



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
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ATLANTA, GEORGIA 30303-8931

April 18, 2010

Mr. Mike Annacone  
Vice President  
Carolina Power and Light Company  
Brunswick Steam Electric Plant  
P.O. Box 10429  
Southport, NC 28461

**SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT, NRC INSPECTION REPORT  
05000325/2010006 AND 05000324/2010006**

Dear Mr. Annacone:

On March 19, 2010, the U.S. Nuclear Regulatory Commission (NRC) completed a supplemental inspection pursuant to Inspection Procedure 95001, "Inspection for One or Two White Inputs in a Strategic Performance Area," at your Brunswick Steam Electric Plant, Unit 1. The enclosed inspection report documents the inspection results, which were discussed at the exit meeting on March 19, 2010, with you and other members of your staff.

As required by the NRC Reactor Oversight Process Action Matrix, this supplemental inspection was performed because a finding of low to moderate safety significance (White) was identified in the 4th quarter of 2008. This issue was documented in NRC Inspection Report 05000324, 325/2009009. The NRC was informed on January 4, 2010, of your staff's readiness for this inspection.

The objectives of this supplemental inspection were to provide assurance that: (1) the root causes and the contributing causes for the risk-significant issues were understood; (2) the extent of condition and extent of cause of the issues were identified; and (3) corrective actions were or will be sufficient to address and preclude repetition of the root and contributing causes. The inspection consisted of examination of activities conducted under your license as they related to safety, compliance with the Commission's rules and regulations, and the conditions of your operating license.

The inspector determined that, in general, the problem identification, root cause analysis, and corrective actions were adequate. As stated in your staff's evaluation, the identified primary root causes of the issue were (1) a latent organizational weakness existed where control wire circuitry maintained the same wire segment number on both sides of the Alternate Safe Shutdown key switches and (2) a lack of sufficient rigor by the Responsible Engineer and Design Verifier in performance of their responsibilities during activities associated with modification of control logic circuitry. As a result, operators would not have been able to operate any of the four emergency diesel generators locally during certain fire scenarios. Based on the results of this inspection, no findings of significance were identified.

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 enclosure, 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/***

Rebecca L. Nease, Chief  
Engineering Branch 2

Docket Nos.: 50-325, 50-324  
License Nos.: DRP-71, DRP-62

Enclosure: NRC Inspection Report 050003252010006 and 050003242010006

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Letter to Michael J. Annacone from Rebecca L. Nease dated April 18, 2010

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT, NRC INSPECTION REPORT  
05000325/2010006 AND 05000324/2010006

Distribution w/encl:

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket No.: 05000325, 05000324

License No.: DPR-71 and DRP-62

Report No.: 05000325/2010006 and 05000324/2010006

Licensee: Progress Energy - Carolina Power and Light (CP&L)

Facility: Brunswick Steam Electric Plant, Units 1 & 2

Location: 8470 River Road SE  
Southport, NC 28461

Dates: March 15 – 19, 2010

Inspectors: N. Staples, Reactor Inspector

Approved by: Rebecca L. Nease, Chief  
Engineering Branch 2  
Division of Reactor Safety

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## SUMMARY OF FINDINGS

Inspection Report (IR) 05000325, 324/2010006; 03/15/2010 - 03/19/2010; Brunswick Steam Electric Plant, Unit 1; Supplemental Inspection for a White Finding

This inspection was conducted by a Reactor Inspector from Region II's Division of Reactor Safety. No findings of significance were identified. 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.

### Cornerstone: Mitigating Systems

This supplemental inspection was performed in accordance with Inspection Procedure (IP) 95001, "Inspection for One or Two White Inputs in a Strategic Performance Area," to assess the licensee's evaluation associated with a White inspection finding involving a failure to correctly designate termination points for linking control power to the emergency diesel generator lockout relay reset circuitry during the implementation of a design change. The NRC staff previously characterized this issue as having low to moderate safety significance (White) as documented in NRC IR 05000325, 324/2009009.

