Power Supply".

This report is being submitted in accordance with 10 CFR 50.73(a)(2)(i)(B), 10 CFR 50.73(a)(2)(ii)(B), and 10 CFR 50.73(a)(2)(v)(A)-(D).

There are no regulatory commitments contained in this letter or its attachment.

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

If there are any questions on this report, please contact L.J. Rudy at (803) 701-3084.

Sincerely,

Kelvin Henderson

LJR/s

Attachment

Document Control Desk  
Page 2  
December 20, 2012

xc (with attachment):

V.M. McCree  
Regional Administrator  
U.S. Nuclear Regulatory Commission - Region II  
Marquis One Tower  
245 Peachtree Center Ave., NE Suite 1200  
Atlanta, GA 30303-1257

J.H. Thompson (addressee only)  
NRC Project Manager  
U.S. Nuclear Regulatory Commission  
Mail Stop 8-G9A  
11555 Rockville Pike  
Rockville, MD 20852-2738

G.A. Hutto, III  
NRC Senior Resident Inspector  
Catawba Nuclear Station

INPO Records Center  
700 Galleria Place  
Atlanta, GA 30339-5957

Document Control Desk  
Page 3  
December 20, 2012

bxc (electronic copy)(with attachment):

INPO  
L.E. Harmon  
C.S. Kamilaris  
R.D. Hart  
G.Y. Helton  
S.F. Hatley (ICES)  
M.K. Green  
R.T. Simril, Jr.  
B.C. Carroll  
M.C. Nolan  
W.J. Pritchett, Jr.  
T.L. Patterson  
K.R. Alter  
H.D. Brewer  
R.E. Abbott, Jr.  
B.J. Horsley  
S.L. Western

ICES  
Lee.Harmon@NRC.gov

bxc (hard copy)(with attachment):

D.B. Alexander  
L.S. Nichols  
L.J. Rudy  
ELL  
Master File CN-801.01  
LER File  
RGC Date File  
NCMPA-1  
NCEMC  
PMPA

**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 Catawba Nuclear Station, Unit 2	2. DOCKET NUMBER 05000414	3. PAGE 1 OF 6
---	------------------------------	-------------------

4. TITLE  
 Diesel Generator (DG) 2B Was Unknowingly Inoperable from 09/28/12 to 10/23/12 Due to Failed Tachometer Relay Power Supply

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	23	2012	2012	001	0	12	20	2012	Catawba Unit 1	05000413
									FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE 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"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 20.2203(a)(3)(iii)	<input type="checkbox"/> 20.2203(a)(3)(iv)	<input type="checkbox"/> 20.2203(a)(3)(v)	<input type="checkbox"/> 20.2203(a)(3)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(B)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(C)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)	<input type="checkbox"/> 50.73(a)(2)(x)	<input type="checkbox"/> 73.71(a)(4)	<input type="checkbox"/> 73.71(a)(5)
10. POWER LEVEL 100%	Specify in Abstract below or in NRC Form 366A																														

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME L.J. Rudy, Regulatory Compliance	TELEPHONE NUMBER (Include Area Code) (803) 701-3084
---	--

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
E	EK	2EQCGEB	P292	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: _____
---	---

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

On 10/23/12, during planned maintenance on DG 2B, it was determined that the DG had been retroactively inoperable since its last monthly test which was conducted on 09/28/12. During this test, it was noted that an engine tachometer malfunction had occurred; however, at the time, the malfunction was not recognized as adversely affecting DG operability. On 10/23/12, the cause of the DG inoperability was determined to be a failed tachometer relay power supply. It was determined that the failed power supply would have prevented the DG's output breaker from automatically closing in response to a Design Basis Accident (DBA).

The root cause of this event was determined to be an inadequate technical evaluation following the tachometer malfunction on 09/28/12. Planned corrective actions in response to this event include: 1) Revising the DG operating and test procedures to ensure that the tachometer relay is operating properly; 2) Revising the DG Design Basis Document to describe the relationship between the tachometer related components; and 3) Developing a visible and/or an audible indication for verification of the status of the tachometer relay power supply.

There was minimal safety significance to this event. A Probabilistic Risk Analysis (PRA) evaluation was performed and the results of this evaluation indicated that the Incremental Conditional Core Damage Probability (ICCDP) and the Incremental Conditional Large Early Release Probability (ICLERP) associated with this event were less than 1.0E-06 and less than 1.0E-07, respectively. Therefore, this event did not affect the health and safety of the public.

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

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Catawba Nuclear Station, Unit 2	05000414	YEAR	SEQUENTIAL NUMBER	REV NO	2 of 6
		2012	- 001	0	

**NARRATIVE**

**BACKGROUND**

This event is being reported under the following criteria:

10 CFR 50.73(a)(2)(i)(B), any operation or condition which was prohibited by the plant's Technical Specifications (TS).

10 CFR 50.73(a)(2)(ii), any event or condition that resulted in: (B) The nuclear power plant being in an unanalyzed condition that significantly degraded plant safety.

