UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW, SUITE 23T85
ATLANTA, GEORGIA 30303-8931

June 28, 2007

Southern Nuclear Operating Company, Inc.
ATTN: Mr. T. E. Tynan
Vice President - Vogtle
7821 River Road
Waynesboro, GA 30830

SUBJECT: VOGTLE ELECTRIC GENERATING PLANT - NRC SUPPLEMENTAL INSPECTION REPORT 05000425/2007012

Dear Mr. Tynan:

On May 18, 2007, the U. S. Nuclear Regulatory Commission (NRC) completed a supplemental inspection at your Vogtle Electric Generating Plant (VEGP) Unit 2. The enclosed integrated inspection report documents the inspection findings, which were discussed on May 18, 2007, with you and other members of your staff.

As required by the NRC Reactor Oversight Process Action Matrix, this supplemental inspection was performed in accordance with Inspection Procedure 95001. The purpose of the inspection was to examine the causes for and actions taken related to the Performance Indicator (PI) for Cooling Water Systems crossing the threshold from Green (within expected range) to White (low to moderate risk significance) for Unit 2 in the third quarter of 2006. This PI crossed the White threshold primarily due to functional failures of the Nuclear Service Cooling Water system pump control circuits. This supplemental inspection was conducted to provide assurance that the root causes and contributing causes of the events resulting in the White PI are understood, to independently assess the extent of condition, and to provide assurance that the corrective actions were sufficient to address the root and contributing causes and to prevent recurrence. The inspection consisted of selected examination of representative records, interviews with personnel and field walkdowns.

Based on the results of this supplemental inspection, the inspector determined that, in general, the problem identification, root cause and corrective actions were adequate. However, several deficiencies were identified by the inspector relating to the thoroughness and quality of the root cause corrective actions. Additionally, one self-revealing finding of very low safety significance was identified which involved a violation of NRC requirements. However, because the violation was of very low safety significance and has been entered into your corrective action program, the NRC is treating the issue as a Non-Cited Violation (NCV) in accordance with Section VI.A.1 of the NRC's Enforcement Policy. If you contest this NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the United States Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at Vogtle.

In accordance with the Code of Federal Regulations 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at *http://www.nrc.gov/reading-rm/adams.html* (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Scott M. Shaeffer, Chief
Reactor Projects Branch 2
Division of Reactor Projects

Docket Nos.: 50-425
License Nos.: NPF-81

Enclosure: Inspection Report 05000425/2007012
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

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Letter to T. E. Tynan from Scott M. Shaeffer dated June 28, 2007

SUBJECT: VOGTLE ELECTRIC GENERATING PLANT - NRC SUPPLEMENTAL INSPECTION REPORT 05000425/2007012

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

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|---|---|
| Docket No: | 50-425 |
| License No: | NPF-81 |
| Report No: | 05000425/2007012 |
| Licensee: | Southern Nuclear Operating Company, Inc. |
| Facility: | Vogtle Electric Generating Station, Unit 2 |
| Location: | Waynesboro, GA 30830 |
| Dates: | May 14 - 18, 2007 |
| Inspector: | Jim Hickey, Senior Resident Inspector (Hatch) |
| Approved by: | Scott M. Shaeffer, Chief<br>Reactor Projects Branch 2<br>Division of Reactor Projects |

Enclosure

## SUMMARY OF FINDINGS

IR 05000425/2007012; 05/14/2007 - 5/18/2007; Vogtle Electric Generating Plant, Unit 2; Supplemental Inspection Procedure 95001 for a White Cooling Water Systems Performance Indicator

Cornerstone: Mitigating Systems

This inspection was conducted by a Senior Resident Inspector. One self-revealing non-cited violation (NCV) of very low safety significance was identified. The significance of most findings is identified by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process", Revision 4, dated December 2006.

This supplemental inspection was conducted in accordance with Inspection Procedure 95001, "Inspection for One or Two White Inputs in a Strategic Performance Area" in response to a White Performance Indicator (PI) associated with the Nuclear Service Cooling Water (NSCW) system. Based on the results of this inspection, the inspector determined that the cause evaluations were generally adequate. While the inspector identified several weaknesses in the quality of the corrective actions, the overall corrective actions were adequate for the identified root causes.

Given the licensee's acceptable performance in addressing the Cooling Water Systems PI, consistent with the guidance in IMC 0305, "Operating Reactor Assessment Program," the white PI will only be considered in assessing plant performance until it returns to a Green characterization. The implementation and effectiveness of the licensee's corrective actions will be reviewed during future inspections.