Based on the results of this inspection, the inspector determined that the root cause evaluation was generally adequate and corrective actions were comprehensive and properly prioritized. The licensee's root cause evaluation for all emergency diesel generators not resetting locally following a lock-out with the Alternate Safe Shutdown key switch (ASSD) in the LOCAL position was due to the lockout control relay being wired downstream of the ASSD key switch such that it lost control power when the key switch was placed in LOCAL. The first primary root cause was identified as a latent organizational weakness where the emergency diesel generator control wire circuitry maintained the same wire segment number on both sides of the ASSD key switch. The second primary root cause was identified as a lack of sufficient rigor by the Responsible Engineer and Design Verifier in performance of their responsibilities during activities associated with modification of control logic circuitry. Corrective actions for this event included revising applicable plant drawings with cautionary notes; developing formal requirements that wire segment numbers be changed wherever a circuit is divided into non-continuous segments; developing requirements to verify that all control logic circuits be verified from source to destination; providing additional guidance in procedures for testing daisy-chained circuits and detailing expectations for determining the sphere of influence of control circuit modifications; and additional training for all employees involved in the plant modification process. The licensee also implemented corrective actions to complete its review of all components containing ASSD key switches to ensure that wire numbers are unique on either side of the key switches, perform a complete as-built verification between field wiring and applicable drawings associated with control panels for all four Emergency Diesel Generators, and provide training for supervision to use human performance tools for high safety-significant modifications.

Given the licensee's comprehensive evaluation addressing the loss of Emergency AC Power event, the White finding will only be considered in assessing plant performance for a total of four quarters in accordance with the guidance in Inspection Manual Chapter 0305, "Operating Reactor Assessment Program." The implementation and effectiveness of the licensee's corrective actions will be reviewed during future inspections.

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## REPORT DETAILS

### 4. OTHER ACTIVITIES

#### 4OA4 Supplemental Inspections

##### .1 Inspection Scope

- a. This supplemental inspection was performed in accordance with IP 95001 to assess the licensee's evaluation of a White finding which affected the Mitigating Systems cornerstone objective in the Reactor Safety strategic performance area. The White finding involved a failure to correctly designate termination points for linking control power to the emergency diesel generator (EDG) lockout relay reset circuitry during the implementation of Engineering Change (EC) 66274 for four EDGs. On August 18, 2008, EDG #4 failed to start during surveillance test OPT-12.14.L, "DG4 Local Control Operability Test." The failure resulted from an inability to locally reset a lockout condition while the alternative safe shutdown (ASSD) key switch was in the LOCAL position. Troubleshooting activities performed in response to this failure determined that this inability was due to the reset relay (LOCR) being configured (wired) such that it was isolated from control power when the ASSD key switch was operated. This configuration was the unintended consequence of EC 66274 under which it was installed in June 2007. The finding was characterized as having low to moderate safety significance (White) based on the results of a phase 3 risk analysis as discussed in NRC inspection report (IR) 05000325, 324/2009009.

The licensee informed the NRC on January 4, 2010, that they were ready for this supplemental inspection. The inspection objectives were to:

- provide assurance that the root and contributing causes of risk-significant issues were understood;
- provide assurance that the extent of condition and extent of cause of risk-significant issues were identified;
- provide assurance that the licensee's corrective actions for risk-significant issues were or will be sufficient to address the root and contributing causes and to preclude repetition.

The inspector reviewed the Significant Adverse Condition Investigation Report (SACIR) associated with nuclear condition report (NCR) 00292232. This root cause evaluation was performed to identify weaknesses that existed in various organizations, which allowed for a risk-significant finding, and to determine the organizational attributes that resulted in the White finding. The inspector reviewed corrective actions that were either taken or planned to address the identified root and contributing causes. The inspector also held discussions with licensee personnel to ensure that the root and contributing causes and the contribution of safety culture components were understood and corrective actions taken or planned were appropriate to address the causes and preclude repetition.

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## .2 Evaluation of the Inspection Requirements

### 2.01 Problem Identification

- a. IP 95001 requires that the inspection staff determine that the evaluation documented who identified the issue (i.e., licensee identified, self-revealing, or NRC-identified) and under what conditions the issue was identified.

