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May 29, 2012

U.S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555

Subject: Duke Energy Carolinas, LLC (Duke Energy)  
Oconee Nuclear Station (ONS) Units 1 and 2  
Docket Nos.: 50-269, 50-270  
Licensee Event Report 269/2011-06, Revision 1  
Problem Investigation Program No: O-10-08094,  
O-11-6700 and O-12-2655

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), please find attached Licensee Event Report (LER) 269/2011-06, Revision 1, regarding the inoperability of the Unit 1 and Unit 2 pressurizers due to insufficient emergency-powered heater capacity that exceeded the three (3) days allowed by Technical Specification (TS) 3.4.9 Condition 'C.' Consequently, this report is being submitted in accordance with 10 CFR 50.73(a)(2)(i)(B), as an operation prohibited by the ONS Technical Specifications. This report has been revised to add the root cause and corrective actions for this adverse condition which were not available for Revision 0 of the report. In addition, the safety analysis has been updated since risk assessment results are no longer preliminary as they were in Revision 0.

There are no regulatory commitments contained in this report.

Any questions regarding the content of this report should be directed to Kent Alter, ONS Regulatory Compliance Group Manager, at 864-873-3255.

Sincerely,

*TP GILLESPIE*  
T. Preston Gillespie, Jr.  
Vice President  
Oconee Nuclear Station

Attachment

*JEa  
NPK*

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May 29, 2012  
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cc: Mr. Victor McCree  
Administrator, Region II  
U.S. Nuclear Regulatory Commission  
Marquis One Tower  
245 Peachtree Center Ave., NE, Suite 1200  
Atlanta, GA 30303-1257

Mr. John P. Boska, Project Manager  
U. S. Nuclear Regulatory Commission  
Office of Nuclear Reactor Regulation  
11555 Rockville Pike  
Rockville, MD 20852

Mr. Andrew Sabisch  
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)

**1. FACILITY NAME**

Oconee Nuclear Station (ONS), Unit 1

**2. DOCKET NUMBER**

05000- 269

**3. PAGE**

1 OF 5

**4. TITLE**

Pressurizer Heater Capacity Non-Compliant with Technical Specification 3.4.9

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
08	11	2011	2011	06	01	5	29	2012	ONS Unit 2	05000 270
									FACILITY NAME	DOCKET NUMBER

**9. OPERATING MODE**

Unit 1 - 1  
Unit 2 - 1

**10. POWER LEVEL**

Unit 1 - 100  
Unit 2 - 100

**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)                          |
| <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)  | <input type="checkbox"/> Specify in Abstract below or in NRC Form 366A |

**12. LICENSEE CONTACT FOR THIS LER**

**FACILITY NAME**

Kent Alter, ONS Regulatory Compliance Group

**TELEPHONE NUMBER (Include Area Code)**

864-873-3255

**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
B	AB	52	G080	Y					

**14. SUPPLEMENTAL REPORT EXPECTED**

YES (If yes, complete EXPECTED SUBMISSION DATE)  NO

**15. EXPECTED SUBMISSION**

MONTH DAY YEAR

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

An extent of condition review associated with the temperature induced trip of Standby Shutdown Facility pressurizer (PZR) heater panel board breakers inside containment determined that during a loss-of-offsite-power (LOOP) event, the power supply breakers in each unit's east penetration room, supplying PZR Heater Groups 'A' and 'E' through 'K', may trip on thermal overload due to elevated ambient temperature in the penetration room.

Technical Specification (TS) 3.4.9 requires a minimum of 400 kilowatts of PZR heaters be Operable and capable of being powered from an emergency power supply. However, the above described review determined that the total available emergency-powered heater capacity did not comply with TS 3.4.9 for Unit 1 and Unit 2. This condition has existed since March 2005, which exceeds TS 3.4.9 Action Condition 'C' 72-hour completion time. Thus, this condition is reported in accordance with 10 CFR 50.73(a)(2)(i)(B), as an operation prohibited by TSs.

An alternate configuration of breakers and in-service heaters was developed and implemented that restored compliance with TS 3.4.9. Actions to prevent recurrence include planned changes to documents that will strengthen design evaluation processes.

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17. NARRATIVE

BACKGROUND:

The pressurizer [PZR] heaters [HTR] replace heat lost during normal steady state operation, raise the pressure to normal operating pressure during Reactor Coolant System (RCS)[AC] heatup from the cooled-down condition, and restore system pressure following transients. The heaters are arranged into four banks, which are then divided into 11 groups. Pressurizer heater input may decrease over the course of an operating cycle due to tripped breakers [52] or burnt elements. A minimum required heater capacity, capable of being powered from an emergency power source (EPS), is necessary to offset these losses and ensure that RCS pressure can be maintained.