A. NRC-Identified and Self-Revealing Findings

- Green. A self-revealing NCV of 10 CFR 50 Appendix B, Criterion V, "Instructions, Procedures, and Drawings", was identified when the licensee did not use adequate design change documents when modifying the Unit 2 Nuclear Service Cooling Water (NSCW) pump control circuitry. An error in the implementation of the modification resulted in the inability of the #3 and #5 NSCW pumps to control the position of the cooling tower spray valve.

  This finding was determined to be more than minor because the wiring error impacted the design control attribute of the mitigating systems cornerstone objective in that the improper design change installation resulted in the unplanned inoperability of Train A of NSCW when the #1 NSCW pump was removed from service. The finding was of very low safety significance because there was no loss of overall loss safety function. The finding was also associated with the complete and accurate work package and design documentation aspect of the human performance cross-cutting area. (Section 02.03.a)

B. Licensee-Identified Violations

None.

## REPORT DETAILS

01 INSPECTION SCOPE

The purpose of this supplemental inspection was to assess the licensee's evaluation of a White PI for Unit 2 in the Mitigating Systems cornerstone. The licensee had three functional failures of the NSCW system that caused the Cooling Water Systems PI to become White during the third quarter of 2006. The inspector reviewed the licensee's actions associated with the three functional failures listed below and conducted interviews with licensee personnel to ensure that the root cause and contributing causes of the events were identified and understood and that appropriate corrective actions to prevent recurrence were initiated.

1. The wiring configuration for the #1 NSCW pump control circuit disabled the ability of the #3 and #5 NSCW pumps to control the NSCW cooling tower spray valve when maintenance was performed on the #1 NSCW pump control circuit. This failure was documented in CR 2004003091.

2. An implementation error that occurred during corrective action to address event #1, resulted in permanently disabling the ability for the #3 and #5 NSCW pumps to control the NSCW cooling tower spray valve. As a result, Train A of NSCW was rendered inoperable when maintenance was performed on the #1 NSCW pump. This failure was documented in CR 2005109973.

3. Time delay relay setpoint drift caused the #1 NSCW pump breaker to trip approximately one minute after starting. A coordinated scheme of time delay relays control the pumps and valves in the NCSW system. The purpose of the coordinated scheme is gradually increase water flows during startup. This failure was documented in CR 2006109869.

02 EVALUATION OF INSPECTION REQUIREMENTS

02.01 <u>Problem Identification</u>

a. <u>Determination of who identified the issue and under what conditions</u>

The first failure was identified by the licensee on July 22, 2005. A technician heard a relay unexpectedly change state when an lead was lifted during a calibration procedure on the #1 NSCW pump control circuit.

The second failure was self-revealing on November 1, 2005, when the licensee removed the #1 NSCW pump from service for planned maintenance.

The third failure was identified by the licensee on September 12, 2006. The licensee determined that relay setpoint drift caused the #1 NSCW pump breaker to trip approximately one minute after starting during surveillance testing.

b. Determination of how long the issue existed and prior opportunities for identification

The first failure appears to have existed since initial plant startup. Prior opportunities for identification would have been hearing a relay change state during the periodic relay calibrations.

The second failure occurred on October 4, 2005, during the implementation of Minor Design Change (MDC) 2049505001. Prior opportunities for identification included post modification point to point wiring checks and post modification functional testing performed October 5, 2005.

No conclusive time for beginning of the time delay relay setpoint drift event can be determined. The #1 NSCW pump was successfully started six days prior to September 12, 2006. Prior opportunities for identification would only occur during actual starts of the #1 NSCW pump.

c. Determination of the plant-specific risk consequences (as applicable) and compliance concerns associated with the issues

For the first event, the licensee reviewed the previous three years to determine if, during relay calibrations or replacements, an inadvertent loss of NSCW safety function had occurred. Based on this review, no NSCW components in the opposite train were inoperable. Therefore, no loss of safety function for the NSCW had occurred.

For the second event, the #1 NSCW pump always receives an emergency start signal and would have controlled the tower spray valve, because the #1 NSCW pump was operable during the time the pump control circuit was mis-wired. Therefore, except during planned maintenance of the #1 NSCW pump, the mis-wiring would not have impacted the operability of Train A of the NSCW system.

For the third event, two of the three NSCW pumps were required for an operable train. Therefore, during the six day exposure time, Train A of the NSCW system remained operable.

The inspector determined that the licensees' evaluations to assess risk consequences were adequate and no compliance concerns were identified.