On August 18, 2008, EDG #4 failed to start from the local control panel during the performance of surveillance OPT-12.14.L, "Diesel Generator #4 Local Control Operability Test." The failure resulted from an inability to reset a lockout condition while the ASSD key switch was in the LOCAL position. The EDG was only inoperable during the time frame the ASSD key switch was aligned to the LOCAL position. The biennial (i.e., every 24 months) surveillance is a non-technical specification (TS) related test to demonstrate that control and indication for EDG #4, and the EDG #4 to Bus E4 output breaker, can be isolated from the control room and be controlled from the respective local control station, as required by the ASSD analysis.

Troubleshooting activities performed in response to this failure determined that this inability was due to the LOCR being configured (wired) such that it was isolated from the control power when the ASSD key switch was operated. This resulted in the wiring for LOCR being installed such that the EDG could not be operated locally as required by the safe shutdown analysis report. This same wiring configuration was verified to exist in the other three EDGs. Upon discovery, the licensee revised EC 66274 to correct the identified design flaw and each EDG was re-wired and tested. The local control function was restored to all EDGs on August 21, 2008. The inspector determined that the event evaluations were sufficiently detailed to identify whom and under what conditions the issue was identified.

- b. IP 95001 requires that the inspection staff determine that the evaluation documented how long the issue existed and prior opportunities for identification.

The licensee determined in the SACIR that the LOCR was improperly installed in a June 2007, plant modification. The ASSD key switch was wired such that power was lost when the associated ASSD key switch was in the LOCAL position, preventing EDG #4 from being started locally. Immediately following the failed surveillance, on August 19, 2008, the licensee concluded that the plant modification was installed on all four EDGs. This condition impacted the ability of EDG Nos. 2, 3, and 4 to perform their intended ASSD function. Although the error was also introduced in the EDG #1 circuitry, local control of EDG #1 is not credited in the ASSD analysis. This condition did not affect the TS operability of the EDGs and they remained fully capable of performing their intended safety system functions. The licensee did not note prior opportunities to identify the drawing discrepancy that has existed since the original modification (#77-369) was completed on April 09, 1979. Unique numbering was not provided on both the hot-side wiring and the neutral-side wiring which were split into two distinctly different circuits as it transitioned across the ASSD key switch. When the ASSD key switches were added in 1979, the wire number designations on the design drawing were not changed from one

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side of the key switch to the other. The inspector determined that the evaluation for the event documented how long the issue existed and prior opportunities for identification.

- c. IP 95001 requires that the inspection staff determine that the evaluation documented the plant-specific risk consequences, as applicable, and compliance concerns associated with the issues.

The NRC determined this issue was a White finding, as documented in NRC IR 05000325, 324/2009009. The SACIR did not qualitatively assess the increased risk associated with condition, but the appeal submitted by the licensee (BSEP 09-0107, Appeal of the Final Significance Determination of White Finding and Reply to a Notice of Violation, EA-09-121) contended that the total CDF associated with the event would be  $1.05E-07$  for both Units 1 and 2. At the regulatory conference held at the Region II office on July 28, 2009, the licensee presented an assessment of the significance of the finding. However, the licensee did not contest the characterization of the NOV as a violation of 10 CFR 50, Appendix B, Criterion III. The NRC concluded that the inspection finding was appropriately characterized as having low to moderate safety significance (White) based on the results of a phase 3 risk analysis as discussed in the NRC inspection report.

Upon identification of this condition, NCR 00292232 was initiated and EC 66274 was revised to correct the responsible design flaw (Revisions 5 and 6). Work activities were undertaken to implement the necessary configuration changes on all four EDGs. These modifications consisted of re-wiring the LOCR relays such that they do not lose power when the ASSD key switches are operated. Full compliance was restored when the local control function was restored on all EDGs on August 21, 2008. The licensee implemented several corrective actions to address risk including a corrective action to prevent recurrence (CAPR) to ensure that when designing high risk modifications, engineering management rigorously apply human performance tools when personnel under their cognizance are producing products associated with high safety significant plant components. The licensee further modified the risk assessment matrix in procedure EGR-NGGC-011, "Engineering Product Quality," to provide a more detailed risk evaluation, and to provide additional clarification for establishing appropriate mitigation strategies based on risk level determination. The licensee also modified procedure EGR-NGGC-005, "Engineering Change," to ensure that the designated approval authority level is commensurate with the EC Safety class/risk impact. The inspector determined that the evaluations for the event adequately documented the risk consequences and compliance concerns.