Technical Specification (TS) 3.4.9, "Reactor Coolant System – Pressurizer," Limiting Condition for Operation (LCO) requires a minimum of 400 kilowatts (kW) of pressurizer heaters be Operable and capable of being powered from an EPS. If pressurizer heater capacity capable of being powered from an EPS is < 400 kW, TS 3.4.9 Action Condition 'C' specifies a 72-hour completion time (CT) to restore the pressurizer heater capacity to a minimum of 400 kW. If the CT cannot be met, TS 3.4.9 Action Condition 'D' requires the unit be shutdown to Mode 4 conditions with RCS temperature <= 325 degrees Fahrenheit (F) within 30 hours.

This event is reportable per 10 CFR 50.73(a)(2)(i)(B) as an operation prohibited by Technical Specifications. At the time of this event, both Unit 1 and Unit 2 were operating in Mode 1 at approximately 100% power. No systems, structures, or components were out of service that contributed to this event.

EVENT DESCRIPTION:

On July 8, 2011, during an extent of condition review associated with the temperature response trip of Standby Shutdown Facility (SSF)[NB] pressurizer heater panel board [BD] breakers inside containment, an unanalyzed condition was discovered relative to the load current rating of power supply breakers that supply Pressurizer Heater Groups 'A' and 'E' through 'K.' The power supply breakers to these pressurizer heater groups are located in motor control centers (MCCs)[MCC] in the East Penetration Room for each unit and are molded case circuit breakers rated for 50 degrees Centigrade (C) ambient conditions. However, during a loss-of-offsite-power (LOOP) event, the maximum ambient temperature in each unit's East Penetration Room could rise to approximately 60 degrees C (i.e., 140 degrees F) due to loss of the 'C' and 'D' chillers [CHU]. Thus, these pressurizer heater power supply breakers, on all three units, may trip on thermal overload due to the elevated ambient temperature in the East Penetration Rooms. Duke Energy Carolinas, LLC (Duke Energy) determined that the loss of pressurizer heater groups during a LOOP event results in violation of the TS LCO 3.4.9.b minimum 400 kW heater capacity requirement for Unit 1 (233 kW) and Unit 2 (341 kW). Unit 3 (439 kW) adheres to the minimum pressurizer heater capacity requirement during a LOOP event.

A reportability review of this adverse condition, completed on August 11, 2011, determined that in the past three years, there is evidence that the condition existed for longer than the TS 3.4.9 Action Condition 'C' 72-hour CT. Further review determined that the adverse condition existed since implementation of License Amendments 343, 345, and 344 for Unit 1, Unit 2, and Unit 3, respectively. These license amendments changed the TS LCO 3.4.9.b minimum pressurizer heater capacity value from "126" to "400" kW. The Nuclear Regulatory Commission (NRC) approved these license amendments in March 2005. Consequently, this adverse condition is reportable as a condition prohibited by Technical Specifications pursuant to 10 CFR 50.73(a)(2)(i)(B).

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CAUSAL FACTORS:

The pressurizer heater power supply breakers were not evaluated for their new purpose (i.e., to function during elevated ambient temperature in a LOOP event) when ONS converted to Improved Technical Specifications (ITS) in 1998. ITS added a new TS LCO requirement (3.4.9.b) for a minimum pressurizer heater capacity (126 kW) powered from an EPS. In addition, ONS failed to adequately evaluate the effects of increasing the 126 kW minimum pressurizer heater capacity requirement to 400 kW in a 2003 license amendment request. Thus, the root cause for this adverse condition is incomplete process guidance that does not clearly require re-analysis of re-purposed equipment to ensure that it will function under any new conditions.

CORRECTIVE ACTIONS:

As a measure to restore compliance with TS LCO 3.4.9.b, on July 11, 2011, selected pressurizer heater breakers were opened in Unit 1 and Unit 2 Reactor Buildings that reduced the total heater load on each associated supply breaker in the MCCs located in the East Penetration Rooms such that the resulting load current ensures the MCC supply breakers do not trip on thermal overload during a LOOP event. The alternate configuration of heater breakers and in-service pressurizer heaters restored pressurizer heater capacity to Operable status on Unit 1 and Unit 2.

Corrective actions to address the root cause and prevent recurrence are as follows:

Planned corrective actions:

- Revise Engineering Directive Manual (EDM) 601 (Engineering Change Manual) to:
  - require a design evaluation when a proposed change alters the design function or the design requirements of a system, structure, or component (SSC) without any physical change;
  - specify what design functions are and that design changes are required when an SSC's design basis is modified; and
  - add a new question to the Equipment Qualification screening appendix which will ask if a change involves design/licensing basis changes that imply that an existing SSC has a new or altered function or design requirement.
- Revise the Nuclear System Directive (NSD) 301 (Engineering Change Program) to:
  - require a design evaluation when a proposed change alters the design function or the design requirements of an SSC without any physical change; and
  - specify what design functions are and that design changes are required when an SSC's design basis is modified.

