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SOUTHERN COMPANY

August 29, 2014

Docket No.: 50-321

NL-14-1302

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

Edwin I. Hatch Nuclear Plant
Licensee Event Report 1-2014-005-00
Degraded Diesel Room Fan Flow Switch and Incorrect Thermal Overload Setting Result in Condition Prohibited by Technical Specifications

Ladies and Gentlemen:

In accordance with the requirements of 10 CFR 50.73(a)(2)(i)(B) Southern Nuclear Operating Company hereby submits the enclosed Licensee Event Report.

This letter contains no NRC commitments. If you have any questions, please contact Greg Johnson at (912) 537-5874.

Respectfully submitted,

D. R. Vineyard
Vice President – Hatch

DRV/jcm

Enclosures: LER 1-2014-005-00
cc: Southern Nuclear Operating Company
Mr. S. E. Kuczynski, Chairman, President & CEO
Mr. D. G. Bost, Executive Vice President & Chief Nuclear Officer
Mr. D. R. Vineyard, Vice President – Hatch
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U. S. Nuclear Regulatory Commission
Mr. V. M. McCree, Regional Administrator
Mr. R. E. Martin, NRR Senior Project Manager - Hatch
Mr. D. H. Hardage, Senior Resident Inspector – Hatch

X NRC FORM 366 (02-2014) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 01/31/2017

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 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.

# LICENSEE EVENT REPORT (LER)

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**4. TITLE**

Degraded Diesel Room Fan Flow Switch and Incorrect Thermal Overload Setting Result in Condition Prohibited by Technical Specifications

| 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 | 03 | 2014 | 2014 | - 005 - | 00 | 8 | 29 | 2014 | FACILITY NAME | DOCKET NUMBER |

| 9. OPERATING MODE | 11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)* | | | |
|---|---|---|---|---|
| 1 | ☐ 20.2201(b) | ☐ 20.2203(a)(3)(i) | ☐ 50.73(a)(2)(i)(C) | ☐ 50.73(a)(2)(vii) |
| | ☐ 20.2201(d) | ☐ 20.2203(a)(3)(ii) | ☐ 50.73(a)(2)(ii)(A) | ☐ 50.73(a)(2)(viii)(A) |
| | ☐ 20.2203(a)(1) | ☐ 20.2203(a)(4) | ☐ 50.73(a)(2)(ii)(B) | ☐ 50.73(a)(2)(viii)(B) |
| | ☐ 20.2203(a)(2)(i) | ☐ 50.36(c)(1)(i)(A) | ☐ 50.73(a)(2)(iii) | ☐ 50.73(a)(2)(ix)(A) |
| **10. POWER LEVEL** | ☐ 20.2203(a)(2)(ii) | ☐ 50.36(c)(1)(ii)(A) | ☐ 50.73(a)(2)(iv)(A) | ☐ 50.73(a)(2)(x) |
| | ☐ 20.2203(a)(2)(iii) | ☐ 50.36(c)(2) | ☐ 50.73(a)(2)(v)(A) | ☐ 73.71(a)(4) |
| 100 | ☐ 20.2203(a)(2)(iv) | ☐ 50.46(a)(3)(ii) | ☐ 50.73(a)(2)(v)(B) | ☐ 73.71(a)(5) |
| | ☐ 20.2203(a)(2)(v) | ☐ 50.73(a)(2)(i)(A) | ☐ 50.73(a)(2)(v)(C) | ☐ OTHER |
| | ☐ 20.2203(a)(2)(vi) | ☒ 50.73(a)(2)(i)(B) | ☐ 50.73(a)(2)(v)(D) | Specify in Abstract below or in NRC Form 366A |

**12. LICENSEE CONTACT FOR THIS LER**

| LICENSEE CONTACT | TELEPHONE NUMBER *(Include Area Code)* |
|---|---|
| Edwin I. Hatch / Steven Tipps – Licensing Supervisor | 912-537-5880 |

**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 | ED | 94 | C770 | Y | B | ED | PDS | D282 | Y |

| 14. SUPPLEMENTAL REPORT EXPECTED | 15. EXPECTED SUBMISSION DATE | MONTH | DAY | YEAR |
|---|---|---|---|---|
| ☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO | | | | |


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

On 07/03/2014 at 0856 EDT, the 1A Emergency Diesel Generator (EDG) Room Exhaust Fans 'A' and 'B' were found in a tripped condition during the 1A EDG monthly surveillance. The 1A EDG was declared inoperable and the required actions were taken in accordance with the Technical Specifications. The thermal overloads for the motor control center (MCC) cubicles feeding the fans had tripped due to incorrectly sized thermal overload heaters. New thermal overload heaters were installed June 6, 2014 in order to correct a previous modification that installed incorrectly sized thermal overload heaters. The thermal overload heaters that were installed in June 2014 were found to have been sized too conservatively, leading to trip settings that were close to the normal operating current for the fans. The differential pressure flow switch for the 'A' fan was also found to be malfunctioning, causing both the 'A' and 'B' fans to cycle on and off on a frequent basis. This frequent starting of the exhaust fans resulted in the thermal overloads being exposed to many motor start cycles, thereby increasing the operating current of the motor. The incorrectly sized thermal overload heaters in conjunction with the frequent fan starts led to the thermal overloads having trip settings that were too close to the normal operating current for the fans, resulting in premature trips of the thermal overloads. The flow switch and thermal overload heaters were replaced and the fans were returned to service restoring the 1A EDG to operable status.

The thermal overloads for the pan assemblies associated with the 1A EDG ventilation exhaust fans and the 'A' flow switch were replaced and the fans were returned to service.

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NARRATIVE

PLANT AND SYSTEM IDENTIFICATION

General Electric – Boiling Water Reactor
Energy Industry Identification System codes appear in the text as (EIIS Code XX).

DESCRIPTION OF EVENT

On 07/03/2014 at 0856 EDT, with Unit 1 operating at approximately 100 percent rated thermal power, the 1A emergency diesel generator (EDG) (EIIS Code DG) room exhaust fans (EIIS Code FAN) were found inoperable while performing the 1A EDG monthly surveillance due to tripped thermal overload relays (EIIS Code 94) in the motor control center (MCC) cubicles. The EDG room exhaust fans are two 100% capacity ventilators responsible for exhausting heat from the EDG room during EDG operation. The 'A' fan is the primary exhaust fan and the 'B' fan is the standby exhaust fan for the 1A EDG room. The 1A EDG was declared inoperable and the required actions were taken in accordance with the Technical Specifications. New thermal overload heaters were installed June 6, 2014 as part of a corrective action for incorrectly sized thermal overload heaters that were previously installed in April 2014. These new thermal overload heaters were found to also be incorrectly sized, leading to thermal overloads with trip settings that were too close to the normal operating current for the fans. The incorrectly sized thermal overload heaters resulted in premature trips of the thermal overloads.

On 07/04/2014, Maintenance replaced the overload heaters in the 1A EDG ventilation fan pan assemblies and proper operation of each of the ventilation fans was then verified in accordance with Operations procedures.

On 07/07/2014, while analyzing data from the 'A' and 'B' exhaust fans, the primary exhaust fan differential pressure flow switch (EIIS Code PDS) was found to be malfunctioning, leading to frequent cycling between the primary and alternate 1A EDG room exhaust fans and increasing operating current. The fan control switches were aligned to make the 'B' fan the primary fan and the 'A' fan the standby fan to temporarily alleviate the problems encountered with the flow switch.

On 07/08/2014, Maintenance replaced and calibrated the 'A' differential pressure flow switch and returned the 'A' exhaust fan as the primary fan and the 'B' was aligned as the standby fan.

Additional safety-related and non-safety-related components whose thermal overloads were resized in early June 2014 as part of the same corrective action were walked down. The affected safety-related components were confirmed to be operating or in a standby configuration and their respective thermal overloads were not tripped. Some non-safety-related components whose respective thermal overloads had been resized were found in a tripped condition. Reasonable assurance was maintained that their support function did not adversely impact the operability of structures, systems, or components required by the Technical Specification in their "as found" condition. Several previously replaced overload elements were determined to still be incorrectly sized for these components, based on the added guidance to use actual measured motor currents. Corrective actions were also taken to resize the affected components to increase their margin of operation and their reliability.

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CAUSE OF EVENT

The affected EDG room exhaust fans were found in a tripped condition due to the combination of incorrectly sized thermal overloads, increased demand on the motor due to the cycling of the 'A' flow switch, and operation of the motor with the running amps near their respective trip set points.