10 CFR 50.73(a)(2)(v), any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to: (A) Shut down the reactor and maintain it in a safe shutdown condition; (B) Remove residual heat; (C) Control the release of radioactive material; or (D) Mitigate the consequences of an accident.

Catawba Nuclear Station Units 1 and 2 are Westinghouse four-loop Pressurized Water Reactors (PWRs) [EIS: RCT].

The onsite standby power source for each 4160 volt Engineered Safety Features (ESF) bus [EIS: BU] at Catawba is a dedicated Diesel Generator (DG) [EIS: EK]. For each unit, DGs A and B are dedicated to ESF buses ETA and ETB, respectively. A DG starts automatically on a Safety Injection (SI) signal (i.e., low pressurizer pressure or high containment pressure) or on an ESF bus degraded voltage or undervoltage signal. After the DG has started, it will automatically tie to its respective bus after offsite power is tripped as a consequence of ESF bus undervoltage or degraded voltage, independent of or coincident with an SI signal. With no SI signal, there is a ten-minute delay between the degraded voltage signal and the DG start signal. The DGs will also start and operate in the standby mode without tying to the ESF bus on an SI signal alone. Following the trip of offsite power, a sequencer [EIS: EK] strips loads from the ESF bus. When the DG is tied to the ESF bus, loads are then sequentially connected to its respective ESF bus by the automatic load sequencer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading the DG by automatic load application.

In the event of a loss of preferred power, the ESF electrical loads are automatically connected to the DGs in sufficient time to provide for safe reactor shutdown and to mitigate the consequences of a Design Basis Accident (DBA) such as a Loss of Coolant Accident (LOCA).

Certain required unit loads are returned to service in a predetermined sequence in order to prevent overloading the DG in the process. Approximately one minute after the initiating signal is received, all loads needed to recover the unit or to maintain it in a safe condition are returned to service.

Each DG must therefore be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on detection of bus undervoltage. This must be accomplished within 11 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the ESF buses.

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

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO.	
Catawba Nuclear Station, Unit 2	05000414	2012	- 001	0	3 of 6

**NARRATIVE**

TS 3.8.1, "AC Sources - Operating" delineates requirements for the DGs. Two DGs are required to be operable in Modes 1, 2, 3, and 4. With one DG inoperable (Condition B), the inoperable DG must be restored to operable status within 72 hours (Required Action B.4). With two DGs inoperable (Condition E), one DG must be restored to operable status within 2 hours (Required Action E.1). If this is not accomplished (Condition G), the affected unit must be placed in Mode 3 within 6 hours (Required Action G.1) and in Mode 5 within 36 hours (Required Action G.2). In addition, because the DGs provide emergency AC power to certain TS required systems that are shared between the Catawba units, the cascading effects on these shared systems' TS and their supported systems' TS must also be considered when one or more DGs become inoperable.

On 09/28/12 when the tachometer relay power supply failure occurred and on 10/23/12 when this event was determined to be reportable, both units were in Mode 1 at 100% power. Except as indicated in the Safety Analysis section of this report, no other structures, systems, or components were out of service that had any effect on the event.

**EVENT DESCRIPTION**

Date/Time            Event  
(Some event times are approximate.)

- 08/29/12/0022-0225    DG 2B was started and run successfully during its monthly test. (Time indicates DG 2B start/shutdown.)
- 09/28/12/1919-2128    During the monthly test of DG 2B, an engine tachometer malfunction was noted. A work request/work order was generated to inspect and repair the tachometer during the next DG 2B work window on 10/23/12. At the time, the tachometer malfunction was determined to not affect DG 2B operability. (Time indicates DG 2B start/shutdown.)
- 09/29/12/1930            Problem Investigation Process (PIP) report C-12-08248 was written to document the issue.
- 10/02/12/----            PIP C-12-08248 was updated to document the fact that the tachometer had read 0 rpm during the test.
- 10/23/12/0418            DG 2B was declared inoperable for planned maintenance.
- 1645            During the planned maintenance on DG 2B, Engineering determined that the lack of rpm indication was caused by a failed tachometer relay power supply. A 24 hour clock per TS 3.8.1 Required Action B.3.1 was started for performing a common mode failure evaluation for DGs 2A, 1A, and 1B.
- 1731            PIP C-12-08991 was written to document the common mode failure evaluation. At the time, it was believed that the failed tachometer relay power supply would have prevented DG 2B from automatically starting in response to a DBA.

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

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO	
Catawba Nuclear Station, Unit 2	05000414	2012	- 001	0	4 of 6

**NARRATIVE**

---- It was subsequently determined that the failed tachometer relay power supply would not have prevented DG 2B from automatically starting; however, it would have prevented the DG's output breaker from automatically closing in response to a DBA.

10/24/12/0322 The common mode failure evaluation was completed. No common mode failure mechanisms were identified.