02.02 Root Cause and Extent-of-Condition Evaluation

a. Evaluation of methods used to identify root causes and contributing causes

For the first event, the licensee used a "Paper and Pencil Narrative" . This technique utilized a description of the events which led to the discovery of the issue and a detailed evaluation of how the control circuit was configured.

For the second event, the licensee used an event and causal factor flowchart with barrier analysis. The evaluation included programmatic causes and well as human performance causes.

For the third event, a fault tree analysis was used to determined which component caused the #1 NSCW pump to trip.

Overall, the methods used to determine the causes were adequate.

b. Level of detail of the root cause evaluation.

The inspector determined that the level of detail for each method used was adequate to identify the root cause for each failure as well as any programmatic weakness.

c. Consideration of prior occurrences of the problem and knowledge of prior operating experience.

For each event, the licensee performed reviews for prior similar events and reviewed operating experience databases for similar occurrences outside of the organization. The reviews were adequate for each circumstance.

d. Consideration of potential common causes and extent of condition of the problem.

For the first event, the licensee's review determined this issue affected both trains of NSCW on both Unit 1 and Unit 2.

For the second event, the licensee's review determined the post modification testing was inadequate for B Train of NSCW. A comprehensive test was performed which demonstrated the modification was correctly implemented on the B Train.

For the third event, the licensee's review determined there were multiple examples of relay setpoint drift in the industry with a variety of causes.

For each event, the inspector determined that the consideration of common causes and extent of condition was adequate.

02.03 Corrective Actions

a. Appropriateness of corrective actions

For the first event, the licensee developed an MDC to prevent Train A of NSCW from being inoperable during relay calibration of the #1 NSCW pump. A weakness was identified in corrective action AI 2006200467. The corrective action required a procedure change to ensure all Agastat Relay calibration and replacements are reviewed by the system engineer. The actual procedure change only required system engineer review of relay "changeouts". The licensee has entered the issue into the corrective action program as CR2007105748.

For the second event, a weakness was identified in corrective action AI 2005204491 and 2005204492 in that the corrective action required briefing maintenance technicians on the event. However, no documentation of who was briefed and no criteria for how many individuals in the target population must be briefed to consider the corrective action complete was available for inspection. The licensee has entered the issue into the corrective action program as CR2007105758.

For the third event, the licensee developed an MDC to change the time delay setpoint such that worst case expected drift would not cause this event to repeat. Additionally, a corrective action to require relay replacement when as-found timing values exceed a specific threshold has been implemented.

Findings

.1 Wiring Error Results in the Inoperability of Train A of the Nuclear Service Water System

Introduction: A Green self-revealing NCV of 10 CFR 50 Appendix B, Criterion V, "Instructions, Procedures, and Drawings", for failure to properly utilize adequate design change documents when modifying the Unit 2 NSCW pump control circuitry. As a result of the inadequate implementation documents and human performance errors, Train A of the NSCW system was unintentionally made inoperable.

Description: On November 1, 2005, the #1 NSCW pump was removed from service for planned maintenance. When operators attempted to place Train A of the NSCW system in bypass operation to support cooling tower maintenance, the NSCW system would not realign. Train A of the NSCW system was declared inoperable.

The licensee determined that on October 4, 2005, during the implementation of a MDC on the #1 NSCW pump control circuit, the technician incorrectly performed the specified wiring change. The wiring error resulted in disabling the ability of the #3 and #5 NSCW pumps to control the NSCW cooling tower spray valve. The licensee performed a root cause and determined inadequate implementation instructions and inadequate post modification testing contributed to the wiring error and/or the failure to discover the wiring error prior to declaring the #1 NSCW pump operable. Specifically, procedure 20429-C, Plant Equipment Component Configuration Control did not require point to point wiring checks or "redlining" for wiring changes made in accordance with MDCs. In addition, the post modification functional test did not demonstrate that the #3 and #5 NSCW pumps would control the NSCW cooling tower spray valve.

Analysis: The inspector determined the inadequate implementation instructions and post-modification functional test which resulted in Train A of the NSCW system becoming inoperable, constituted a performance deficiency. This finding is greater than minor because it is associated with design control attributes and affected the objective of the Mitigating Systems cornerstone in that the improper installation of the design change resulted in the inoperability of Train A of NSCW when the #1 NSCW pump was removed from service. This finding was determined to be a finding of very low safety significance because no loss of safety function occurred. The finding was also

associated with the complete and accurate work package and design documentation aspect of the human performance cross-cutting area.