- d. Findings

No findings of significance were identified.

## 2.02 Root Cause, Extent-of-Condition, and Extent-of-Cause Evaluation

- a. IP 95001 requires that the inspection staff determine that the problem was evaluated using a systematic methodology to identify the root and contributing causes.

The inspector verified that the licensee used the following methods for SACIR, NCR 00292232 as outlined in CAP-NGGC-0205, "Significant Adverse Condition Investigations and Adverse Condition Investigations-Increased Rigor":

- Events and Casual Factors Charting: a combination of several techniques used to develop a graphical flow chart of the entire event, depicting cause and effect relationship.
- Why Staircase Diagram: a technique used to analyze the relationship between cause and effect by asking the question "why?"
- Barrier Analysis: a technique used to analyze the administrative or physical controls that were used to prevent the event.
- Cause and Effect Analysis: a technique used to maintain the evaluation on track.
- Human Performance Analysis is a technique used to determine if organizational weaknesses are the root cause of the problem.
- Culpability Decision Tree: a technique used to analyze each human error that directly affected the outcome of the event to determine if individuals are at fault.

The licensee identified two root causes: (1) a latent organizational weakness where the Emergency diesel generator control wire circuitry maintained the same wire segment number on both sides of the ASSD key switch; (2) a lack of sufficient rigor by the Responsible Engineer and Design Verifier in performance of their responsibilities during activities associated with modification of control logic circuitry.

The Human Performance Analysis was used with the Event and Causal Factors Charting, the Barrier Analysis, and the Culpability Decision Tree to identify failed or flawed barriers pertaining to the Electrical/Instrumentation and Control (I&C) design group. The licensee identified three contributing causes: (1) a failure to adhere to a standard and accepted wire segment numbering convention which requires a change in a wire segment's number designation whenever the circuit path is divided by a distinct device; (2) supervision involvement was not adequate to ensure sufficient rigor or thorough use of Human Performance Tools for control logic modifications involving high safety significant components; (3) the post modification testing was inadequate;

The licensee also determined that the following contributed to the event:

- Self checking was not effectively used to verify that the selected termination point was electrically continuous to the required power source;
- Neither the Design Verifier nor the Design Review Board performed an adequate independent verification;
- Procedure EGR-NGGC-0011, "Engineering Product Quality," did not adequately stress the degree of rigor based on safety significance;
- Procedure EGR-NGGC-0155, "Specifying Electrical/I&C Modification Related Test," did not stress adequate testing of the design functions;
- Job briefings did not address risk mitigation;
- Engineering processes did not rigorously apply human performance tools for specifying the acceptance test for the EC;
- Engineering modifications were distinguished by perceived complexity instead of modifications being evaluated on risk significance;

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- Management did not adequately consider the safety significance of this design activity and did not identify any risk mitigation strategies for the modification implementation.

The inspector determined that the systematic methods used were adequate for determining root and contributing causes.

- b. IP 95001 requires that the inspection staff determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

The licensee's SACIR consisted of reviewing all drawings that had the ASSD key switch installed. The licensee also reviewed all EDGs with the LOCR that was improperly installed in a June 2007, plant modification. The ASSD key switches for all four EDGs were incorrectly wired such that power was lost when the associated ASSD key switch was in the LOCAL position, preventing the EDG from being started locally. The licensee's SACIR also focused on all design modifications involving control logic changes for safety-related and critical components installed two years prior to the event or which were scheduled for completion during the time of discovery. In addition, the licensee's SACIR involved reviewing management processes, the processes for design control, the processes for modification development and implementation, post modification testing development and implementation, and reviewing procedures for clarity and adherence. The licensee determined two root causes and identified three contributing causes for this event. The inspector determined that the level of detail was adequate for the root cause evaluation.

- c. IP 95001 requires that the inspection staff determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

The licensee reviewed internal and external operating experience for prior occurrences involving issues related to: EDG relay replacement modifications, labeling, daisy-chained logic circuits, and post modification testing. The most significant opportunity that the licensee had to identify prior occurrences was related to Oyster Creek in that the inadequate scope of the post modification test failed to completely test all control circuit functions (missed testing all of the ASSD elements also). As a result, the licensee implemented more robust project management processes for design control activities that involve design verification, error prevention, and post modification testing. The inspector determined that the evaluations for the event considered prior occurrences and operating experience.