When the overload heaters were replaced in June 2014, the thermal overload heater size was based on the nameplate rating of the affected component. It was later learned that some motors were drawing current in excess of their nameplate rating. It is common for safety related fan motors to have a full load operating current value higher than their nameplate rating due to the motor housing being larger than normal. Using the nameplate amperage value instead of the full load operating current value led to the operation of the exhaust fans with running amps too close to their respective trip set points.

In conjunction with the undersized thermal overload heaters, the 'A' differential pressure flow switch for the primary 1A EDG room exhaust fan was malfunctioning and causing the primary and standby 1A EDG room exhaust fans to continuously cycle on and off. The abnormal cycling of the flow switch subjected the EDG room exhaust fans and its associated thermal overload heater to frequent in-rush currents. The frequent cycles prevented the overload heater from properly cooling, increasing its susceptibility to spurious trips. The failure of the flow switch is due to a lack of preventative maintenance on the component as the flow switch was no longer correctly calibrated. The malfunction of the 'A' flow switch did not impact the functionality of the 'A' exhaust fan once the correctly sized overload heater was installed. However, it did cause the standby 'B' exhaust fan to start due to a false low flow signal.

REPORTABILITY ANALYSIS AND SAFETY ASSESSMENT

The event is reportable per 10 CFR 50.73(a)(2)(i)(B) due to the 1A EDG room exhaust fans being in a tripped condition, resulting in the Limiting Condition for Operation (LCO) for the EDG existing for a time longer than permitted by Technical Specifications (TS). It was assessed that the fans had been in a tripped condition following the installation of incorrectly sized thermal overload heaters.

The event was discovered during routine surveillance testing of the 1A EDG with its associated emergency bus being supplied power from off-site sources through the unit's auxiliary transformers. As a result this condition did not result in any plant transient or loss of safety function for the components served by this emergency bus. The design of the plant's electrical power systems and compliance with the unit's Technical Specifications provide assurance of independent and redundant sources of power to support required safety systems during all anticipated operational occurrences and accident conditions. The needed electrical power to safely shut down the Unit 1 reactor, maintain it in a shutdown condition, and mitigate the consequences of a postulated accident remained operable since the 1B and 1C EDGs remained operable. Based on this information, this event had very low safety significance.

CORRECTIVE ACTIONS

The thermal overload heaters for the pan assemblies associated with the 1A EDG ventilation fans were replaced and the fans were returned to service. The thermal overload sizing for a 3 pole block using 2 heaters to provide adequate thermal overload protection of Class 1E systems was also verified for all components whose pan assembly was replaced in June 2014. A new pressure differential switch for the 'A' exhaust fan was also installed and calibrated.

The maintenance procedure used to provide instruction for sizing the thermal overload heaters was revised to require the use of the running amps for the affected load as input in determining the correct size thermal

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overload hater for that load. Surveillance procedures will also be revised such that, prior to a diesel generator test or run, a visual verification will be performed verifying each fan will run.

ADDITIONAL INFORMATION

Other Systems Affected: No systems other than those mentioned in this report were affected by this report.

Failed Components Information:

Master Parts List Number: 1R24S025
(1X41-C002A/B)
Manufacturer: Cutler Hammer
Model Number: AA23AB
Type: Thermal Type A Overload Relay

Manufacturer Code: C770
EIIS System Code: ED
Reportable to EPIX: Y
Root Cause Code: 94

Master Parts List Number: 1X41-N045A
Manufacturer: Dwyer Instruments
Model Number: 1637-25
Type: Differential Pressure Switch

Manufacturer Code: D282
EIIS System Code: ED
Reportable to EPIX: Y
Root Cause Code: PDS

Commitment Information: This report does not create any new licensing commitments.

Previous Similar Events:

LER 2-2014-001, identified incorrectly sized thermal overloads that led to a condition prohibited by Tech Specs. The 1A and the 2A EDG were inoperable for a period of time greater than the 72 hour RAS due to the tripped condition of the 1A and 2A EDG Room Exhaust Fans. The thermal overloads for the pan assemblies feeding the fans had tripped due to incorrectly sized thermal overload heaters. New thermal overloads had previously been installed in conjunction with a modification that installed new pan assemblies. The new thermal overload heaters were found to be incorrectly sized, leading to thermal overloads with trip settings close to the normal operating current of the fans. These overly conservative trip settings led to the premature tips of the thermal overloads. The trip of the 'A' and 'B' fans was not prevented by the previous corrective actions due to the fact that the cause determination and resulting corrective actions from that event had not had been identified and fully implemented.