Completed corrective actions:

- Revised NSD-227 on communicating with the NRC adding a new responsibility for the Technical Lead (Originator) to ensure that no material statements change the design basis of the plant without processing an Engineering Change.
- Revised the Compliance Functional Area Manual Section 3.17 (Licensing Resource Manual), adding an example to the roles and responsibilities of the Technical Lead. The example describes that even if existing plant equipment is capable of performing new design functions, an engineering change is

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required when design functions are changed to ensure that configuration control is maintained with regards to documenting the new licensing/design basis requirements.

- Engineering issued a design deliverable document identifying the revised pressurizer heater breaker configuration.

EXTENT OF CONDITION:

The MCCs that feed the power supply breakers in question are limited to MCC 'XH', 'XI', 'XJ' and 'XK' on each unit. These MCCs feed the pressurizer heater loads and some motor starters [MSTR] for Feedwater [SJ] and Containment Purge [VA] motor-operated valves [ISV]. Only the pressurizer heaters are required to function for a LOOP event. A walk down of the East Penetration Rooms on each unit was performed to identify any additional breakers beyond those in MCCs 'XH', 'XI', 'XJ' and 'XK.' In the Unit 1 East Penetration Room, there are two panel boards with molded case circuit breakers, which are lighting panel board '1L10' and power panel board '1KF.' In the Unit 2 East Penetration Room, there are two panel boards with molded case circuit breakers, which are lighting panel board '2L10' and power panel board '2KD.' In the Unit 3 East Penetration Room, there are two panel boards with molded case circuit breakers, which are lighting panel board '3L10' and power panel board '3KF.' In all of these panel boards, there are no loads on the panel boards that are required during or after a LOOP event.

In addition to the power supply breakers, the cabling [CBL5] and electrical penetrations [PEN] associated with the pressurizer heaters are also exposed to the elevated temperature in the East Penetration Room. An evaluation of the cables and electrical penetrations determined that both are fully capable of providing their intended functions during a LOOP event.

There are other components/equipment (valves [V], instrumentation, electrical penetrations, etc.) located in the East Penetration Rooms that are required to function during or after a loss of coolant accident (LOCA)/LOOP event. As such, this equipment is scoped into the Environmental Qualification (EQ) program and is required to meet the maximum temperature specified for the East Penetration Rooms for accident conditions. Per the ONS EQ Criteria Manual, the maximum temperature for the East Penetration Rooms is 145 degrees F for accident conditions which bounds the 60 degrees C (140 degrees F) temperature specific for a LOOP event.

SAFETY ANALYSIS:

The Applicable Safety Analyses section of the Bases for TS 3.4.9 states that the requirement for emergency power supplies is based on NUREG-0737. The intent is to allow maintaining the reactor coolant in a sub-cooled condition with natural circulation at hot, high pressure conditions for an undefined, but extended, time period after a LOOP. While a LOOP event is an initial condition or coincident event assumed in many accident analyses, maintaining hot, high pressure conditions over an extended time period is not evaluated as part of Updated Final Safety Analysis Report accident analyses. Although the pressurizer heaters are not specifically used in accident analyses, the need to maintain sub-cooling in the long term while in a LOOP condition is the reason for providing a TS LCO.

Duke Energy used a qualitative approach to determine the risk significance associated with having insufficient pressurizer heater capacity on Unit 1. A failure of the pressurizer heater groups after a Loss of Offsite Power (LOOP) due to elevated temperature in the East Penetration Room (EPR) may result in insufficient

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pressurizer heater capacity on Unit 1 but is not a significant safety concern in regards to core damage. For a LOOP event, emergency power would be available from Keowee to power the pressurizer heater groups in question until the supply breakers in the EPR trip open due to elevated temperature. Analysis demonstrates that it would take over 5 days to reach a temperature that would trip the supply breakers and it is probable that offsite power would be recovered before the pressurizer heaters are lost. If for some reason offsite power is not recovered before the supply breakers in the EPR trip open, and RCS subcooling was subsequently lost, emergency power is expected to be available through the Keowee underground line. Emergency power provides the capability to implement feed and bleed core cooling as directed in the Emergency Procedures.

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

It should be noted that there is no safety significance associated with Unit 2 since it was determined that ambient heat losses for Unit 2 did not exceed the capacity of the heaters during the TS violation period.

ADDITIONAL INFORMATION:

To determine if a recurring or similar event exists, a search of the site corrective action program database was conducted for a time period covering five years prior to the date of this event. Based on this search, no other events that are similar to the subject event were discovered. Therefore it is concluded that this event is not recurring.

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

There were no releases of radioactive materials, radiation exposures or personnel injuries associated with this event.

This event is considered reportable under the Equipment Performance and Information Exchange (EPIX) program as noted in Failure Report No. 1168.