- d. IP 95001 requires that the inspection staff determine that the root cause evaluation addressed the extent of condition and the extent of cause of the problem.

The licensee's extent of condition review for NCR 00292232 included a complete review of control logic drawings that contained ASSD key switch contacts to identify if duplicate wire numbers on both sides of the ASSD key switch contacts had been introduced by modification #77-369. A total of 170 plant drawings having 1326 ASSD key switch contacts were reviewed. The ASSD key switch contacts population involved

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approximately 360 EC's and consisted of reviewing control wiring drawings and interconnecting wiring drawings to verify if wire numbers were unique on either side of the key switches. Each drawing was reviewed and independently reviewed by a second party for duplicate wires on both sides of the contacts. The licensee's extent of condition review also focused on all design modifications involving control logic changes for safety-related and critical components installed two years prior to the event or which were scheduled for completion during the time of discovery. In addition, for all installed modifications, the licensee verified all surveillance tests had been performed on the associated component. If not yet performed, the licensee expedited scheduling and completion of the uncompleted surveillance tests. For all control logic modifications that were ready for installation the licensee required a full board review to be repeated. In addition to the above reviews, the licensee identified circumstances (other than the ASSD circuits) where unique wire numbers were not utilized on either side of a device which splits the control circuit. This review consisted of sampling 25 safety related component control circuits control wiring drawings. The inspector determined that the evaluations for the event adequately addressed extent of condition and extent of cause. The inspector also determined that the root cause analysis report contained corrective actions which addressed the extent of condition and extent of cause evaluations.

- e. IP 95001 requires that the inspection staff determine that the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0305.

As part of the SACIR, the licensee performed a safety culture assessment. This assessment identified the following areas needing improvement: design control, risk management, and corrective action program. In addition, a culpability decision tree was performed to explore the degree to which this was an individual error versus a cultural or organizational problem. Based upon the corrective actions listed in the safety culture assessment, the inspector determined that the licensee's root cause evaluation, extent of condition, and extent of cause appropriately considered the safety culture components as described in IMC 0305.

- f. Findings

No findings of significance were identified.

## 2.03 Corrective Actions

- a. IP 95001 requires that the inspection staff determine that appropriate corrective actions are specified for each root and contributing cause or that the licensee has an adequate evaluation for why no corrective actions are necessary.

Corrective actions to prevent recurrence included:

- Revised EC 66274 to correct the identified design flaw and each EDG was re-wired and tested
- Revised plant drawings to clearly denote that duplicate wire numbers exist on either side of the EDG ASSD key switches

- Revised EGR-NGGC-0011, "Engineering Product Quality," to require that any additions to control logic circuits be verified to be electrically continuous with their intended source and/or destination; provided additional guidance/cautions, to address other factors affecting rigor and risk management during design and review activities
- Revised EGR-NGGC-0155, "Specifying Electrical/I&C Modification Related Test," to give additional guidance on the concept of unintended consequences as related to control logic circuits; addressed daisy-chained circuits and testing; described how to comprehensively determine the sphere of influence of a control circuit modification such that potential consequences can be adequately addressed
- Resurrected OENP-29, "Wire Number Assignment," to formalize the requirement that wire segment numbers be changed whenever a circuit is divided into non-continuous segments

Additional Corrective Actions:

- Installed signage outside of all EDG control panel doors to flag that duplicate wire numbering exists on either side of the EDG ASSD key switch circuitry;
- Conducted training on this event and all applicable corrective actions for management and engineering staff; established continuing training on EGR-NGGC-0155, "Specifying Electrical/I&C Modification Related Test;"
- Training coordinators conducted lessons learned training for all engineering staff;
- Immediate supervisors provided coaching to responsible individuals concerning the necessity to more rigorously apply human performance tools when personnel under their cognizance are producing products associated with high safety significance;
- Coached Engineering personnel on the need to initiate corrective actions whenever inadequacies are identified in design drawings.