1534-1850 The failed tachometer relay power supply was replaced. Required testing was completed on DG 2B. (Time indicates DG 2B start/shutdown.)

10/24/12/2221 DG 2B was declared operable.

**CAUSAL FACTORS**

The root cause of this event was determined to be an inadequate technical evaluation following the DG 2B engine tachometer malfunction on 09/28/12. This was attributed to an inadequate understanding of the relationship between the tachometer dial, the tachometer relay, the tachometer relay power supply, and the interlocks associated with the DG's output breaker (breaker 2ETB-18). Engineering DG subject matter experts and Operations licensed personnel did not recognize that the anomalous engine speed indication affected the automatic operation of the DG's output breaker. The impact of the tachometer malfunction on the ability of the DG's output breaker to automatically close was not recognized until 10/23/12 when the tachometer relay power supply failure was being investigated.

**CORRECTIVE ACTIONS**

**Immediate:**

1. Station Management initiated a Unit Threat Team in response to the failed tachometer relay power supply. A maintenance plan was developed to replace the failed component.
2. Based on available information during the event, Catawba performed a common mode failure evaluation as required by TS.

**Subsequent:**

1. Following replacement of the tachometer relay power supply, DG 2B was tested and returned to operable status. All applicable TS Conditions were subsequently exited.
2. The failed tachometer relay power supply was sent to the vendor for failure analysis.

**Planned:**

1. Operations will add steps to the DG operating and test procedures to verify the DG running status light is lit and Operator Aid Computer (OAC) on and speed indications are present when the DG is started. This will ensure that the tachometer relay is energized.

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

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Catawba Nuclear Station, Unit 2	05000414	YEAR	SEQUENTIAL NUMBER	REV NO	5 of 6
		2012	- 001	0	

**NARRATIVE**

2. Engineering will revise the DG Design Basis Document (DBD) to describe the relationship between the tachometer, the tachometer relay, the tachometer relay power supply, and the interlocks associated with the DG's output breaker.
3. Engineering will develop a visible and/or an audible indication for verification of the status of the tachometer relay power supply (local indicating light or priority OAC alarm).

There are no NRC commitments contained in this LER.

**SAFETY ANALYSIS**

During the time period that DG 2B was inoperable from 09/28/12 to 10/24/12, there was one instance where DG 2A was also inoperable for planned maintenance. This instance began on 10/09/12 at 0400 hours and ended on 10/10/12 at 0546 hours. Therefore, during this interval, both Unit 2 DGs were simultaneously inoperable. In addition, various Unit 2 and Unit 2/Unit 1 shared Train A TS required equipment was inoperable during the time period that DG 2B was inoperable. This resulted in various Unit 2 and Unit 1 supported system TS requirements being violated during this time period.

Duke Energy used a risk-informed approach to determine the risk significance associated with the vulnerability of the DG 2B output breaker failing to automatically close.

The Incremental Conditional Core Damage Probability (ICCDP) and the Incremental Conditional Large Early Release Probability (ICLERP) associated with this event were evaluated by considering the following:

- The duration of the period of vulnerability of the DG 2B output breaker
- The use of the average maintenance Probabilistic Risk Analysis (PRA) model to represent plant configuration, equipment unavailability, and maintenance activities during this violation

The ICCDP associated with this event was determined to be less than 1.0E-06 with the use of the model of record. The ICLERP associated with this event was determined to be less than 1.0E-07.

During the time period that DG 2B was inoperable, the Standby Shutdown System (SSS) remained functional. The SSS is designed to mitigate the consequences of certain postulated fire, security, and station blackout incidents by providing the capability to maintain Mode 3 conditions and by controlling and monitoring vital systems from locations external to the main control room.

Therefore, this event is considered to have a small risk impact and is of no significance with respect to the health and safety of the public.

**ADDITIONAL INFORMATION**

Within the previous three years, there have been two other LER events involving DG inoperability due to a failed subcomponent. These events were documented in LER 413/2010-004, "Technical Specification Violation Involving Notice of Enforcement Discretion Due to Failure of Diesel Generator Engine-Mounted Thermocouple", and LER 413/2011-001, "Technical Specification Violation Involving Notice of Enforcement

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

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Catawba Nuclear Station, Unit 2	05000414	YEAR	SEQUENTIAL NUMBER	REV NO	6 of 6
		2012	- 001	0	

**NARRATIVE**

Discretion Due to Failure of Diesel Generator Mechanical Governor". However, those events did not involve the same root cause as this event. This event is therefore considered to be non-recurring.

Energy Industry Identification System (EIIIS) codes are identified in the text as [EIIIS: XX]. This event is considered reportable to the INPO Consolidated Event System (ICES) (formerly called the Equipment Performance and Information Exchange (EPIX) program).

This event is considered to constitute a Safety System Functional Failure during the time period when both DGs were simultaneously inoperable. There was no release of radioactive material, radiation overexposure, or personnel injury associated with the event described in this LER.