Enforcement: 10 CFR 50 Appendix B, Criterion V, states, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Contrary to the above, inadequate procedures (MDC implementation guidance and post modification functional testing guidance) resulted in Train A of the NSCW system to become inoperable on November 1, 2005. Because this failure to comply with 10 CFR 50 Appendix B, Criterion V, is of very low safety significance and has been entered into the licensee's corrective action program, as CR2005109973, this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000425/2007012-01, Incorrect Pump Control Circuit Wiring results in Inoperability of Train A of the Nuclear Service Water System.

b. Prioritization of corrective actions

The inspector determined that the corrective actions for the three function failure events were adequately prioritized.

c. Establishment of a schedule for implementing and completing the corrective actions

The inspector verified that the licensee's corrective action program identified assigned individuals, completion dates, and reference numbers to ensure that individual corrective actions would be completed in accordance with their priority.

d. Establishment of quantitative or qualitative measures of success for determining the effectiveness of the corrective actions to prevent recurrence

The inspector determined that effectiveness reviews had been performed or scheduled for the corrective actions for each failure.

03 MANAGEMENT MEETINGS

Exit Meeting Summary

The inspector presented the results of the supplemental inspection to Mr. T. Tynan and other members of licensee management and staff on May 18, 2007. The inspector confirmed that no proprietary information was provided or examined during the inspection.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## SUPPLEMENTAL INFORMATION

### KEY POINTS OF CONTACT

Licensee Personnel
J. Cash, Operations Support
J. Churchwell, Senior Engineer
P. Conley, Programs Supervisor
W. Copeland, Performance Analysis Supervisor
J. Davis, ISI Engineer
R. Dedrickson, Plant Manager
J. Godbee, Modifications Engineer
J. Robinson, Operations Manager
S. Swanson, Engineering Support Manager
T. Tynan, Vice-President - Vogtle
J. Williams, Site Support Manager

NRC personnel:
Gerald McCoy, Senior Resident Inspector

### ITEMS OPENED AND CLOSED

Opened and Closed

| | | |
|---|---|---|
| 05000425/2007-012-01 | NCV | Incorrect Pump Control Circuit Wiring results in Inoperability of Train A of the Nuclear Service Water System |

### LIST OF DOCUMENTS REVIEWED

Procedures
20429-C Plant Equipment Component Configuration Control
NMP-DP-001 Operational Risk Awareness
00205-C Operational Risk Awareness
13150-2 Nuclear Service Cooling Water System
18021-C Loss of Nuclear Service Cooling Water System
29402-C Work Request Processing
00054-C Rules for Performing Procedures
NMP-DM-002 Minor Design Change Packages

Condition Reports (CR)
2006109869, 2004003091, 2006100338, 2005109973, 2006111543, 2006112454

Work Orders
2049505003, 2049505002, 1061846402, 1061846403, 1061846404, 1061846405, 1061846406, 1061846407, 2061850303, 2061850304, 2061850305, 2061850306, 2061850307, 20534220012053425501

Drawings
2X3D-*D_K05U Elementary Diagram Nuclear Service Cooing Water System 2HV-1668A
2X3D-BD-K04E Elementary Diagram Nuclear Service Cooling Water System 2-1202-P4-005-MO1
2X4DB133-1 & 2 P & I Diagram Nuclear Service Cooling Water System No. 1202

Action Items
2005204493, 2006204927, 2006204928, 2006204930, 2006204739, 2006204741, 2004202244, 2004202245, 2004202785, 2006200476, 2005204527, 20052044494, 2005204495, 2005204543, 2006201012, 2006201013, 2006201014, 2006201015, 2007200133, 2007200657, 2006200441, 2005204491, 2005204492, 2006200443, 2006200442, 2005204545, 2006101134, 2006205049, 2006205050, 2006205051, 2006205052, 2006205053, 2006205054, 2006205055, 2007104507, 2006205056, 2006205057

Miscellaneous
Design Bases DC-1202 Nuclear Service Cooling Water System
Final Safety Analysis Report Sections 3, 7, 9
Technical Specification Section 3.7 Nuclear Service Cooling Water System
MDC 04-V2M050 (2049505001) Unit 2 NSCW Agastat relay Wiring Change
Minor Design Change Request 1061846401 NSCW Relay Timing Change
Minor Design Change Request 2061850301 NSCW Relay Timing Change
Design Change Package 2054393501 Unit 2 Train “B” NSCW Cooling Tower Restoration
System Description Nuclear Service Cooling Water System