The inspector noted that GE Elementary Diagrams contained inconsistencies with the completion of corrective action assignment #25 for NCR 00292232. The intent of assignment #25 was for a corrective action to place a note on the affected drawings indicating that there are duplicate wire numbers upstream and downstream of the ASSD key switch contacts and to annotate the wire numbers on one side of the ASSD contacts with a reference to the note. However, the inspector determined that in some instances, the wires on both sides of the ASSD key switch contacts were annotated with the reference note and in other instances it was only on one side of the ASSD key switch. The inspector determined that this inconsistency could lead to confusion. NCR 00387531 was created to address this issue. The inspector determined that appropriate root and contributing causes were specified and that corrective actions were appropriate for the identified root and contributing causes for the root cause evaluation.

- b. IP 95001 requires that the inspection staff determine that corrective actions have been prioritized with consideration of risk significance and regulatory compliance.

The inspector determined that the corrective actions for the event were appropriately prioritized.

- c. IP 95001 requires that the inspection staff determine that a schedule has been established for implementing and completing the corrective actions.

The inspector determined that all of the corrective actions listed in the SACIR have been either scheduled or completed and that the schedule was consistent with the licensee's commitments made to resolve the violation.

- d. IP 95001 requires that the inspection staff determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

The licensee's corrective action program only requires effectiveness reviews to be conducted on corrective actions to prevent recurrence and does not provide explicit guidance on how to conduct the reviews. As documented in CAP-NGGC-0205, "Significant Adverse Condition Investigations and Adverse Condition Investigations-Increased Rigor," the licensee established measures for determining the effectiveness of the corrective actions. The licensee criteria for measuring the success of the corrective action plan consists of: 1) determine if corrective action is actionable; 2) determine if corrective action is measureable; 3) determine if corrective action is specific enough to address the adverse condition and inappropriate act and to determine if corrective actions have prevented recurrence and achieved the desired goal. The licensee scheduled the final effectiveness review for completion on October 21, 2010. The licensee determined that this date would allow sufficient time for observing that all corrective actions are implemented. The inspector verified that procedure CAP-NGGC-0205 requires that sufficient time is allowed for monitoring that the corrective actions have prevented recurrence and achieved the desired goal.

The effectiveness of the modifications, implemented through EC 66274 (revisions 5 and 6), to restore compliance was demonstrated during the post-modification testing. The action was initiated to correct the condition, not to prevent recurrence for the causes of the event. The inspector determined that quantitative and qualitative measures of success were developed for determining the effectiveness of the corrective actions to prevent recurrence.

- e. IP 95001 requires that the inspection staff determine that the corrective actions planned or taken adequately address a Notice of Violation (NOV) that was the basis for the supplemental inspection, if applicable.

The NRC issued an NOV to the licensee on September 14, 2009. The licensee provided the NRC a written response to the NOV on October 13, 2009. The licensee's response described: (1) corrective steps which have been taken and the results achieved; (2) corrective steps which will be taken; (3) the date when full compliance will be achieved; and (4) the reasons for the violation. During this inspection, the inspector confirmed that the licensee's SACIR and planned and taken corrective actions addressed the NOV. The licensee restored EDGs to full compliance on August 21, 2008. The licensee had originally planned to correct the drawings and re-label wire segments with unique numbers in all EDG control panels. However, the licensee determined that relabeling wire segments with unique wire numbers inside of the EDG control panels could

introduce additional errors due primarily to the complexity of the wiring located inside of the control panels. As a result, the licensee generated an EC package for the affected drawings which annotated with a note cautioning engineers that duplicate wire numbers exist on both sides of the ASSD key switch contacts and to use extreme caution when changing the design to ensure the intended change is applied to the appropriate side of the ASSD switch.

During this inspection, the inspector reviewed the mis-wired ASSD key switches, drawing changes, and procedure revisions. The inspector determined that corrective actions completed for the mis-wired ASSD key switches located in the control panels for all four EDGs will restore full compliance and that the licensee's planned and completed corrective actions addressed the NOV. Since these corrective actions have not been completed, the implementation and effectiveness of the licensee's corrective actions will be reviewed during future inspections.

f. Findings

No findings of significance were identified.

4OA6 Meetings, Including Exit

The inspector presented the results of the supplemental inspection to you and members of your staff on March 19, 2010. The inspector confirmed that no proprietary information was provided or examined during the inspection.

ATTACHMENT: SUPPLEMENTAL INFORMATION



## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

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S. Gordy, Operations Manager  
D. Hooten, Electrical Engineering, Design Supervisor  
S. Howard, Outage and Scheduling Manager  
J. McPadden, Root Cause Team  
J. Padgett, Design Engineer  
A. Pope, Supv. Licensing/ Regulatory Program  
T. Sherrill, Licensing  
B. Stackhouse, Appendix R Engineer

#### **NRC Personnel**

P. O'Bryan, Brunswick Senior Resident Inspector  
G. Kolcum, Brunswick Resident Inspector

### **LIST OF REPORT ITEMS**

#### **Opened**

None.

#### **Closed**

05000325, 3242009009-01 NOV Inability to Operate the EDGs Locally as Required  
by the Safe Shutdown Analysis Report

#### **Discussed**

None.

## DOCUMENTS REVIEWED

### Procedures

0ENP-29, Wire Number Assignment, Rev. 1  
1SP-07-101, Post Replacement Testing for Selected DG-1 and DG-2 Relays, Rev. 0  
CAP-NGGC-0200, Corrective Action Program, Rev. 32  
CAP-NGGC-0205, Significant Adverse Condition Investigations and Adverse Condition Investigations-Increased Rigor, Rev. 11  
EGR-NGGC-0005, Engineering Change, Rev. 28  
EGR-NGGC-0011, Engineering Product Quality, Rev. 12  
EGR-NGGC-0155, Specifying Electrical/I&C Modification Related Tests, Rev. 5  
ESG0020N, Common ESP Training Guide, Modification Engineer, Rev. 5  
OPT-12.14.L, Diesel Generator 4 Local Control Operability Test, Rev.18

### Drawings

0-FP-20152, Diesel Generator No. 1 Engine Control Panel Connection Diagram, Rev. AE  
0-FP-20156, Diesel Generator No. 3 Engine Control Panel Connection Diagram, Rev. AA  
F-09345, Diesel Generator No. 1 Circuits Control Wiring Diagram, Sh. 1, Rev. 36  
F-09345, Diesel Generator No. 1 Circuits Control Wiring Diagram, Sh. 2, Rev. 43  
F-03119, 4160 Switchgear "E1" – Div. I Compartment "AE7" PT Compartment Interconnection Wiring Diagram, Rev. 30  
F-03121, 4160 Switchgear "E1" – Div. I Compartment "AE8" Diesel Generator No. 1 Aux. & PT Compartment Interconnection Wiring Diagram, Rev. 15  
F-03122, 4160 Switchgear "E1" – Div. I Compartment "AE9" Diesel Generator No. 1 Interconnection Wiring Diagram, Rev. 15  
F-03227, Diesel Generator No. 1 Engine (HA9) Excitation (H46) Control Panel & Auxiliaries Interconnection Wiring Diagram, Sh. 1, Rev. 27

### Miscellaneous Documents

Design Basis Document DBD-39, emergency diesel generator System, Rev. 7  
UFSAR 9.5.1, Fire Protection System, Rev. 18C  
BSEP 96-0136, Response to NRC GL 96-01  
LER 1-2008-006, dated Oct. 14, 2008  
W/O 01053510-10, Acceptance Testing of EC 66274  
W/O 01401989-01, 2-DG4-ENG: OPT-12.14.L, Investigate Failure to Start  
W/O 01402309-01, 2-DG1-LR: Implement Wiring Changes  
W/O 01402309-01, 2-DG1-LR: Implement Wiring Changes  
W/O 01402308-01, 2-DG2-LR: Implement Wiring Changes  
W/O 01402307-01, 2-DG3-LR: Implement Wiring Changes  
W/O 01053523-10, Acceptance Testing of DG3 Logic, Completed 06/08/07  
OPT-12.14.L, Diesel Generator 4 Local Control Operability Test, Rev.16, Completed 08/19/08

**Corrective Actions Reviewed**

NCR 292232, DG4 Failure ASSD Switch Corrective Actions

**Corrective Actions Generated**

NCR 00387531, Electrical Drawing Inconsistencies